THE INFLUENCE OF GENETIC POLYMORPHISMS ON THE RISK OF DEVELOPING ASBESTOSIS

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Background and Aims: Relatively little is known about the genetic factors that may influence the development of asbestosis. The aim of this study was to investigate whether common functional polymorphisms in *GSTT1*, *GSTM1*, *GSTP1, MnSOD*, *ECSOD*, *CAT* and *iNOS* genes represent risk factors for developing asbestosis in workers occupationally exposed to asbestos.
Methods: The study included 262 cases with asbestosis and 265 controls with no asbestos-related disease. Data on cumulative asbestos exposure were available for all subjects. PCR based methods were used to genotype *GSTM1*-null, *GSTT1*-null, *GSTP1* Ile105Val and Ala114Val, *MnSOD* Ala –9Val, *ECSOD* Arg213Gly, *CAT* –262C>T and *iNOS* $(CCTTT)_n$ polymorphisms. Logistic regression analysis was used to assess asbestosis risk.
Results: The OR of asbestosis was 3.21 (95%CI 2.43–4.23) for cumulative asbestos exposure, 1.01 (95%CI 0.71–1.43) for *GSTM1*-null; 0.61 (95%CI 0.40–0.94) for *GSTT1*-null; 1.52 (95%CI 1.08–2.15) for *GSTP1* 105Ile/Ile versus 105Ile/Val and 105Val/Val; 0.97 (95%CI 0.64–1.48) for *GSTP1* 114Ala/Ala versus 114Ala/Val and 114Val/Val; 1.50 (95 %CI 1.01–2.24) for *MnSOD* –9Ala/Ala versus Ala/Val and Val/Val; 1.63 (95%CI 0.62–4.27) for *ECSOD* 213Arg/Gly versus Arg/Arg ; 1.36 (95%C 0.70–2.62) for *CAT* –262TT versus CT and CC; and 1.20 (95%CI 0.85–1.69) for *iNOS* LL versus SL and SS. The associations between *MnSOD* Ala –9Val polymorphism and asbestosis risk and between *iNOS* $(CCTTT)_n$ and asbestosis were modified by *CAT* –262C>T polymorphism (p=0.038; p=0.031, respectively).
Conclusions: Our study showed that *GSTP1* 105Ile/Ile and *MnSOD* –9Ala/Ala genotypes significantly increase the risk of developing asbestosis, whereas a protective effect was found for *GSTT1*-null genotype. A strong interaction was observed between *MnSOD* Ala –9Val and *CAT* –262C>T, as well as between *iNOS* $(CCTTT)_n$ and *CAT* –262>T polymorphisms. The findings suggest that in addition to asbestos exposure, genetic factors may also have an important influence on developing asbestosis.

INDOOR AIR POLLUTION AND MYOCARDIAL INFARCTION RISK AMONG WOMEN

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Background and aims: Indoor air pollution and health outcomes are under investigation in the recent years. Myocardial infarction risk is associated not only with the traditional ischemic heart disease risk factors, but with toxicants in the living and working environment as well. The aim of our study was to investigate the associations between indoor (gas stoves usage, environmental tobacco smoke) air pollution and first myocardial infarction among 34-61 years old women in Kaunas, Lithuania, taking into account the possible effects from age, the traditional ischemic heart disease risk factors (arterial hypertension, increased body mass index, low physical activity), education level, socioeconomic position, household crowding, perceived stress, sleep disorders, family stress, residential high traffic.
Methods: We conducted the population-based case-control study among 35-61 years old women in Kaunas, the second largest city in Lithuania in 1997-2005. Totally 368 myocardial infarction cases and 725 healthy controls were interviewed, using the standardized questionnaire, containing the information on gas stove usage, environmental tobacco smoke and other risk factors. The logistic regression analysis was used for the calculation of the adjusted OR and 95% CI of age, gas stove usage, environmental tobacco smoke, the traditional ischemic heart disease risk factors (arterial hypertension, increased body mass index, low physical activity), education level, socioeconomic position, household crowding, perceived stress, sleep disorders, family stress, residential high traffic for the first myocardial infarction risk among women.
Results: In the fully adjusted model the OR for gas stove usage was 1.20; 95% CI 0.72-1.98, environmental tobacco smoke 1.28; 95% CI 0.71-1.66.
Conclusions: The study has demonstrated that indoor air pollution exposure might have trace associations with the first myocardial infarction risk among women.

TRAFFIC-RELATED AIR POLLUTION AND ACUTE CHANGES IN HEART RATE VARIABILITY AND RESPIRATORY FUNCTION IN URBAN CYCLISTS

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Background and Aims: Few studies have examined the acute health effects of air pollution exposures experienced while cycling in traffic. The aim of this study was to examine the relationship between traffic-related air pollutants and acute changes in heart rate variability, lung function, and exhaled NO in healthy cyclists.
Methods: Forty-two healthy adults (19 to 58 years of age) cycled for 1-hour on high and low-traffic routes as well as indoors. Ultrafine particles (UFPs) (<0.1 um), PM2.5, black carbon, and volatile organic compounds were measured along each cycling route and ambient NO2, SO2, and O3 levels were recorded from a fixed-site monitor. Mixed-effects models were used to examine the relationship between air pollution exposures and changes in baseline health measures adjusted for potential confounders.
Results: An inter-quartile range increase in UFP levels was associated with a 220 ms decrease (95% confidence interval: -386, -53) (approximately 35 %) in high frequency power 4-hours after the start of cycling. Significant inverse relationships were also observed between NO2 and the ratio of low-frequency to high-frequency power and between O3, root mean square of successive differences in adjacent NN intervals (RMSSD), and percentage of adjacent NN intervals differing by more than 50 ms (pNN50). Acute changes in respiratory outcomes were not consistently associated with air pollution levels.
Conclusions: Exposure to traffic-related air pollution may contribute to decreased parasympathetic modulation of the heart in the hours immediately following cycling.

SPATIAL ANALYSIS OF INDOOR AND OUTDOOR POLLUTION AND WORLD ASTHMA MORTALITY RATES USING GEOGRAPHIC INFORMATION SYSTEMS

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Background: Asthma deaths are an increasing public health problem in lower income countries. Exposure to indoor and outdoor pollution has been known to increase the risk of asthma; by analyzing this association globally, the death rate could be decreased.
Aims: Using Geographic Information System (GIS) analysis, the study objective was to perform an ecological investigation to determine if there is a positive correlation between countries' asthma mortality rates (AMR) and two exposures: indoor and outdoor air pollution. A secondary objective was to compare the strength of the associations between AMR and the two exposures.
Methods: Relevant articles and country data on indoor pollution (percentage of solid fuel usage), outdoor pollution (annual particulate matter less than ten microns), and AMR were researched using PubMed and World Health Organization databases. Exposure data was matched to outcome data and layered on their respective countries using a GIS software tool.
Results: AMR, indoor pollution, and outdoor pollution were highest in Africa and Southeast Asia. Linear regression was used to determine that indoor pollution (r^2=.42, df=170, p=.000) and outdoor pollution (r^2=.04, df=173, p=.011) were significantly associated with AMR, though indoor air pollution had a stronger association.
Conclusions: AMR and indoor pollution percentages were strongly associated and prominent in Africa and Southeast Asia. Further epidemiological studies could focus on hypothesized “social justice” confounders such as lack of proper healthcare or lack of resources in these regions.

RISK FACTORS FOR DIRECT HEAT-RELATED HOSPITALIZATIONS DURING THE 2009 ADELAIDE HEATWAVE

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Background and Aims: Adelaide experienced an extreme heatwave in the summer of 2009 with six consecutive days over 40ºC. The health impacts of this extreme event included an almost 14-fold increase in direct heat-related hospital admissions. However, risk factors for these extra health burdens have not been investigated. This study aims to identify risk factors for direct heat-related hospitalization during the 2009 Adelaide heatwave in order to reduce future health burdens related to extreme heat events and to provide scientific evidence for improving the current South Australian heatwave emergency response system.
Methods: A case-crossover study was conducted in metropolitan Adelaide to compare the characteristics of patients from heatwave (28 Jan to 1 Feb) and non-heatwave periods before and after (21-25 Jan and 11-15 Feb). Direct heat-related hospitalization was based on ICD-10 codes (X30, T67, E86) from any of the principal and other diagnosis of each patient. Analyzed factors included age, gender, country of birth, marital status, socio-economic status, and number/type of co-existing morbidities, including cardiovascular disease, renal failure and diabetes. Logistic regression was applied to estimate the Odds Ratios and 95% CIs.
Results: Among the 355 patients being admitted during the heatwave period, half of them were female; 70% were over 60 years old; 37% were born overseas, 32% were married and the mean number of co-morbidity was 5.7. The factors significantly included in the Logistic regression model were age (OR=1.02: 1.01-1.02), higher socio-economic status (OR=0.57: 0.35-0.96), number of co-morbidity (OR=0.90: 0.86 -0.94) and renal failure (OR=1.67:1.05- 2.62).
Conclusions: The most vulnerable groups to the heatwave include those who are older, with lower socio-economic status and with renal failure. Public health responses to extreme heat events should give priorities to these vulnerable groups. Patients with more co-morbidity may be less likely to be admitted to a hospital with direct-heat related conditions.

NITRATES IN DRINKING WATER AND THE RISK OF DEATH FROM CHILDHOOD BRAIN TUMORS IN TAIWAN

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Background and Aims: The objective of this study was to (1) examine the relationship between nitrate (NO3-N) levels in public water supplies and risk of death from childhood brain tumors (CBT) and (2) determine whether calcium (Ca) and magnesium (Mg) levels in drinking water might modify the effects of NO3-N on development of CBT.
Methods: A matched cancer case-control study was used to investigate the relationship between the risk of death attributed to CBT and exposure to NO3-N in drinking water in Taiwan. All CBT deaths of Taiwan residents from 1999 through 2008 were obtained from the Bureau of Vital Statistics of the Taiwan Provincial Department of Health. Controls were deaths from other causes and were pair-matched to the cases by gender, year-of-birth, and year-of-death. Information on the levels of nitrate-nitrogen (NO3-N), Ca and Mg in drinking water were collected from Taiwan Water Supply Corporation. The municipality of residence for CBT cases and controls was presumed to be the source of the subject's NO3-N, Ca, and Mg exposure via drinking water.
Results: Relative to individuals whose NO3-N exposure level was <0.31 ppm, the adjusted OR (95% CI) for CBT occurrence was 1.4 (1.07-1.84) for individuals who resided in municipalities served by drinking water with a NO3-N exposure > 0.31 ppm. No significant effect modification was observed by Ca and Mg intake via drinking water.
Conclusions: Data suggest that exposure to NO3-N in drinking water is associated with a higher risk of CBT development in Taiwan.

PUBLIC SEWER SYSTEM AND DRAINAGE OF A CITY IN THE NORTH OF MEXICO

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Background and Aims: Owing to the fact that the workers of the sewer system of Chihuahua City are presumably exposed to various risks situations and to environments potentially harmful for their health, and considering that the nature of their activities and the conditions under which those take place have very peculiar characteristics that require to be investigated by reconstructing the various procedures and processes involved in their daily work tasks, and by that, identify the working conditions and the risks that of those tasks come up during the working day. The aims consisted in developing an occupational health diagnosis to identify conditions, insecure acts, risks and demands in the health of this group of workers, and also to support the development of an intervention proposal.
Methods: The reconstruction of the complex diagrams of the work process was realized by the elaboration of a direct observation guide of the squads in their working day, identifying with this the conditions, insecure acts, risks and demands, classifying them according to the social philosophy of work. The data collection was obtained by interviews with administrative personnel, managers, and squad leaders. Using the General Information Warrant of the Company, of the Verifying Questionnaire of Health Diagnose by Dr. Jesus Gabriel Franco.
Results: We can conclude that the workers are exposed to a large amount of risks and demands in their working conditions and to insecure acts. There is a lack of personal protection equipment and there is no safety work and health training program, among other subjets.
Conclusions: It could be determined that there is no conscience about this risks or about the high accidents probability and the health damages. There is no intervention of the Safety Commission or of the authorities.
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SOCIAL AND ECOLOGICAL HEALTH EFFECTS FROM LIVING IN A DIOXIN CONTAMINATED NEIGHBORHOOD

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Background: The Cabot-Koppers wood treatment facility was in operation for nearly 100 years and is located in a densely populated low-income neighborhood with over 4,000 residents in Gainesville, Florida. For decades, residents have been expressing concern about adverse effects associated with exposure to chemicals from Koppers. In 2009, the USEPA confirmed the presence of elevated levels of dioxins in residents' yards. Recent indoor house dust sampling in the area has detected dioxin concentrations up to 700 times above background levels. The goal of this research project was to assess how the social and ecological health indices of this large neighborhood are changing as the nature and extent of dioxin contamination is becoming characterized.

Methods: In July 2009, a door-to-door survey on perceptions of risk associated with living near the Cabot-Koppers Superfund site was administered to 94 residents living within .5 mile of the site. Information about ways in which residents interact with their environment was also collected. Twenty in-depth interviews are currently being conducted with a subset of this original sample to better understand how residents interpret the demographic, social and environmental changes occurring in their neighborhood and how these changes influence their perceptions of risk.

Results: Preliminary analysis of survey data shows that residents' perceptions of risk are not correlated with how knowledgeable they feel about the nature and extent of the dioxin contamination of their yards and homes. Instead, perceptions of risk are correlated with awareness of specific changes occuring in the neighborhood environment that they attribute to the dioxin contamination.

Conclusion: Public knowledge of the contamination of residential properties with dioxin is resulting in changes in the way residents' experience their home environment and neighborhood. Residents' perceptions of risk associated with living in a dioxin contaminated neighborhood are complex and interwoven with concerns about the overall decline in the social and ecological health of their neighborhood.

OCCUPATIONAL SOLVENT EXPOSURE DURING PREGNANCY AND CHILD BEHAVIOR AT AGE TWO IN THE PELAGIE COHORT

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Background: Many women work during pregnancy and are exposed to occupational toxicants. The developing central nervous system is highly vulnerable to neurotoxics such as solvents. Although ample evidence shows the neurotoxicity of solvents on adults, very few studies have examined their neurodevelopmental effects in humans following prenatal exposure. Our objective was to analyze the associations between maternal occupational exposure to solvents during pregnancy and child behavior problems (attention deficit/hyperactivity, aggressivity, opposition, and emotionality) at age two.
Methods: Women from the PELAGIE mother-child cohort (including 3005 working women) were recruited in Brittany (France) between 2002 and 2006, at the beginning of pregnancy to document occupational exposure to solvents at that time. Maternal reports (n = 1277) described children's behavior at two years of age. We evaluated the associations between occupational solvent exposure and children's behavior with linear regressions after adjustment for confounders.
Results: 51% of women reported no occupationally exposure to solvents, 21% occasional exposure and 28% regular exposure in early pregnancy. Children prenatally exposed to solvents were more likely to have higher scores for attention deficit/hyperactivity (p for trend = 0.019) and aggressivity (p for trend = 0.014) scores, and dose-response relations were observed.
Conclusions: The dose-response effect and the high prevalence of children potentially exposed to solvents from their mother's workplace exposure underline the public health relevance of this result. Further studies should corroborate our results and explore which particular solvents are most deleterious. Determination of the persistence of these behavioral effects requires long-term follow-up of exposed children.
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A POPULATION-BASED CASE-CONTROL STUDY OF RADIOFREQUENCY EXPOSURE IN RELATION TO CHILDHOOD CANCER

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Background and Aims: The existing epidemiological evidence concerning the putative link between exposure to radiofrequency (RF) electromagnetic fields and cancer risk has been mostly acquired from studies of adult population; the cancer risk associated with RF exposure in children has not been adequately addressed. This study was conducted to investigate the relationship between environmental exposure to RF emitted from mobile phone base stations (MPBS) and risks of all cancers, leukemia, and brain tumors in children.
Methods: This is a population-based case-control study based on Taiwan's National Health Insurance inpatients claims. Cases were incident cases aged 15 or less and admitted in 2003-2007 for all cancers (ICD-9-CM: 140-239) (*n*=2,606) including 939 leukemia cases (204-208) and 394 cases of brain cancer (191). Controls were randomly selected from all non-cancer children insured in the same year of case's first-time admission, with frequency matched on age (+/- 5 years) and with a case/control ratio of 1:30. Annual cumulative power (ACP, watt-year) was calculated for each of the 71,185 MPBS in service between 1998 and 2007. Then the annual power density (APD, watt-year/km^2) of each township (*n*=367) was computed as a ratio of summation of ACP of all MPBS in a township to the area of that particular township. Each study subject's exposure to MPBS emitted RF was indicated by the averaged APD within the 5-year period prior to the cancer diagnosis calculated for the township where he/she lived. For those study subjects aged less than 5 years, the APD was only averaged for the time period between birth and child's age. Unconditional logistic regression model with generalized estimation equation was employed to calculate the relative risk estimates of childhood cancer in relation to RF exposure.
Results: Per 10 watt-years/km^2 increase in 5-year averaged APD was associated with a covariate-adjusted odds ratio (AOR) of 1.02 (95% confidence interval (CI)=0.96-1.08) for all cancers. The corresponding figures for leukemia and brain tumors were also not elevated at 0.97 (0.87-1.08) and 1.09 (0.95-1.25). A higher than median averaged APD (some 168 watt-years/km^2) was significantly associated with an increased AOR for all cancers (1.13; 95% CI=1.01-1.28), but not for leukemia (1.23; 95% CI=0.99-1.52) or brain tumor (1.14, 95% CI=0.83-1.55).
Conclusions: This study noted a positive but weak association between RF exposure to MPBS and risk of all cancers in children. The elevated risk was also seen for leukemia and brain tumors, but further inferences were limited by inadequate statistical power.

TOOLS FOR ADAPTING TO INFECTIOUS DISEASE IMPACTS FROM CLIMATE CHANGE

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Background and Aims: Europe will endure differential impacts from climate change with specific vulnerabilities in each bio-geographic region. The dynamics of infectious disease transmission are intricate in their own right but particularly so under climate change scenarios when distribution and transmission patterns are projected to shift.
Methods: The European Centre for Disease Prevention and Control (ECDC) has developed three tools for adapting to these impending challenges.
Results:

1) Knowledge mapping for climate change and food and waterborne diseases (FWD)

Information (key facts) was extracted from peer-reviewed 722 relevant publications for the period 1998 to 2009 and entered into an electronic knowledgebase. Key facts (~ 50,000 words) pertaining to temperature, precipitation, water, food, etc. for 6 selected pathogens were scrutinized, evaluated and compiled according to exposure pathways. Electronic data mining can facilitate management of future threats from infectious diseases.

2) A tool for Quantitative Microbial Risk Assessment (QMRA) for climate change and FWD

ECDC has developed a highly versatile decision support tool to estimate infection risks from climate change. Through QMRA of FWD this tool can assist decision makers in prioritizing different adaptation options. The tool includes a total of 13 QMRA combinations, each existing of consecutively linked modules selected from a total of 22 modules which can be run under current location-specific climate conditions; projected climate; or specific conditions depending on the selected modules.

3) A handbook for vulnerability, impact and adaption assessment of climate change health threats from infectious diseases

ECDC has developed a toolkit with a set of decision-making algorithms to help assess vulnerabilities, impacts and adaptation. Criteria for evaluating health and economic variables and options for monitoring and evaluation are presented to guide prioritisation of adaptation strategies.
Conclusions: These three tools can help public health practitioners allocate scarce resources under climate change conditions.

MAPPING CLIMATE CHANGE VULNERABILITIES FOR INFECTIOUS DISEASES IN EUROPE

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Background and Aims: Global climate change can shift the distribution of infectious diseases. Europe has a number of distinct climatic regions with specific climate change vulnerabilities. The quantitative outcome of these impacts on infectious diseases is less than certain.
Methods: Two surveys were conducted, one in 2007 and one from 2009/2010, with national infectious disease experts from 29 EAA countries. The aim was to capture their assessment of the projected epidemiologic situation for vector-, food-, water-, and rodentborne microorganisms under climate change scenarios.
Results: The large majority of experts agreed with the epidemic potential of these pathogens as a result of climate change. The proportion of countries reporting concerns was 83% for vectorborne; 68% for waterborne; 70% for foodborne; and 68% for rodentborne diseases. Specifically, 83% of countries were concerned about borreliosis; 69% about West Nile fever; 63% about tick-borne encephalitis; 62% about leptospirosis and 60% about salmonellosis. Observed changes in geographic distribution, seasonality, altitude and latitude were mapped by country. Planning and preparedness activities were captured as part of the survey along with surveillance activities for these pathogens. A number of shortcomings and deficiencies were identified that lend themselves to adaptation interventions.
Conclusion: In the absence of sufficient scientific data on climate change impacts on infectious diseases we resort here to an expert appraisal of projected changes in disease distribution. We map the landscape of this assessment and conclude that scarce resources can be allocated more effectively by conducting impact, vulnerability and adaptation assessments, on a regional or national scale. Surveillance activities should be tailored to the most appropriate region, season, and pathogen and guide strategic adaptation to climate change.

CHARACTERIZING ULTRAFINE PARTICLE NUMBER REDUCTIONS INSIDE VEHICLES

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Background and Aims: Time spent in vehicles is an important contributor to ultrafine particle (UFP) exposure, but exposures are difficult to characterize due to the complicated interplay between varying on-road UFP concentrations, particle losses to the ventilation system and cabin interior surfaces, and particle replenishment rates, as reflected by air exchange rate (AER). No study to date has systematically characterized all of these factors under a full range of real-world conditions.
Methods: In this study, six vehicles were chosen to be representative of vehicles up to 10 years old across a full range of driving speeds. Each vehicle was tested at seven AER conditions. UFP losses were determined as a function of particle size at different driving speeds, fan settings, cabin filter loadings, and ventilation conditions (outside air [OA] or recirculation [RC]) for each vehicle. AER was also measured.
Results : AER was determined as the dominant factor affecting inside-to-outside (I/O) UFP concentration ratios. Lower AERs occurred under RC conditions, e.g., <30 air changes per hour (hr^{-1}). Under these conditions, I/O ratios ranged from <0.05 at AER <2hr^{-1} up to 0.40 at AER = 20hr^{-1} and were highly negatively correlated to AER (r^2=0.83). At OA ventilation setting, AERs were an order of magnitude higher, e.g.,20 to 145 hr^{-1}, and I/O ratios were higher, ranging from 0.4 to 0.6. Vehicle cabin filter condition was never a major factor and filtration appeared to play a very small role in UFP removal. Particle losses were lowest in the range of 100 to 200 nm and were roughly constant over the range where on-road UFP size distributions vary the most, i.e., < 50 nm.
Conclusions : UFP concentration reductions inside vehicles are driven primarily by AER, with I/O ratios ranging from nearly zero to above 0.6. Therefore, ventilation setting and AER are necessary to accurately estimate in-vehicle UFP exposure.

DEVELOPMENTAL ORGANOCHLORINE COMPOUND EXPOSURE, THYROID FUNCTION, AND NEUROPSYCHOLOGICAL FUNCTION UP TO AGE 5½ YEARS

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Background and Aims: Exposure to organochlorine compounds can alter thyroid function in humans (Alvarez-Pedrerol et al. 2009), and hypothyroidism during early in life can adversely affect a child's neurodevelopment (Haddow et al. 1999). This study aims to assess the relationship between developmental organochlorine exposures and thyroid function in regard to subsequent neurodevelopment.
Methods: A population-based birth cohort of 182 children was followed annually up to age 66 months. The assessments included organochlorine compound concentrations in maternal pregnancy serum and milk, clinical thyroid function parameters in maternal and cord serum, and subsequent neuropsychological outcomes of the child, along with socio-demographic cofactors.
Results: The findings showed consistent, negative and monotonic associations between organochlorine and resin-triiodothyronine uptake ratio after covariate adjustments. No associations were observed with other thyroid function parameters. Increased resin-triiodothyronine uptake ratio was associated with improved performance on most of the neuropsychological tests. For other thyroid function parameters, the findings were less consistent. The regression coefficients between resin-triiodothyronine uptake ratio and neuropsychological outcomes were slightly increased after adjustment for polychlorinated biphenyl exposure as a covariate, although the latter did not have a clear independent effect.
Conclusions: The results are in accordance with a plausible neurotoxic pathway of organochlorine compound exposures by negatively affecting resin-triiodothyronine uptake ratio during early life. Even minor changes linked to decreases of the resin-triiodothyronine uptake ratio during early life may adversely impact a child's neurodevelopment.
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SERUM PERFLUORINATED COMPOUND CONCENTRATION AND ATTENTION DEFICIT/HYPERACTIVITY DISORDER IN CHILDREN AGED 5–18.

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Background and Aims: Perfluorinated compounds (PFCs) are ubiquitous, environmental pollutants used to manufacture non-stick cookware and waterproof fabrics. Perfluorooctanoic acid (PFOA) and other PFCs are found in maternal and umbilical cord blood and breast milk. Toxicology studies demonstrate the potential for PFCs to impact human growth and development. Attention Deficit/Hyperactivity Disorder (ADD) is a developmental disorder with suspected environmental and genetic etiology.
Objectives: We examined the cross-sectional association between serum PFC concentration and report of doctor-diagnosed ADD with and without current ADD medication use.
Methods: We used data from the C8 Health Project, a 2005–2006 survey in a Mid-Ohio Valley community highly exposed to PFOA through contaminated drinking water, to examine the association between serum PFC concentration and report of doctor-diagnosed ADD in non-Hispanic white children aged 5–18. This community was highly exposed to PFOA, but exposure to other PFCs reflects typical background levels. Logistic regression models were adjusted for age and gender.
Results: Of the 10,546 eligible children, 12.4% reported ADD, and 5.1% reported ADD plus current ADD medication use. The adjusted odds ratio (OR) for PFOA exposure above the 50th percentile was decreased (OR 0.80, 95% confidence interval (CI) 0.67, 0.95) for ADD plus medication as compared to exposure below the 50th percentile. Conversely, the OR for perfluorohexane sulfonic acid (PFHxS) levels above the 50th percentile was increased (OR 1.33, 95% CI 1.11, 1.59) for ADD plus medication as compared to exposure below the 50th percentile. There were no clear associations between the other PFCs and ADD.
Conclusions: It seems unlikely that PFOA protects against ADD. We suspect that the inverse association between PFOA and ADD reflects a spurious finding related to the geographic determination of PFOA exposure in this population, or to unmeasured behavioral or physiologic correlates of both exposure and outcome.

ASSOCIATION OF DIABETES WITH ARSENIC EXPOSURE, ARSENIC METABOLITES AND AS3MT POLYMORPHISM

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Background and Aims. Exposure to inorganic arsenic (iAs) is suspected of causing diabetes mellitus and other diseases. This study examined associations of diabetes with exposure to iAs in drinking water, metabolites of iAs in urine and AS3MT polymorphism.
Methods. Participants were adults and children age • 5 years living in Durango-Coahuila and Hidalgo states, Mexico. Information on water used and residential and medical history was obtained by questionnaire and participants provided samples of drinking water and spot urine. Prevalent diabetes was classified by fasting blood glucose (FBG) (≥125 mg/dl), oral glucose tolerance test (OGTT) (≥200 mg/dl) and self-report of diabetes diagnosis or treatment. iAs and its metabolites in urine were analyzed by hydride generation-atomic absorption spectroscopy. Associations between diabetes and iAs and urinary metabolites of iAs were estimated by logistic regression with adjustment for age, sex, hypertension and obesity. Urinary creatinine was evaluated as a covariate in analyses of urinary metabolites of iAs.
Results. Odds ratios (ORs) for diabetes classified by FBG and OGTT were similar. The OR increased about 1% per ppb of As in water (95% CI 1.01-1.02). Diabetes was associated with current iAs exposure, but cumulative arsenic exposure, or with total urinary arsenic concentration or total tri- or pentavalent iAs in urine. However, the OR for urinary dimethyl-As^{III} was 1.07 (95% CI 1.01-1.13) per ng As/ml after adjustment for creatinine (1.05 without adjustment). Neither methyl-As^{III} nor pentavalent methylated arsenicals in urine were associated with diabetes. Met287Thr polymorphism was associated with FBG • 126 mg/dl (OR = 2.36) and OGTT • 200 mg/dl (OR = 2.86), although neither association was statistically significant.
Conclusions. This study links diabetes with exposure to iAs and is the first to suggest that the dimethyl-MAs^{III} may be a marker of risk of developing diabetes.

DETERMINANTS OF URINARY ARSENIC CONCENTRATION IN A MEXICAN POPULATION

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Background and Ams. Millions of people worldwide are exposed to inorganic arsenic (iAs), a known carcinogen, in drinking water. This study examined potential predictors of urinary arsenic concentration in two areas in central Mexico with historically high iAs levels in village water supplies.
Methods. Participants were adults and children age • 5 years residing in the La Laguna and Zimapán regions in Durango-Coahuila and Hidalgo states, respectively. Information on residential history and water use was obtained by questionnaire and participants provided samples of drinking water and spot urine. Concentrations of iAs in water and As species in urine, iAs, MAs and DMAs, were determined by hydride-generation atomic absorption spectrometry. Potential predictors of iAs in water and urine were examined using linear regression and linear mixed models on log-transformed concentrations.
Results. The concentration of iAs in water samples was significantly associated with the source of drinking water and place of residence, including the village as well as the region. Interactions of location and water source were significant. Total arsenic (tAs) in urine was significantly associated with iAs concentration in water, source of drinking water and region of residence, as well as with sex and urinary creatinine. Higher urinary tAs concentrations were observed among those drinking municipal tap water rather than bottled water or water from springs or dug wells. Other environmental and personal factors including source of cooking water, length of residence, duration of water use, recent absence from the area, age and obesity were not associated with urinary tAs. Trivalent and pentavalent species of iAs in urine were associated with tAs in urine but not with environmental or personal factors.
Conclusions. The level of tAs is strongly related to the concentration of iAs in drinking water, but sex and factors specific to location also play a role.

WILL WOMEN DIAGNOSED WITH BREAST CANCER PROVIDE BIOLOGICAL SAMPLES FOR FUTURE RESEARCH PURPOSES?

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Background and Aims: Biological samples are often used to assess exposures in case control studies of cancer risk. Little is known about the response rates for biological sample provision, especially in younger age groups, and how these are affected by other demographic or lifestyle variables. A population based study of breast cancer patients was conducted to estimate these rates and to obtain information on the recruitment of friend/colleague controls.
Methods: Breast cancer cases diagnosed April-May 2010 were recruited to determine the proportion willing to provide biological samples (morning or 24 hour urine, saliva, blood) and contact information for similarly aged women for control recruitment. Cases (n=417) were women 25-74 years of age identified through the Ontario Cancer Registry and 67% (n=278) of those completed a mailed questionnaire.
Results: Women indicated they were willing to provide blood samples, by visiting a clinic (62%) or having a nurse visit the home (61%). They also were willing to provide saliva samples (73%) and morning (66%) or 24-hr urine samples (52%). Compared to older women, younger women (• 45) were consistently more likely to agree to provide any biological samples and were 3.1 times (OR) more likely to report they would collect a morning urine sample (95% CL: 1.15-8.35). Only 26% of cases indicated they would be willing to give contact information for similarly aged women (controls) to provide samples in future studies. Educated women were more likely to agree to provide biological samples, and women who consumed alcohol were more likely to agree to provide contact information than non-drinkers. Ethnicity, income, body mass index, and smoking status did not influence these results.
Conclusions: Reasonable response rates for biological sample collection can be expected in future case controls studies of breast cancer (especially among younger women), however, other methods of control selection must be devised.

COOKING FUEL CHOICES AND INDOOR AIR POLLUTION ACTIVITIES OF ACCRA HOUSEHOLDS: DETERMINING FACTORS AND ASSOCIATIONS WITH BIRTH WEIGHT

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Background and Aims: Birth weight is a predictor of infant growth and survival, and an important indicator of health in adulthood. The evidence linking air pollution especially ambient levels with reduced and low birth weight has been accumulating worldwide. The effect of indoor air pollution on birth weight however remains largely unexplored but yet purported as the most important environmental exposure for pregnant women especially in developing countries. This study therefore sought to establish the cooking fuel choices and indoor air pollution activities of Accra households, identify the perpetuating factors, and examine their consequences for birth weight trajectories.
Methods: A cross-sectional design was employed to assess exposure status of 592 mothers accessing postnatal services at the Korle Bu Teaching Hospital located in Accra and to record birth weight of their newborns.
Results: Cooking fuel choices of mothers was dependent on their residential location (p=0.011) and educational level (p=0.000). Mothers residing in middle/upper class neighbourhoods preferred LPG whereas charcoal was most preferred by mothers in low class and slum areas. Primary and junior high educated mothers and mothers with no formal education preferred charcoal whilst tertiary educated mothers liked LPG. Cooking fuel type (p=0.000) and household rubbish burning (p=0.027) was associated with birth weight with charcoal users and mothers present most of the time during rubbish burning sessions delivering smaller babies. Charcoal use was a significant risk factor for LBW (Adjusted OR=3.526, CI=1.732-7.179, p=0.001).
Conclusion: Improving social status and income levels of women residing in deprived areas; scaling up household waste collection to cover all Accra zones; and increasing LPG production facilities, expanding their distribution networks in urban centres, and curbing their competing use in motor vehicles are thus important in reducing maternal exposure to indoor air pollution.

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HYPOPLASTIC LEFT HEART SYNDROME AND COARCTATION OF THE AORTA: TOXICOGENOMIC STUDIES SUGGEST AN ENVIRONMENTAL FACTOR

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Background : We sought to identify possible gene-environment interactions for congenital heart malformations (hypoplastic left heart (HLH) and coarctation of the aorta (CoAo)). We have previously shown geospatial aggregations of HLH and CoAo, higher maternal solvent exposure, and potential interaction with GST-theta activity.(Loffredo)
Methods: Mother/infant pairs, where infants were < 1yr of age were studied. Cases werei infants undergoing cardiac surgery for HLH or CoAo (N=14 pairs). Controls were unrelated cardiac malformation (N=16 pairs). Bloods were obtained at the time of surgery. Mothers completed a questionnaire about environmental exposures. Blood DNA was genotyped for 14 toxicogenomics loci. Blood concentrations of 37 lipid-adjusted PCB isomers, and 9 pesticides were determined in all pairs. Statistical analyses were made for the sum of total PCBs, dioxin like (DLPCB) and non dioxin like (NDL) PCBs. Blood AhR transactivation was also measured.
Results: Mean infant age was 53 days for cases and 92 days for controls. Total PCBs, DLPCBs, NDLPCB levels were associated with CoAo (*N=7) (P= 0.008 for total PCB), but not with HLH (N=7). Covariates for PCB levels included history of alcohol consumption and maternal age. By non parametric analysis, blood concentrations of summed pesticides were associated with case status (p=0.0034), and separately for HLH and for CoAo specifically (ppDDE and t-NONA). 4 gene loci showed positive associations of low metabolizer alleles with infant cases (ARNT T19, PON1 rs# 662, CAT C26T rs # 1001179and CYP1A2 rs # 726551).
Conclusions: Our data are consistent with gene-environment interactions leading to genospatial clustering of congenital heart malformations. Blood levels of PCBs and pesticides in infants with HLH or CoAo and their mothers were higher than controls. DL and NDL PCB and pesticides were associated with CoAo; DDE and t NONA were associated with both HLH and CoAo. This pilot study should be confirmed in larger cohorts

IMPACT OF ATMOSPHERIC POLLUTION UPON THE HEALTH OF THE POPULATION: SINGULAR EVENTS

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Background and Aims: Recent studies point out that the association between morbidity and mortality with atmospheric pollution varies depending upon the region, seasonal period and the heterogeneous chemical composition of suspended particulate matter. From the environmental point of view, many studies exist about variations in PM levels, both on their size distribution as well as their chemical composition, according to certain singular events having an either natural or anthropogenic origin, identified by the analysis of the surrounding orographic, meteorological and environmental characteristics.
The objective of this study is to estimate the short-term association between the number of hospital emergency room admissions and atmospheric pollution, evaluated by a lone variable categorized as event.
Methods: Ecological study of temporal series relating hospital emergency room admissions caused by the circulatory apparatus cerebrovascular, total cardiac, total respiratory, asthma and chronic pulmonary obstruction and the atmospheric pollution indicated by the presence or not of a singular event in the city of Elche. The following are considered events: a) Saharan intrusion, contributing mineral dust masses from North Africa; b) Atmospheric stability, high stability situations favoring pollution accumulation; c) Regional accumulation, persistent recirculation of contaminated air masses; d) European episode, the entrance of air masses originating in Europe; e) Smoke or collections of particles resulting from incomplete combustion; and f) Firework displays. The magnitude of association was estimated using Poisson regression.
Results: The increase in atmospheric pollution during periods of atmospheric stability is associated with an increase of 1.64% (IC 95%: 1.30-2.08%) in hospital admissions from respiratory causes, and specifically from asthma (2.55%) or COPD (1.26%), but not statistically significant. On the other hand, a risk of becoming ill due to cardiovascular causes was obtained in both periods of Saharan intrusion as well as atmospheric stability, but they were not significant either.
Conclusions: Singular events are a variable to keep in mind in the study of the impact of atmospheric pollution upon the health of the population. Although these results can only be considered preliminary, as there were only two events – a Saharan intrusion and atmospheric stability – a sufficient number of days did transpire to be studied.

EXPOSURE TO ENVIRONMENTAL LEAD AFFECTS LUNG AGING OF THE GENERAL POPULATION FROM A LARGE INDUSTRIAL COMPLEX

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Background and Aims: Lead effects, even from low level exposures, have been implicated in the aging process of several organs including brain. However, effects of lead on the lung aging of general population have not been studied. This study was to ascertain the risk factors of aging on the pulmonary function (PF; forced expiratory volume in 1 second [FEV_1], forced vital capacity [FVC]) of those exposed to lead in the vicinity of industrial complex
Methods: In total, 263 men and women, aged over 30, were recruited from two cities during a 2-year follow-up. Spirometry testing was conducted at yearly cycles I and II. We estimated the change in FVC and FEV_1 during the study period and analyzed the rate of change according to the height, baseline FVC, and FEV_1, after controlling for sex, bronchial hyperresponsiveness, blood lead, urinary cotinine, and 1-hydroxyprene.
Results: The decline of PF progressed with age. More marked decline of FVC was noted for men than women ($p < 0.05$), but the decline of FEV_1 was not. Biological factors, especially height ($p < 0.05$) and pulmonary status ($p < 0.0001$), were associated with the decline of both PFs. Exposure to environmental lead was also significantly associated with the decline of both PFs
Conclusions: Even within a normal range of PF decline from aging, people with a smaller height, lower pulmonary status at baseline, and higher level of BPb were more vulnerable to the decline of PF. Lead accumulated in adult may contribute to rapid aging on pulmonary function.
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AN APPROACH TO THE ASSESSMENT OF THE COMBINED IMPACT OF SOME AMBIENT AIR POLLUTANTS ON THE RESPIRATORY SYSTEM OF CHILDREN

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Background and Aims: Assessment of the type of combined harmful impact produced by the most important ambient air pollutants (NO_2, SO_2, particulate matters) on the respiratory system in a specific environment could allow the uncertainty in risk assessment to be reduced. We approached such assessment based on toxicological concepts ("additivity", "subadditivity, or antagonism", "superadditivity, or synergy") applied to the data of an epidemiological study**.**
Methods: We analyzed the data of a questionnaire-based survey of 5085 primary schoolchildren in 13 areas of 10 Russian townships and the results of a year-long monitoring of ambient air pollution with the above-mentioned substances in these areas. The assessed respiratory response was the presence of cough for at least 3 months during the year. The association of this response with the impact of pollutants was investigated by translating pollutant concentrations into categorical form (below or above the median value), with the effects of the most essential confounders eliminated by means of database restriction. Restriction was carried out for two risk factors: smoking of adults in the presence of the child and the use of gas ovens for home heating and linen drying. Such restriction reduced the dataset to 1965 children, for which two-level charts for cough probability dependence on pollutant levels were constructed, and correlation analysis was carried out.
Results: It has been shown that, at the levels of ambient air pollution which are characteristic of the environmental situation considered, the combined respiratory impact of SO_2 and NO_2 is less than additive, that of SO_2 and PM_{10} is additive, and that of SO_2 and $PM_{2.5}$ is more than additive.
Conclusions: It has been demonstrated that it is possible to estimate the combined impact of ambient air pollutants on the respiratory airways if the effects of other strong potential risk factors are eliminated by means of dataset restriction.

ASSOCIATION BETWEEN VEHICULAR DENSITY AND HOSPITALIZATION BY CARDIOVASCULAR DISEASES IN THE CITY OF SAO PAULO, BRAZIL

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Background and aims: A cross-sectional study using vehicular density (VD) as an indicator of exposure, calculated for micro-areas of the city of Sao Paulo, was conducted to assess the impact of air pollution on admissions for cardiovascular diseases.
Methods: Hospitalizations for cardiovascular diseases (ICD10: I20-I25.9 and ICD10: I60-I69.8) in adults aged 40 years or more from public and private hospitals of the city in the period 2004-2006 were geocoded by their residence addresses.
Vehicular density, according to the type of fuel, was calculated for micro-areas of 500m2 of the city and used as the indicator of exposure to traffic-related air pollution. The number of resident people and the Human Development Index (HDI) were available for these micro-areas. Admission rates for cardiovascular diseases were calculated and the VD (total and according to type of fuel) and HDI were categorized into quartiles. Multiple logistic regression models with the admission rates as the dichotomous dependent variable (equal or greater than the median) and the VD and the HDI as independent variables were used.
Results: 30,843 admissions by cardiovascular diseases were analyzed in 1,927 micro-areas of the city. Having the first quartile of VD as baseline and allowing for the HDI, the adjusted OR for total VD were: 2.54 (95%CI: 1.93-3.42; 4.49 (95%CI: 3.35-6.01; 4.94 (95%CI: 3.60-6.79). For diesel vehicles the OR were: 2.55 (95%CI: 1.94-3.36): 4.96 (95%CI: 3.06-5.42); 4.09 (95%CI: 3.02-5.56), and for vehicles powered by gasoline and alcohol were: 2.60 (95%CI: 1.97-3.42); 4.70 (95%CI: 3.51-6.30): 4.96 (95%CI: 3.61-6.83). Significant linear trends were observed for cardiovascular diseases and all types of fuel.
Conclusions
A statistically significant association between VD and admissions for cardiovascular diseases was found. This association was not influenced by the type of fuel.

MATERNAL EXPOSURE TO AMBIENT TEMPERATURE AND THE RISK OF PRETERM BIRTH AND STILLBIRTH

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Background and Aims: Almost 10% of all births are preterm and 2.2% are stillbirths. Recent research has suggested that environmental factors may be a contributory cause to these adverse birth outcomes. We examined the association of preterm birth and stillbirth with ambient temperature in Brisbane, Australia
Methods: We obtained data on meteorological factors, air pollution and births (n = 101,870) in Brisbane, Australia between 2005 and 2009. We used a Cox proportional hazard model to assess the association of preterm birth and stillbirth with ambient temperature. We also examined if there were any periods of the pregnancy particularly vulnerable to high temperatures.
Results: We found an association between maternal exposure to higher ambient temperature and increased risk of stillbirth. With increasing temperatures from 12 °C to 21 °C, the hazard ratio for stillbirth increased by about 70%. The temperature effect was greatest for fetuses of less than 36 weeks of gestation. We also found an association between higher temperatures and shorter gestations and the hazard ratio for live birth increased by about 6% as the mean temperature increased from 15 °C to 25 °C. This effect was greatest at later stages of the pregnancy.
Conclusions: The results provide strong evidence of an association between exposure to higher temperature during pregnancy and increased risk of stillbirth and shorter gestations.

CHILD GROWTH AND DEVELOPMENT FROM BIRTH TO 36 MONTHS OLD BORN TO ADOLESCENT MOTHERS-RESULTS OF THE TAIWAN BIRTH COHORT STUDY

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Background: Adolescent pregnancy carries a higher risk of adverse birth outcomes. So far, there have been very few longitudinal studies on the growth of children born by adolescent Mothers. This study explores birth outcomes and their determinants in adolescent pregnancies, using subjects drawn from the Taiwan Birth Cohort Study (TBCS).

Methods: Using data of Wave I (6months old), II (18 months old) and III (36 months old) of TBCS, a national sample of 19,381 pairs of mothers and their children were included for analysis, including 560 pairs resulting from adolescent mothers. Through completed field interviews with structured questionnaires and surveys with mothers or other family members, and with references to each child's birth certificate and Passport of Well-baby Care, differences in birth outcomes and personal, pregnancy and social profiles of mothers were analyzed.

Results: A total of 560 adolescent mothers (<20 years old) and 18,821 adult mothers (20-34 years old) were included in our study. There was no significant difference between two groups in terms of parameters of the child growth. For development, the numbers (proportions) of failure in milestones at 3 years old for gross motor, fine motor, language and social development of children born to adolescent mothers are 13(2.32%), 34(6.07%), 10(1.79%)and 24(4.29%), respectively; while there are 392(2.08%), 1015(5.39%), 308(1.64%)and 512(2.72%) for those born to adult mothers. The determinants of failure in development are “the mother isn't the night-time caregiver” and “family dysfunction“.

Conclusion: There was no significant difference in both growth and development at 3 years old between children born to adolescent and adult mothers.

THE ASSOCIATION BETWEEN EXPOSURE TO PARTICULATE MATTER DURING PREGNANCY AND BIRTH WEIGHT AND GESTATIONAL AGE: THE UK PAMPER STUDY

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Background and Aims: Exposure to particulate matter during pregnancy is associated with adverse birth outcomes, but the evidence for some outcomes is inconsistent. The UK Particulate Matter and Perinatal Events Research (PAMPER) study investigated associations between maternal exposure to black smoke (BS) and birth outcomes in Newcastle upon Tyne, an industrial city with stable population, over three decades (1962-1992).
Methods: A two-stage statistical exposure modeling strategy was used, incorporating monitored weekly BS levels and temporally and spatially varying covariates, to estimate weekly BS exposure for each individual pregnancy (88,679 births with complete covariate information) averaged over each trimester and the whole pregnancy period. Regression analyses assessed associations between BS exposure and birth weight, gestational age and birth weight standardized for gestational age and sex.
Results: The median weekly BS exposure estimate across whole pregnancy was 33.8μg/m^3 (IQR 17.2-108.3μg/m^3). The unadjusted linear decrease in birth weight was 3.4g (95% CI 2.9, 3.9) per 10μg/m^3 increase in BS, reducing to 1.7g (95% CI 0.9, 2.4) after adjustment. The exposure-response function was non-linear: birth weight decreased by 70g for an approximately 100μg/m^3 increase in BS from the 1st to 75th percentile, with only 25g decrease for 100μg/m^3 BS increase from the 75th to 95th percentile. Standardized birth weight also reduced with an increase in BS exposure. Associations between BS and gestational age were very small and non-significant. Significant interaction between BS and deprivation on the effect on birth weight and standardized birth weight was observed.
Conclusions: Associations between maternal BS exposure and offspring birth weight were of the same order of magnitude as those reported for passive smoking, and varied across the range of exposure estimates. Based on our findings, we hypothesize that intrauterine growth restriction may be on the causal pathway in the association between exposure to BS and birth weight reduction.

COMPARISON OF EXPOSURE ESTIMATION METHODS FOR AIR POLLUTANTS: AMBIENT MONITORING DATA AND REGIONAL AIR QUALITY SIMULATION

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Background and Aims: Ambient monitors are often used to estimate air pollution exposure for epidemiological studies. This approach is efficient and economical but has limitations, including restricted coverage and resolution. Three-dimensional air quality modeling has potential to address some limitations of monitoring networks. We evaluated application of a regional air quality model to estimate air pollution exposure for epidemiological studies.
Methods: Individual and spatially-aggregated (county-level) exposure estimates for $PM_{2.5}$ and O_3 were calculated for the eastern U.S. in 2002 using simulation results from the Community Multi-scale Air Quality (CMAQ) modeling system and a traditional approach based on ambient monitoring data. Differences in populations included in monitor- versus model-derived exposure estimates were evaluated, and advantages and limitations of exposure estimation approaches were assessed.
Results: Exposure estimates generated from CMAQ provided greater spatial coverage and higher spatial and temporal resolutions compared to estimates from monitor data. The monitoring approach produced estimates for 370 counties for $PM_{2.5}$ and 454 for O_3. Modeled estimates included 1861 counties, covering 50% more population. Populations with and without monitor coverage differed: counties with monitors tended to be more urban, with a higher percentage of black residents, college graduates, young children, and higher median income and modeled pollutant levels. CMAQ slightly overestimated O_3 (annual normalized mean bias [NMB]=4.30%); annual modeled $PM_{2.5}$ estimates were similar to observations (NMB=-2.09%), though bias varied seasonally (e.g., -27.1% in July to 32.0% in November).
Conclusions: Epidemiology may benefit from use of regional air quality models, with improved spatial and temporal resolutions and ability to study populations far from monitors that may differ from those near monitors. However, model performance varied by pollutant, measure of performance, and exposure metric. Appropriateness of using modeled pollutant exposures in health studies depends on the pollutant, acceptable level of uncertainty, population of interest, study design, and other factors.

AIR POLLUTION EXPOSURE DURING PREGNANCY AND MATERNAL AND FETAL C-REACTIVE PROTEIN LEVELS. THE GENERATION R STUDY

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Background and Aims Exposure to air pollution has been associated with increased levels of the inflammatory marker C-reactive protein. We investigated the associations of exposure to particulate matter (PM_{10}) and nitrogen dioxide (NO_2) during pregnancy with high-sensitivity C-reactive protein (hs-CRP) levels in mothers in first trimester and neonates in a population-based cohort study among 7339 pregnant women in Rotterdam, the Netherlands.
Methods Air pollution levels were modelled at the home address using a combination of advanced GIS based modelling and hourly monitoring data. For different periods preceding the blood sampling, average exposures to air pollution were assessed. Hs-CRP levels were measured in maternal blood samples collected in early pregnancy and in cord blood samples. Hs-CRP levels were log-transformed and multivariate linear and logistic regression analyses were performed. Models were adjusted for known determinants of CRP levels (maternal age, body mass index, ethnicity, education, parity, folic acid supplementation use, smoking, and alcohol consumption), and for season of conception and road traffic noise exposure.
Results Mean exposure levels during pregnancy were 30.3 • g/m^3 (SD 3.2) for PM_{10} and 39.8 • g/m^3 (SD 4.2) for NO_2. In early pregnancy, higher air pollution exposure levels were not associated with hs-CRP levels. An increase in PM_{10} and NO_2 exposure levels during pregnancy was associated with an increased risk of detecting a hs-CRP level above 1.00 mg/L in neonates (odds ratio 2.37, 95% confidence interval 1.16 to 4.88).
Conclusions Maternal exposure to higher PM_{10} and NO_2 levels during pregnancy was associated with increased fetal hs-CRP levels. In contrast, maternal air pollution exposure was not associated with hs-CRP levels in early pregnancy. Our results suggest that maternal exposure to air pollution during pregnancy may promote the inflammatory process in neonates.

PREVENTING THE CORRUPTION OF A GOVERNMENT RESEARCH PROGRAM

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Background and Aims: This presentation will explain how staff of a government agency and a stakeholder's advisory committee created procedures to successfully avoid corruption of an extramural research program.
Methods: The presentation will summarize information about the oversight,conduct and attempted corruption of the California Electric and Magnetic Fields Program.
Results: In 1992 the California Public Utilities Commission (PUC) asked the California Department of Health Services(DHS) to oversee an extramural policy-relevant research program. It was to deal with the mix of electric and magnetic exposures (EMFs) from power lines and house wiring. The research was to provide information about sources of exposure, possible risks and policy options for lowering exposure in schools and from power lines. The PUC stipulated that the program be overseen by a stakeholder's advisory committee made up of concerned citizens, electrical worker unions, utility representatives and public interest organizations such as the Parent Teacher's Organization. The committee was charged with developing procedures and transparency to prevent corruption of the conclusions by any of the stakeholders. This committee later additionally requested a risk assessment by the DHS scientists. The stakeholders had to approve the wording of the scope of work in the requests for proposals, the membership of the panels who judged the submitted research proposals. They were directly involved in specifying the options to be considered and the criteria to be used for judging options for dealing with EMFs from power lines and schools. They demanded the formation of a scientific advisory committee to approve the risk evaluation methodology and the risk assessment itself.
Conclusions: Despite several serious but unsuccessful attempts by some stakeholders to sway the results, the final products were judged by all the stakeholders to be corruption-free.
References:
www.ehib.org/emf

LEVELS OF LEAD AND MERCURY IN BREAST MILK IN SEVEN CHINESE CITIES AND THEIR RELATIONSHIP TO FAMILY FACTORS

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Backgrounds and Aims Although breast milk remains the best source of nutrition for infants, it may represent a potential source of toxicant exposure and a concern for public health, especially in developing countries. The purpose of this study is to investigate the levels of lead and mercury in breast milk in postpartum women in seven cities of China and to explore related determinents.
Methods National surveys were conducted between October and December, 2008 in seven cities in China. A total of 1600 questionnaires were handed out with a response rate of 83.4%. About 10 mL breast milk was obtained from each mother at about 9:00 am 3 to 5 days after delivery. Breast milk samples were fully digested using a microwave protocol and then were analyzed by inductively coupled plasma mass spectrometer (ICP-MS) for lead, zinc (and other trace metals), and by a Direct Mercury Analyzer (DMA80) for mercury.
Results The concentrations of lead varied significantly by region, with overall P25, P50 and P75 values of 2.92• g•L, 5.11• g•L, and 9.14• g•L respectively, and the highest lead concentrations in Xiamen (median 8.76• g•L) . Mercury levels also varied by region, with overallP25, P50 and P75 values of 0.87• g•L, 1.65• g•L, and 3.18• g•L respectively, and the highest levels in Guangzhou(median 3.99• g•L). Results of multivariable linear regression showed that lower educational attainment of fathers (P=0.01), active smoking status of mothers (P=0.00) was associated with a higher level of lead in breast milk. Factors associated with a higher mercury concentration in breast milk included the use of kitchen ventilator (P=0.03), pet bites or scratch injury during pregnancy (P=0.00), higher consumption of fish (P=0.04) and use of milk powder (P=0.02). Zinc concentrations were lower among those with less education (high school or less) .
Conclusions Using microwave digestion-ICP-MS could determine the concentration of multiple elements with minimal samples of breast milk, making it ideal for population surveillance and large sample epidemiological surveys. In general, concentrations of lead and mercury, as well as the nutritional elements iron, selenium, zinc and cooper, were within the acceptable range in breast milk in China. The significant regional variances in lead and mercury concentrations between the seven cities reflected different exposure levels, and most risk factors for higher levels were related to family factors.

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CLIMATE EXTREMES AND PREGNANCY LENGTH

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Background and Aims: Although future climate is predicted to have more extreme heat conditions, the available evidence on the impact of these conditions on pregnancy is very scarce and inconclusive. This study was aimed to investigate the impact of maternal short-term exposure to extreme ambient heat on the length of pregnancy.
Methods: This study was based on a cohort of births (N=7587) that occurred in a major university hospital in Barcelona during 2001-2005. Three indicators of extreme heat conditions were applied, two based on one day exposure to an unusually high (more than 95^{th} and 99^{th} percentiles of long-term average for the same day) heat-humidity index (perceived temperature) and one based on exposure to unusually hot temperatures persisting for a five-day period. Each mother was assigned the measures made by the closest (aerial distance) of three meteorological stations across the region (101 km^2). A two-stage analysis approach was developed with the first stage separating the monthly trend in gestational age for the study region as a whole from within-region personal variation and the second stage quantifying the risk using a range of covariates together with the predicted regional monthly trend by the first stage model as an offset. The second step was repeated for lags zero (delivery date) to six days.
Results: We detected a five-day (95% confidence interval of 0.5-10.1 days) reduction in gestational age at delivery after maternal lag 1 exposure to unusually high (99^{th} percentile) heat-humidity index. The result for the indicator of persistent heat was not conclusive because of the small number of exposed subjects.
Conclusions: Maternal exposure to extreme heat episodes results in a reduction in gestational age at delivery in lag1 exposure, suggesting an immediate effect of this exposure on pregnant women. Further studies are required to confirm our findings in different settings.

CLIMATE AND BACTERIAL INFECTIONS DURING PREGNANCY; PRESENT IMPLICATIONS AND FUTURE CONCERNS

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Background and Aims: Maternal bacterial infections during pregnancy are both frequent and can be associated with serious complications like maternal morbidity and mortality, and life-threatening neonatal infections. The available evidence on the impact of climate on human bacterial infections particularly during pregnancy is very limited. This study was aimed to investigate the impact of climatic factors on maternal group B streptococci (GBS) colonisation during pregnancy.
Methods: This study was based on a cohort of births (N=7976) that occurred in a major university hospital in Barcelona during 2001-2005. Averages of daily temperature, relative humidity, and heat index (perceived temperature) over the weeks 32-36 (one month prior to sampling) of pregnancy measured by the closest (aerial distance) of three meteorological monitors to the maternal residential place were assigned to each subject. Logistic regression models were developed to extract adjusted odds ratios for continuous and categorical (quartiles) exposures.
Results: We detected an increased risk of GBS colonisation due to increase in daily average temperature (adjusted odds ratio (95% confidence interval (CI)) of 1.02 (1.01, 1.03)), relative humidity (1.03, 95% CI (1.01, 1.05)), and heat index (1.01, 95% CI (1.01, 1.02)). Treating exposures as categorical variables resulted in similar findings.
Conclusions: We found elevated risk of maternal GBS colonisation during pregnancy in association with increase in ambient temperature and humidity. If confirmed by future studies, our findings are important as they provide guidance for clinicians and policy makers for providing targeted primary and secondary preventions and in time, it offers a basis for assessing the impact of possible changes in future climate on maternal infections during pregnancy and their consequent complications.

MEASUREMENT ERRORS IN THE ASSESSMENT OF EXPOSURE TO SOLAR ULTRAVIOLET RADIATION AND ITS IMPACT ON RISK ESTIMATES IN EPIDEMIOLOGICAL STUDIES

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Background and Aims: To date, many studies addressing long-term effects of ultraviolet radiation (UVR) exposure on human health have relied on a range of surrogates such as the latitude, ambient UVR levels, or time spent outdoors to estimate personal UVR exposure. This study aimed to differentiate the contributions of personal behaviour and ambient UVR levels on personal UVR exposure and to evaluate the impact of using UVR exposure surrogates on detecting exposure-outcome associations.
Methods: Data on time-activity was obtained from Expolis study (www.ktl.fi/expolis/) for adult (aged 25-55 years old) indoor workers in six European cities: Athens (37ºN), Grenoble (45ºN), Milan (45ºN), Prague (50ºN), Oxford (52ºN), and Helsinki (60ºN). Data on daily ambient UVR levels was obtained from Cost Action 726 (www.cost726.org/). Population-based data on holiday destinations of the corresponding countries to these cities were obtained from the Eurostat report on Tourism statistics. Annual UVR facial exposure levels were simulated for 10000 subjects in each city for 1997, using a behavioural UVR exposure model with data on time-activity, ambient UVR, and holiday destinations as inputs (Diffey 2008).
Results: Within-city variations of facial UVR exposure were three times larger than the variation between cities, mainly because of time-activity patterns. Ambient UVR levels, latitude and time spent outdoors alone accounted for less than one fourth of the variation in facial exposure levels. Use of these surrogates to assess long-term exposure to UVR resulted in requiring more than four times more participants to achieve similar statistical power to the study that applied true facial exposure.
Conclusions: Our results emphasise the importance of integrating both personal behaviour (time-activity and holiday behaviour) and ambient UVR levels/latitude in exposure assessment methodologies.
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ASSOCIATIONS BETWEEN METEOROLOGICAL FACTORS AND OUTDOOR AIR-POLLUTION IN EACH TRIMESTER WITH ADVERSE BIRTH OUTCOME: 10 YEARS DAILY BIRTHS RECORDS TIME SERIES ANALYSIS

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Background and Aims: Small for gestational age (SGA) and preterm birth (PTB) are important causes of infant mortality, neonatal, peritoneal, childhood and long-term adult morbidity. There exist epidemiological evidences that environmental factors affect these birth outcomes and their impact in each pregnancy phase is different. However, knowledge about these effects is insufficient and contradictory. This study aimed to assess the association between meteorological and air-pollution factors in each of pregnancy trimester with SGA and PTB.
Methods: The data includes all daily birth records for August 1999 – February 2010 registered at a medical center serving the entire population of Southern Israel. Dependent variables were defined as daily counts of SGA and PTB. Daily total birth count was used as offset variable. Meteorological variables list included daily measurements of temperature, relative humidity, solar radiation and wind velocity. Air-pollution variables list included particular matters PM10, total nitrogen oxides (NOx), sulfur dioxide (SO2), carbon monoxide (CO) and ozone (O3). Natural cycles based on annual and weekly cycles are considered in trigonometric form. GLM Poisson models based on special time series technique with independent variables lagged for each pregnancy trimester were used for assessment of above named associations.
Results: The mean daily temperature and humidity range were associated with SGA and PTB rates. The daily solar radiation negative associated with SGA and PTB rates. Exposure to NOx, CO, O3 were associated with SGA rates, and exposure to SO2, CO, O3 was associated with PTB rates.
Conclusions: Air-pollution and changes in weather are statistically significant associated with adverse birth outcomes in each pregnancy trimester. The possible air-pollution effect is combined and synergistic and influence of environmental exposure on SGA and PTB rates is different in each trimester. Our findings suggest the highest impact of environmental exposure during the third pregnancy trimester on considered births outcomes.

HEATWAVES, POPULATION HEALTH, AND EMERGENCY RESPONSE IN ADELAIDE, AUSTRALIA: LESSONS LEARNT

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Background: Heatwaves in the southern regions of Australia have received greater public health attention. An unprecedented heatwave occurred in Adelaide in early 2009, with maximum temperatures over 40 ^{o}C in 5 consecutive days. There was a 14-fold increase in hospital admissions, 2.4% increase in emergency department presentations, and 186 people died over five days. The present article is based on a qualitative study, which examines emergency stakeholder responses to the 2009 heatwave.
Method: A qualitative interview was conducted in 2010. Interviews included the stakeholders from major Adelaide public hospitals, South Australian Ambulance Service, relevant South Australian Government Departments, Non-Government Organisations and other Service Providers. N Vivo has been used in data analysis.
Findings: The results are presented in below sections: (1) the lack of organisation in emergency services responses to the 2009 heatwave was examined; (2) evening temperatures and their impact were explored; (3) coping strategies used by emergency services personnel were inspected; and (4) emergency services and challenges to population health were checked.
The areas in emergency responses which need improvement as cited by key stakeholders were discussed, including (1) A more co-ordinated effort between emergency agencies in relation to their community responses; (2) Better management of triage patients during heatwaves which would prevent bottle-necks; (3) Increasing rest periods of emergency services staff and shorter working shifts in order to prevent fatigue; and (4) Greater clarification of heatwave trigger points in order to diminish misunderstanding by the public.

DDT, MALE REPRODUCTIVE HEALTH AND THYROID HOMEOSTASIS OF NON-OCCUPATIONALLY EXPOSED MEN FROM A MALARIA AREA IN LIMPOPO PROVINCE, SOUTH AFRICA

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Background and Aims: The Persistent Organic Pollutant (POP), dichloro-diphenyl-trichloroethane (DDT), has been used for malaria vector control in Limpopo Province, South Africa, since 1945. POPs are noted for their toxicity, persistence and bio-accumulative characteristics. The Aim of the study was to investigate the association between DDT, as reflected in plasma concentrations, and seminal parameters, possible adverse effects on human sperm genetic integrity, and thyroid homeostasis, while considering related factors.
Methods: A cross-sectional study, recruiting 546 young males from three communities in an endemic malaria area where DDT is sprayed annually, was conducted. Blood plasma DDT and its metabolite levels were measured. A semen analyses were performed and sperm chromatin structure assay and Aniline Blue test were used to assess sperm DNA/chromatin integrity in 209 participants. Dietary intake, serum retinol-binding protein (RBP), transthyretin (TTR) and albumin concentrations and liver- and thyroid function were compared between cases with evidence of a body burden of DDT in the circulation and controls.
Results: The lipid adjusted DDT mean (+SD) and median concentrations were 109.2 (+106.6) and 83.9 µg/g, respectively; and the lipid adjusted DDE mean (+SD) and median concentrations were 246.2 (+218.5) and 177.8 µg/g, respectively. In additions to effects on seminal parameters, the results point to a weak association between DDT/DDE plasma concentration and the incidence of sperm with chromatin defects. Significantly lower thyroid hormone concentrations were in observed cases ($p \bullet 0.01$). A significant linear trend was observed for S-free T4 and T3 concentrations ($p<0.001$) and relatively low RBP concentrations were associated with significantly higher DDT and DDE isomer concentrations, and a higher DDE/DDT ratio ($p \bullet 0.01$), which signifies long-term exposure.
Conclusions: The results suggest that long-term non-occupational environmental DDT exposure may have a negative impact on seminal parameters, sperm chromatin integrity, and on thyroid function and related parameters of young South African males.

SPATIAL DISPERSION OF ISCHEMIC HEART DISEASE, RESPIRATORY AND NEUROLOGICAL DISEASES AND METEOROLOGICAL , AIR POLLUTION AND SOCIO-ECONOMIC FACTORS IN ISRAEL'S NEGEV DESERT

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Background and Aims: The potential effects of ambient air pollution and meteorological factors on health have received much attention over the past decades. Epidemiological studies have shown that even small increases in air pollution are associated with increased morbidity and mortality. The present study aims to identify geographical (meteorological and air pollution) short term and socioeconomic impacts on cardiovascular, respiratory and neurological diseases in Beer-Sheva city, located in the northern part of the Negev desert.

Methods: 1.GIS and spatial statistics to analyze the spatial distribution of diseases of ER and hospitalization cases.
2. Vehicular air pollution dispersion model (AERMOD software) to receive spatial exposure proxy of NO2 and PM2.5.
3. GLM Poisson models based on time series techniques were used to analyze the association of short term meteorological, air pollution and socioeconomic factors with considered diseases rates.
Results: 1. Highest seasonal monthly noninfectious respiratory diseases hospitalization rate is found in the central part of the city. 2. Highest hospitalization rates found during winter. Significantly different hospitalization rate by seasons found for all disease groups studied. 3. Significant association between socioeconomic ranking and monthly hospitalization rates found for non infectiousrespiratory, diseases, heart ischemic and neuroloical diseasesin 2007. Association of meteorological factors (mean daily temperature and relative humidity) for the elderly (65+) and daily hospitalization rate found for non infectious respiratory diseases in 2003-2007. 5. Association was found between Daily traffic related air pollution is significantlyassociated with daily hospitalization respiratory and cardiovasclar diseases rates
Conclusion: The study showed that short-term exposure to meteorological factors and traffic related air pollution in Beer-Sheva were related to an increase in daily hospitalization rate of cardiovascular , respiratory and neurological diseases, especially in winter time and for the elderly (65+). The results should have implications for environmental thresholds and social policies.

USE OF A COMMUNITY-UNIVERSITY ENVIRONMENTAL JUSTICE PARTNERSHIP TO EXAMINE ENVIRONMENTAL HEALTH DISPARITIES IN NORTH CHARLESTON, SOUTH CAROLINA

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Background and Aims: The Lowcountry Alliance for Model Communities (LAMC), a community-based organization in North Charleston, SC, developed a partnership with the University of South Carolina to study and address local environmental justice and health issues. The objective of this study is to assess spatial disparities in exposure and health for LAMC neighborhoods and other disadvantaged neighborhoods in Metropolitan Charleston.
Methods: Data on the spatial location of EPA regulated facilities and other land uses regulated by the state of South Carolina was obtained. Additional data on air pollution, asthma, diabetes, heart disease, and cancer were obtained from 1998 to 2008 for Metropolitan Charleston. ArcGIS 9.3 was used to map the distribution of facilities, air pollution, and disease rates. Chloropleth maps were created to show the relationship between facility location and demographic composition (percent non-white, percent poverty, percent high school education). The spatial coincidence, spatial approximation, and cumulative distance functions were used to assess spatial disparities in the distribution of environmental hazards and land uses by race/ethnicity and socioeconomic status. SAS 9.2 was used to assess differences in the distribution of pollution-emitting facilities and land uses, pollution levels, and health outcomes at the census tract and census block group levels.
Results: Preliminary analyses have shown that there are spatial disparities in the distribution of environmental hazards and land uses in Metropolitan Charleston based on race and socioeconomic status.
Conclusions: There are racial/ethnic and SES exposure and health disparities in Metropolitan Charleston. Additional work should be performed to explore the linkages between exposure to hazards and pollution and health disparities.

HOUSEKEEPING HEALTH CARE WORKERS HAVE THE HIGHEST RISK FOR TUBERCULIN SKIN TEST CONVERSION

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Background and aims: TB is especially prevalent among health care workers (HCW) as compared to the general population. Not all health care workers are at the same risk for tuberculin skin test (TST) conversion, indicating latent tuberculosis infection. In Israel, reported rates of latent TB infection incidence and prevalence are relatively high. We hypothesized that exposure to hospitalized patients in internal medicine wards will be associated with higher risk of TST conversion. The aim of this study was to identify risk factors for TST conversion among health care workers.
Methods: A retrospective cohort study was conducted at a tertiary university medical center. We included every health care worker who had had a two steps negative TST at work entry and at least one consecutive TST in the five years period of 2005-2009 (mean follow-up period 55 months). Potential risk factors such as age, health care profession, patient exposure profile, workplace division and history of BCG vaccination were entered in the binomic logistic regression model.
Results: There were 450 subjects who met the inclusion criteria and 93 subjects had TST conversion (crude annual conversion rate 4.3%). The highest annual rates of TST conversion occurred in health care workers who worked as housekeeping staff (6.9%).
Older age of staff (above 35), a work environment with high patient turnover and employment in maintenance departments were significant risk factors for TST conversion (adjusted odds ratio of 2.05[1.3-3.3], 5.2[1.3-20] and 8.4[1.7-42], respectively [95% confidence interval]).
Conclusion: Housekeeping staff, older age workers and health care professionals working in the environment of high patient turnover are at increased risk for latent tuberculosis infection. Current measures for latent tuberculosis infection appear to be insufficient. We recommended to increase the awareness of housekeeping staff to occupational hazard of TST conversion and to allocate of more resources to screening system.

USE OF COMMUNITY–DRIVEN RESEARCH TO ASSESS BUILT ENVIRONMENT DISPARITIES AND THE VULNERABILITY OF WATER AND SEWER SERVICES IN UNDERSERVED ENVIRONMENTAL JUSTICE COMMUNITIES

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Background and Aims. Some low-income, communities of-color in the United States rely on a complex mixture of unregulated private wells and septic systems and inadequate public drinking water and sewer services. The West End Revitalization Association (WERA) developed and used the community-owned and -managed research (COMR) to assess disparities in the built environment with a focus on the quality of publicly regulated sewer and water infrastructure.
Methods. Community monitor (CM) training workshops and drinking water and surface water tests of fecal pollution were completed at private (target) and regulated public (referent) service households in three low-income African-American communities in Mebane, North Carolina. ArcGIS was used to map sewer and water infrastructure by race/ethnicity to assess disparities in infrastructure. We performed a cross-sectional household drinking water and sewer service survey and measured fecal pollution levels in drinking water and surface water supplies in the communities. Differences in turbidity (NTU) and fecal microbial indicator concentrations at target and referent sites in WERA neighborhoods (MPN/100ml) were evaluated using SAS version 9.
Results. Maps of sewer and water infrastructure showed disparities in access to this infrastructure by race/ethnicity in Mebane, North Carolina. CMs collected survey data showing a mixture of failing private wells and septic systems and regulated public drinking water and sewer infrastructure. Septic system failure ranged from 11-18%. Higher turbidity levels were observed in private wells compared to regulated public drinking water ($p<0.0001$). There was little statistical evidence of differences in surface water fecal pollution at target and referent sites. Drinking water and surface water fecal pollution levels exceeded maximum contaminant levels at several target and referent sites.
Conclusions. Drinking and surface water fecal contamination levels suggest a need for provision of improved water and sewer services to protect health in these underserved and marginalized EJ communities and more enforcement of regulations.

EVALUATION OF THE EFFECTIVENESS OF AN INNOVATIVE ENVIRONMENTAL JUSTICE AND HEALTH COMMUNITY-UNIVERSITY PARTNERSHIP

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Background and Aims: There are gaps in the scientific knowledge on the effectiveness of community-university environmental justice (EJ) and health partnerships.. We will highlight how the West End Revitalization Association's partnership was used to address the lack of basic amenities, EJ issues, and public health issues in underserved black communities in North Carolina.
Methods: Self-administered surveys (N=37) and semi-structured interviews (N=35) were used to evaluate the effectiveness of WERA's partnership and use of the community-owned and managed research (COMR) approach and collaborative problem solving (CPS) model to address EJ and health issues. Interviews were audio-recorded and transcribed. Descriptive statistics and survey results were analyzed using SPSS v. 17.0.
Results: Analysis of interview and survey data has shown that WERA's partnership, particularly COMR, was effective in improving environmental literacy and addressing EJ and health issues in WERA neighborhoods. Survey respondents generally agree that WERA's COMR approach can be used to help build the community's trust in the scientific research process and also can be used to effectively address local environmental justice and health issues. There is more disagreement among survey respondents about the utility of the CPS approach in addressing local EJ and health issues. Analyses of interview data reveal that WERA's community-university partnership has been effective at addressing local EJ and health issues. Interviewees think COMR is a great way for communities to address their local EJ and health issues. Study participants generally agreed that the COMR approach can be adopted by other communities to address local EJ and health issues.
Conclusions: This evaluation provided information on the efficacy of WERA's COMR approach to address EJ and health issues and revealed barriers to participation and some key lessons learned that may be useful for others trying to address environmental health issues using a partnership approach and exposure assessment methods.

URINARY DIALKYL PHOSPHATE LEVELS BEFORE AND AFTER FIRST SEASON CHLORPYRIFOS SPRAY AMONGST FARM WORKERS IN THE WESTERN CAPE, SOUTH AFRICA

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Background and Aims: Chlorpyrifos, an organophosphate (OP) insecticide associated with neurotoxic, reproductive and developmental effects [Perera et.al., 2005] is commonly used worldwide (Barr & Angerer, 2006) including in South Africa. The study investigated urinary levels of dialkyl phosphates (DAP), an OP biomarker, resulting from pesticide exposure amongst 40 farm workers.
Methods: Workers were tested (urinary DAP levels, anthropometry, short exposure questionnaire) before and after the first day of seasonal chlorpyrifos spraying.
Results: The workers (mean age = 42.2, SD: 61.1 years) were mostly male (65%). Median baseline urinary DAP was high amongst both non-applicators (1587.5 µg/g creatinine, n = 8) and applicators (365.6 µg/g creatinine, n = 9). There was not much evidence of an increase in post-spray DAP levels from pre-spray levels amongst both applicators and non-applicators. Hours mixing, spraying, driving a tractor and hours worked by non-applicators were not significantly associated with an increase in post-spray DAP levels adjusting for age, height, weight, gender, use of empty pesticide containers and self-reported kidney problems. Past applicator status was weakly positively associated with pre-spray DAP levels adjusting for age, height, weight, and gender, self-reported kidney problems, smoking and alcohol (• = 1019.5, p = 0.307, R^2 = 0.28.
Conclusions: The relationship between pesticide exposure and OP bio-monitoring require further investigation. The high DAP levels call for an epidemiological investigation into the health effects of OP pesticides.
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HEALTH IMPACT ASSESSMENT AND MONETARY VALUATION OF LEAD EXPOSURE TROUGH LOCALLY PRODUCED FOOD IN EU MEMBER STATES UNDER DIFFERENT POLICY SCENARIO'S

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Background and Aims: A case study has been performed which involved the full chain of assessments from policy drivers to health effect quantification at the population level across the EU-27, including monetary valuation of the estimated health impact. The main policy scenarios cover the period from 2000 to 2020 and include the most important Community policy developments expected to affect the environmental release of lead and the corresponding human exposure patterns. Three distinct scenarios were explored, namely the emission situation based on 2000 data, a business-as-usual scenario (BAU) up to 2010 and 2020, and a scenario incorporating the most likely technological change expected (Best Feasible Technical Reductions, BFTR) as response to current and future legislation (already planned).

Methods: Consecutive model calculations (MSCE-HM, Watson, Xtrafood, IEUBK) were performed by different partners on the project as part of the full chain approach to derive estimates of Pb blood levels in children as a consequence of the consumption of local produce.

Results: The estimated Pb blood levels were translated into an average loss of IQ points/child using an empirical relationship previously established at Vito. The calculated losses in IQ points were subsequently further translated into the average costs/child using a cost estimate of € 10.000 per IQ point based on data from a literature review. The estimated average reduction of costs/child (%) for all countries considered in 2010 under BAU and BFTR are 12.16 and 18.08%, respectively. In 2020 the percentages amount to 20.19 and 23.39%.

Conclusions: The case study provides an example of the full-chain impact pathway approach taking into account all foreseeable pathways both for assessing the environmental fate and the associated human exposure and the mode of toxic action to arrive at quantitative estimates of health impact assessment at the individual and the population risk levels alike at EU scale.

Acknowledgements: This research has been performed within the context of the EU funded Integrated Research Project HEIMTSA

CLIMATE CHANGE AND INCREASED PRECIPITATIONS: THE IMPACT OF HEAVY RAINFALLS ON SURFACE WATER TOTAL ORGANIC CARBON (TOC) AND RESULTING HUMAN EXPOSURE TO TRIHALOMETHANES

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Background and aims: Several studies suggest that climate change will be accompanied with increased precipitations. Heavy rainfalls can impact surface water total organic carbon (TOC) and, upon treatment, lead to higher trihalomethane levels in drinking water. These meteorological events could therefore exacerbate human exposure to these toxic disinfection by-products. This study aimed at i) assessing the impact of heavy rainfalls on surface water TOC and ii) evaluating subsequent exposure to chloroform and its internal dose metrics in humans.
Methods: Surface water TOC was measured in samples taken from an established sampling point used for drinking water production in a small river in Brittany (France) during dry days and following high precipitations (> 10 mm). Trihalomethane production during water treatment was estimated based on TOC levels, temperature and chlorine dose using an established multivariate model. Finally, drinking water chloroform levels were used to construct different scenarios of exposure (i.e., water consumption, shower/bath and inhalation) in newborns, children, adults and pregnant women using a published physiologically based pharmacokinetic (PBPK) model.
Results: Following high precipitations, surface water TOC increased from a median of 6.2 to 8.9 mg/L. Consequently, median total trihalomethane levels in drinking water were estimated to increase from 29.7 to 33.1 µg/L. Human exposures to chloroform after > 10 mm rainfalls increased hepatic metabolite levels by 11 % when compared to levels reached during dry days. This increase did not vary substantially between exposure routes or physiologic condition.
Conclusions: This study suggests that the occurrence of heavy rainfalls can increase surface water TOC levels. The higher levels of trihalomethanes in drinking water following these precipitations may lead to increased tissue levels in humans. In the context of climate change, risk assessors may need to consider higher exposure to drinking water contaminants.

EFFECT OF EXPOSURE TO P,P' DDE ON MALE HORMONE PROFILE IN MEXICAN FLOWER GROWERS OF STATE OF MEXICO AND MORELOS

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Background and Aims: *p,p'*-dichlorodiphenyldichloroethene (*p,p'*-DDE) acts as an androgen receptor antagonist, (Kelce et al 1995), however the data regarding its hormonal effects in men are limited. The objective of this study was to evaluate the association between serum levels of *p, p'*-DDE and reproductive hormone profile in male flower growers of Mexico.
Methods: A longitudinal study was carried out in a population of men working in the production of flowers and ornamental plants in two Mexican states (Morelos and State of Mexico) during the periods July-October 2004 (rainy season) and December 2004-May 2005 (dry season). A questionnaire including information on their socioeconomic characteristics, tobacco and alcohol use, presence of chronic and acute diseases, occupational history and anthropometry was used and blood and urine samples were obtained. Serum levels of *p, p'*-DDE were analyzed by gas chromatography; FSH, LH, testosterone, estradiol, inhibin B and prolactin levels were measured by enzymatic immunoassay. We also analyzed urinary levels of dialkylphosphates (DAPs) by gas chromatography. Associations between serum levels of *p, p'*-DDE and male reproductive hormones (both transformed to their natural logarithm) were evaluated using multivariate generalized estimating equation (GEE) models.
Results: The median *p,p'*-DDE levels was 678.2 ng/g lipid (range: 9.4-12696.5) during rainy season and 626.7 ng/g lipid (range: 9.4-13668.1) during dry season. After adjusting for potential confounders (age, body mass index, state of residence and DAPs), *p, p'*-DDE levels were negatively associated with prolactin (β=-0.04, CI 95% -0.07, -0.008) and testosterone (β=-0.04, CI 95% -0.08, 0.005) and positively with inhibin B (β=0.11, CI 95% 0.02, 0.21).
Conclusions: These results provide additional support for that *p, p'*-DDE can affect hypothalamo-pituitary-gonadal axis function in humans.
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VALIDATING A PHARMACOKINETIC MODEL OF POLYCHLORINATED BIPHENYLS (PCBs) USING BLOOD LEVELS IN CHILDREN FROM BIRTH UP TO 22 MONTHS OF AGE

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Background and aims: Recent evidence suggests that not only can PCBs disrupt neurodevelopment following prenatal exposure, but also that there are postnatal windows of susceptibility during which exposure may impact additional processes. Estimation of children exposure during different time windows is crucial when assessing such chemically induced ailments. However, the validation of a previously developed pharmacokinetic tool was restricted to the first 6 months of life. We aimed at validating a physiologically based pharmacokinetic (PBPK) model for the postnatal exposure to PCBs using blood levels sampled up to 22 months of age in a birth cohort of children from Slovakia.
Methods: We simulated blood PCB-153 level profiles in 328 children with sufficient information on cord blood levels, weight and height at or close to blood sampling times, duration of breast-feeding, gender and blood levels at two time points (on average at 6 and 16 months, ranging from 5 to 22 months). Predictions were compared to measured levels through Spearman's rank correlations and linear regression.
Results: Estimated levels correlated to measured levels with Spearman correlation coefficients of 0.79 and 0.81 for the 6 month and 16 month sampling times, respectively. Linear regression analyses revealed that estimations explained 62 % and 63 % of the variability in measured levels at 6 and 16 months.
Conclusions: Although correlations in this study were slightly lower than that obtained in our previous study, results suggest that the model is suitable for the estimation of postnatal levels up to 22 months of age. Studies are underway to calibrate the model, extend its validation to children of 5 years of age and to investigate the impact of postnatal exposure to PCBs on a multitude of health outcomes.

MATERNAL OCCUPATION DURING PREGNANCY AND PEDIATRIC ATOPIC DERMATITIS

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Background and Aims Ž Maternal employment during pregnancy has been considered to be associated with prematurity and low birth weight. However, little is known about the effect of maternal employment on the development of atopic disorders. We want to evaluate associations between maternal employment status and atopic dermatitis (AD).
Methods: We used multistage, stratified systematic sampling to recruit 24,200 mother-newborn pairs from the Taiwan national birth registration in 2005. Maternal occupation categories, working hours, shift work, work stress, and potential confounders during pregnancy were gathered by questionnaires at 6 months of age. Information about development of AD was also collected at 6 months of age. Multiple logistic regression analysis was performed to estimate the association of maternal employment status and AD.
Results: Work stress during pregnancy increased the risk of AD in the offspring (OR=1.5, 95%CI=1.00~2.95). Those who work during pregnancy increased the risk of AD in the offspring compared to those without work (OR=1.44 95%CI=1.00~2.95). Shift work and working hours during pregnancy might increase the risk of AD, but failed to reach statistical significance.
Conclusions: Work stress during pregnancy increased the risk of AD in the offspring. However, there was no evidence that maternal shift work or long working hours had a higher risk of AD. Further follow-up study is warranted for other allergic diseases.

Keywords: atopic dermatitis; pregnancy; occupation

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LEAD CONCENTRATIONS IN THE VENOUS BLOOD OF PREGNANT WOMEN AND IN THE CORD BLOOD AND SOME RESULTS OF A BENEFICIAL INTERVENTION (THE MIDDLE URALS EXPERIENCE)

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Background and Aims: Nonferrous metallurgical factories widespread across the Middle Urals, cause substantial environmental pollution with lead, posing a hazard to the health of their employees and to the residents of the cities where they are situated. Earlier we showed that in some of the urban areas lead concentrations in cord blood may exceed 1 µg/dl, or even 10 µg/dl, and that association could be established between these concentrations and adverse impacts on baby's health during the first year of life. Hence follows the challenge of identifying pregnant women with alarming blood lead levels for the purpose of lowering them.
Methods: In 2007-2008, we determined lead concentrations in the venous blood (PbB) by the atomic adsorption method in 1419 residents of 10 industrial cities at 20-24th week of pregnancy. Those with PbB>2 µg/dl were provided with a set of bioprotectors that had been successfully tested in a toxicological experiment. PbB was again measured at 32 to 34th week of pregnancy. For some of these women, lead concentrations were also measure in cord blood (PbB-cord).
Results: A statistically significant positive correlation is shown to be present between PbB at 32- 34th weeks and PbB-cord (Pearson's coefficient = 0.56, Spearman's coefficient = 0.48, P <0.001) with no statistically significant difference between them. Following the course of bio-protectors, the average PbB levels went down to 1.99±0.21 µg/dl from the initial 4.84±0.30 µg/dl (• <0.001). After the course, women also demonstrated a statistically significant reduction in the excretion of ••-ALA and a rise in blood haemoglobin.
Conclusions: Environmentally conditioned lead body-burden of pregnant women creates the risk of a toxic impact on both the woman and the foetus, but this burden may be substantially reduced with the help of a complex of bioprotectors promoting the elimination of lead and enhancing the organism's resistance to its effect.

HEARING LOSS AMONG CH-47D CHINOOKS HELICOPTER CREWS

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Background and Aims: The CH-47D Chinook, the most proficient and recognized transport helicopter, is a multi-mission helicopter for the military or rescuer units. According to the manufactures report, it can fly more than 150 mph at full load more than 330 nautical miles with long-range fuel tanks. The sources of rotary-wing aircraft noise include 2,220-shaft- horsepower twin Lycoming, T55-L-5 turbo shaft engines, and two 3-bladed rotors. To investigate the hearing loss among crews, we reviewed a five-year crews' annual physical examination data.

Methods: We conducted a retrospective longitudinal study (2008~2009) focus on the hearing loss among the CH-47D crews. Data were collected from the annual physical examination records, including the hearing loss in left and right ears at frequency 500 Hz, 1000 Hz, 2000 Hz, 4000 Hz and 8000 Hz. A generalized estimating equation (GEE) was used to assess the association of interests, as well with the adjustment with age.

Results: We found that during the pass 5 years: HL was not significantly increased with age (p=0.2753) and different ears (p=0.1380). Compared with the HL in 2005, there were not significant differences since 2006 to 2009. However, only the crews' HL at 4000 Hz had significant 3.94 dB (A) (p=0.0243) higher than the HL at 500 Hz. Moreover, compare with the variation of frequency differences at baseline (2005), there were only two significant difference at 1000 Hz vs. 500 Hz in 2008 (p=0.0112) and at 8000 Hz vs. 500 Hz in 2006 (p=0.0173).

Conclusions: It is evident that occupational NIHL may exist in the crews, especially at 4000 Hz. We suggest that a longitudinal follow-up is needed for the crews.

HEARING LOSS AMONG OH-58D CREWS

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Background and Aims: OH-58D Kiowa Warrior reconnaissance/attack helicopter contained 4-blade main rotor and 2-blade anti-torque rotor, which were one of the noise sources. Long-term exposure to the helicopter may result in pilots' hearing loss (HL). We report a 5-year study on the noise-induced hearing loss (NIHL) among the OH-58D helicopter pilots.

Methods: We conducted a retrospective longitudinal study (2005~2009) focus on the hearing loss among the AH-1H helicopter pilots. Data were collected from the pilots' annual physical examination records, including the hearing loss in left and right ears at frequency 500Hz, 1000Hz, 2000Hz, 4000Hz and 8000Hz. A generalized estimating equation (GEE) was used to assess the association of interests, as well with the adjustment with age.

Results: We found that during the pass 5 years: HL was significantly increased with age ($p=0.0255$). Left ear had 1.55 dB (A) higher HL than that of right ear ($p=0.0067$). Compared with the HL in 2005, the HL in 2006 and 2009 had 1.15 dB (A) and 5.21 dB (A) significant difference ($p<0.0001$), respectively. Regarding the HL at difference frequency, 4000 Hz and 8000 Hz had 5.29 dB (A) and 5.77 dB (A) significantly higher ($p<0.0001$ and $p<0.0001$) than the HL at 500 Hz, respectively.

Moreover, compare with the variation of frequency differences at baseline (2005), there were only one significant difference at 1000 Hz vs. 500 Hz in 2007 ($p=0.0100$).

Conclusions: Significant HL at 4000 Hz indicated an occupational hazard. We suggest (1) re-evaluating their hearing protective devices, such as era plug, noise muffs, and helmet, (2) establishing regulation for early warning shift and significant threshold shift, and (3) a longitudinal study for the HL among the crews.

THE APHEKOM PROJECT – A LITERATURE REVIEW OF AIR POLLUTION INTERVENTIONS AND THEIR IMPACT ON PUBLIC HEALTH

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Background and Aims: Intervention studies play an important role in supporting and complementing scientific validation of results of epidemiological non-intervention studies linking air pollution and health. In this paper a collection of existing published intervention studies is reviewed with the aim to give a summarized overview spanning a variety of approaches regarding the type of the intervention and findings with the main focus on studies that assessed interventions that improved air quality and the associated positive impact on public health. Air pollution interventions were defined as events aimed at reducing air pollution and also events where air pollution reductions occurred as a side effect.
Methods: Intervention studies published in English from the 1960's up to January 2011 were considered for inclusion in this review. Studies have been selected for inclusion in the review based on the aim to span the diversity of interventions and their assessment of different health outcomes. Where interventions were examined by numerous studies with a variety of publications, only the main, most representative and/or most recent studies were included. The selection was based on a systematic search of Pubmed, Google Scholar, ISI Web of Knowledge^{SM} and Science Direct.
Results: In total, 22 intervention studies have been included in this review. This review shows that air pollution interventions have been successful at reducing air pollution levels. It was shown that there is consistent significant published evidence that most of these interventions have been associated with health benefits, mostly by way of reduced cardiovascular or respiratory mortality and or morbidity. Throughout the majority of reviewed interventions the found decrease in mortality exceeded by far the expected predicted figures based on observations of European multicity studies.
Conclusion: There is consistent and significant evidence that decreased air pollution levels following an intervention resulted in a health benefit for the assessed population.

THE ASSESSMENT OF THE IMPLEMENTATION OF FUEL RELATED LEGISLATIONS AND THEIR IMPACT ON AIR QUALITY AND PUBLIC HEALTH - THE APHEKOM PROJECT

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Background and Aims: The main focus of Work Package 6 of the Aphekom project was: to develop innovative methods to analyse the decrease in air pollution levels following implementation of an European regulation to reduce the sulphur content in liquid fuels; to follow the evolution of health risks over time; to track related effect modifiers; and to quantify the monetary costs of health impacts of the implemented regulation.
Methods: Daily SO_2 air pollution and mortality data from 20 participating cities, spread all over Europe, was analysed employing generalized additive models (GAM) using in R statistical software environment. City specific effect estimates were combined using meta-analysis.
Results: A general downwards trend over the study period urban background SO_2 was observed. There was no clear step change in SO_2 concentrations after implementation of the Directives; rather a gradual decline in SO_2 levels was observed.
The health data analysis showed no evidence of change of slope in the dose-response curve after implementation of the legislations and hence observed effects were related to level changes. The analysis showed that an increase of $10\mu gm^{-3}$ in SO_2 levels was associated with an overall (pooled) increase in daily all-cause (0.53%), respiratory (0.49%) and cardiovascular (0.72%) mortality. Intuitively one would expect that a decrease in daily SO_2 levels would result in a decrease in daily deaths.
The meta-analysis of the mortality data suggests that overall 2212 (95% CI: 772; 3663) lives per year were saved associated with decreases in SO_2 for 20 European cities from year 2000 onwards compared to the pre-Directive period. This has been valued at about €192 million relying on preference-derived monetary values.
Conclusion: The findings underscores the health and monetary benefits from drafting and implementing effective EU policies on air pollution and ensuring compliance with them over time.

PROFILING SO_2 AIR POLLUTION PATTERNS IN 9 EU APHEKOM CITIES - THE APHEKOM PROJECT

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Background and Aims: A detailed analysis of hourly pollutant concentrations mainly focusing on SO_2 data obtained from 9 centres involved in the Aphekom project was conducted. This involved the generation of individual diurnal SO_2 profiles in order to:

(i) identify city specific patterns including source apportionment and quantification,
(ii) track changes over time,
(iii) analyse the changes in SO_2 concentrations from different emission sources, i.e. traffic, heating, shipping and industrial sources, overtime.

Methods: Individual cities diurnal (24hr) SO_2 profiles were generated using hourly SO_2 measurements from different monitoring sites by season and by weekday for each year. European cities with suitable data included Athens, Bordeaux, Brussels, Dublin, Le Havre, London, Rouen, Strasbourg and Vienna.

Results: For the majority of the examined cities similar diurnal patterns were found with a general decreasing trend for SO_2 levels overtime. Morning and evening traffic rush hours were strongly reflected widely in the diurnal profiles as well as lower weekend SO_2 levels due to missing traffic volume and industry related emissions. Seasonal heating related peaks were observed during evening and night-time hours during the winter months.
City specific SO_2 patterns were identified. For example for Dublin these reflected late-night shopping hours on Thursdays. For London these patterns showed elevated SO_2 levels during midday, suggesting the metropolitan life-style of the city involving constant traffic use.

Conclusion: For the majority of the cities examined road traffic and heating appeared to be the most important sources of SO_2 emissions and hence the driving components widely reflected in the diurnal profiles. Furthermore a decrease in emissions related to those two sources overtime has been observed.
Detailed hourly pollution profiles can prove very useful to policy makers/planners in identifying sources and hence policies to reduce pollution levels.

THE GEOGRAPHY OF VIOLENCE IN A US CITY. ALCOHOL, DRUGS AND NEIGHBORHOOD COHESION.

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Background and Aims: We determine, in the city of Boston in 2008, what geographic/environmental and individual factors are related to the production of violence (including subjective and objective assessments of the environment/neighborhood) as well as assessing dynamic relationships between adjacent geographic areas.
Methods: Data from the Boston Police Department (violence, drug arrests and 911 call data), the census, survey data on neighborhood collective efficacy and Massachusetts state data on alcohol outlet type and location. Spatial modeling, including lags to assess adjacency, is employed (census block groups) and maps of hot spots for violence, alcohol outlets and drug markets are produced.
Results: Census block groups with high levels of violence were associated with high levels of drug trafficking arrests, and high densities of liquor stores and bars, within a given area as well as adjacent to the "target" area, controlling for neighborhood disorganization and collective efficacy. Model based violence hot spot areas were found to be adjacent to areas with high drug arrest rates and high densities of liquor stores. There was no difference found between models including and excluding 911 call data.
Conclusions: Spatial effects were, above and beyond typical socio-demographic measures, found to play a role in the prevalence of violence in Boston in 2008. Further, model based hot spots were identified that were found to be associated with significantly higher values for social-demographic, alcohol outlet and drug arrest measures. This is one of the first analyses in which drug arrest and alcohol outlet data, as well as subjective and objective environmental measures, were included in assessing the prevalence of violence. Further, we include the effects (lags) of adjacent area measures/features on target area violence prevalence. Socio-demographic, environmental and drug arrest information were all found, to some degree, to be significantly related to violence, while controlling for spatial autocorrelation.

OZONE AND PARTICULATE AIR POLLUTION TRIGGER DIFFERENT TYPES OF OUT-OF-HOSPITAL CARDIAC ARREST

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Background and Aims: Out-of-hospital cardiac arrest (OHCA) has been previously associated with exposure to air pollution. But it is not clear if it acts by precipitating myocardial infarction or by other mechanisms. We studied the effects of particulate and gaseous air pollution on the risk of OHCA due to myocardial infarction (MI) vs. the risk of OHCA due to other cardiac causes, in Helsinki 1998- 2006.
Methods: Helsinki Emergency Medical Services provided OHCA data. Cardiac cause was identified from prior symptoms, ECGs, hospital and autopsy reports. Pollutant data was obtained from central ambient monitors. A case-crossover analysis determined hazard ratios (HRs) for hourly lagged exposures (Lag 0 - 3) and daily lagged exposures (Lag 0d - 3d).
Results: Among OHCAs due to MI (OHCA_MI), interquartile increases in pollutant exposure were associated with elevated HRs for PM2.5 (Lag 0, 1.16 95% CI:1.04, 1.28, Lag 1, 1.16 CI: 1.04, 1.28, Lag 2, 1.14 CI:1.03, 1.26, Lag 0d 1.21 CI: 1.07, 1.37), PM10 (Lag 0, 1.31 CI 1.02, 1.23, Lag0d, 1.12 CI: 1.05, 1.37), Acc (Lag 2, 1.11 CI: 1.00, 1.22, Lag 0d, 1.18 CI 1.04, 1.34) and NO (Lag 0d, 1.06 CI: 1.01, 1.12). Among OHCAs not identified as due to MI (OHCA_Other), elevated HRs were associated with ozone exposure (Lag 0d, 1.30 CI: 1.03, 1.64; Lag 1d, 1.41 CI: 1.11, 1.79; Lag 2d, 1.37 CI: 1.08, 1.73). HRs for OHCA_MI and ozone were nonsignificantly less than one; HRs for OHCA_Other and PM2.5 were close to one and nonsignificant. HRs for OHCA_MI associated with PM2.5 compared to HRs for OHCA_Other and ozone showed opposite trends with sex and season.
Conclusions: The results suggest that air pollution triggers OHCA via two distinct modes: one associated with particulates and leading to MI and one associated with ozone involving etiologies other than MI, e.g. arrhythmias.

THE INFLUENCE OF IN-UTERO SMOKE EXPOSURE ON ATOPIC DISORDERS VIA EPIGENETIC MECHANISM

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Background and Aims: Evidence has shown that in-utero exposure has important effects on DNA methylation. However, how prenatal tobacco smoke exposure affects DNA methylation leading to atopic disorders remains to be addressed. Since most children suffering from atopic dermatitis (AD) continue to develop asthma later in life, we explored whether prenatal smoke exposure may induce aberrant DNA methylation of specific genes that were related to childhood AD.
Methods: We recruited 261 newborns with cord blood in Taiwan birth panel study. At 2 years of age, information about development of AD and environmental exposures were collected. Cord blood cotinine levels were measured by high performance chromatography-mass spectrometry (HPLC-MS/MS) to stand for prenatal smoke exposure. Methylation differences associated with smoke exposure were screened in cord blood DNA of 14 cohort children by whole genome methylation array. CpG loci that demonstrated a statistically significant difference in methylation were validated by SNaPshot. The functions of the candidate genes were also investigated.
Results: Differential methylation of CpG loci in four genes (TSLP, GSTT1, CYB5R3, and KRT6C) was identified through the screen. Of these, thymic stromal lymphopoietin (TSLP) gene exhibited significant increases in methylation in the exposed than non-exposed children after being validated by SNaPshot (p = 0.001). TSLP gene was therefore selected for further investigation in a larger sample of 54 cohort children. The degree of TSLP 5′CpG islands methylation was inversely related with TSLP protein levels in cord blood.
Conclusions: The effect of prenatal tobacco smoke exposure on the risk for childhood atopic disorders may be mediated through alterations in DNA methylation.
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ASSOCIATIONS OF PERSISTENT ORGANIC POLLUTANTS WITH ABDOMINAL OBESITY IN THE ELDERLY: THE PROSPECTIVE INVESTIGATIONS OF THE VASCULATURE IN UPPSALA SENIORS (PIVUS) STUDY.

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Background and Aims: Although experimental studies observed that persistent organic pollutants (POPs) could induce visceral obesity, there is little human study on this possibility. This study aimed to evaluate associations between POPs and abdominal obesity using both cross-sectional and prospective data.
Methods: Twenty one POPs (including 16 polychlorinated biphenyl (PCB) congeners, 3 organochlorine (OC) pesticides, 1 brominated diphenyl ether (BDE), and 1 dioxin) were measured in plasma collected at baseline in 969 participants aged 70 years of the Prospective Investigation of the Vasculature in Uppsala Seniors (PIVUS). Prospective analyses were based on 511 participants re-examined after 5 years. Abdominal obesity was defined by an increased waist circumference using the APTIII/NCEP-criteria.
Results: At age 70, 322 subjects were abdominally obese. Plasma concentrations of the less chlorinated PCBs, OC pesticides such as p,p-DDE and dioxin were associated with increased risk of abdominal obesity (adjusted odds ratios of 2 to 3). Many of relations had inverted U-shapes rather than being linear, in particular in women. On the contrary, serum concentrations of highly chlorinated PCBs were strongly inversely associated with abdominal obesity. As plasma concentrations of POPs were highly correlated, when summary measures of the less chlorinated PCBs, highly chlorinated PCBs, and OC pesticides were included in one model, both the positive associations and inverse associations became strengthened. During 5 years follow-up, 100 subjects developed abdominal obesity. Similar associations, however less powerful, were seen between POPs and risk of development of abdominal obesity.
Conclusion: Using both a cross-sectional and a prospective design, low-dose exposure to some POPs, like low-chlorinated PCBs, p,p-DDE, and dioxin, were found to contribute to the development of abdominal obesity, while high-chlorinated PCBs seem to induce the opposite effect in an elderly population.

EXPOSURE TO PERSISTENT ORGANIC POLLUTANTS PREDICTS STROKE IN THE EDERLY.

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Background and Aims: The background exposure to persistent organic pollutants (POPs), lipophilic xenobiotics mainly accumulated in adipose tissue, has been recently emerged as a new risk factor of cardiovascular diseases. This prospective study was performed to evaluate if plasma concentrations of selected POPs predict the future risk of stroke among elderly.
Methods: Twenty-one POPs (including 16 polychlorinated biphenyl (PCB) congeners, 3 organochlorine (OC) pesticides, 1 brominated diphenyl ether (BDE), and 1 dioxin) were measured in plasma collected at baseline in 898 participants aged 70 years of the Prospective Investigation of the Vasculature in Uppsala Seniors (PIVUS). Stroke events were identified through hospital records.
Results: During the five year follow-up, 35 subjects developed stroke. During After adjusting for known risk factors of stroke, most PCBs with 4, 5, or 6 chlorine atoms, p,p-DDE, trans-nonachlor, and OCDD significantly predicted the risk of stroke. When we used quartiles of summary measures of PCBs and OC pesticides, the adjusted ORs were 1.0, 0.8, 1.2, and 2.1 for PCBs and 1.0, 1.2, 2.3, and 3.0 (95% confidence interval: 1.0-9.4) for OC pesticides (P for trend =0.11 and 0.03, respectively). The adjusted ORs of summary values among subjects with ≥ 90% were 5.5 (1.7-18.1) for PCBs and 4.0 (1.1-14.6) for OC pesticides. Those among those with ≥ 95% were 7.8 (2.1-29.6) and 9.5 (2.3-38.9), respectively.
Conclusion: The background exposure to POPs may play an important role in the development of stroke in elderly.

MONITORING OF ORGANOCHLORINE PESTICIDES IN WATER BASINS

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Background and Aims: Organochlorine pesticides as persistent organic pollutants (POPs) possess various degree of stability to photolysis, biological and chemical degradation. These substances are semi-volatile; this latter allows their long- distance transport through air flow to all parts of the globe, even to remote areas thousands of kilometers from the nearest POPs source. The following problem was set: to determine residual amounts of organochlorine pesticides, including in surface water of rivers and Lake Sevan as the largest lake in Armenia and a natural reservoir of drinking water for the entire region.
Methods: Generally accepted gas-chromatography analysis was performed to trace the residues of mentioned pesticides in samples of surface and drinking water.
Results: DDE (metabolite of DDT) was determined in water samples from Sevan Lake at 0.016 mcg/L and Lindane (gamma-HCH) at 0.067 mcg/L. In samples of drinking water from Yerevan DDT made 0.0013 mcg/L, while HCH achieved 0.0028 mcg/L. In samples of drinking water from Vanadzor HCH (summary) made 0.01 mcg/L.
Analyses for Hexachlorobenzene (HCB) in waters of open reservoirs revealed this substance in the range of 0.005-0.056 mcg/L. HCB residue amounts were also determined in samples from water supply network of cities Yerevan and Vanadzor. In 9 out of 12 samples of water collected in Yerevan HCB was revealed within the range of 0.0001-0.0078 mcg/L. In Vanadzor the residues of HCBs averaged 0.005 mcg/L.
Analyses to determine residual amounts of Heptachlor found out that in surface waters it ranged 0.034-0.17 mcg/L (averagely 0.074 mcg/L).
Conclusions: The results signify to continuing circulation of organochlorine pesticides in environmental compartments. From contaminated areas POPs, though at insignificant amounts, penetrate to different environmental media (ground and surface waters, air), plants, agricultural produce, and then by trophic chains POPs residues penetrate into human organism

EXPOSURE OF ENVIRONMENTAL POLLUTANTS IN GANGNEUNG AS A NON-INDUSTRIAL AREA IN KOREA

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Background and Aims: In order to investigate the relation between environmental pollution and the human health effect in large scale industrial complex regions, cohort studies have been launched since 2003.
The main purpose of this Gangneung study is to produce background data of a non-industrial area which can be compared with some large scale industrial complex regions, such as Ulsan, Sihwa.Banwol, Gwangyang.Yeosu, Pohang and Cheongju.Daesan industrial complexes.
Methods: In this Gangneung study, 1,007 local residents were recruited, and the framework of this study designed to evaluate and monitor health effects associated with low-level but long-term exposure to environmental pollutants. This survey has been performed based on identical questionnaires, medical checkup, allergen skin-prick test with 12 common allergens, sampling and chemical analysis basically. And the environmental pollutants including heavy metals(Pb, Cd, Hg, As) in blood and urine sample were analysed.
Results: The diagnosis prevalence and medical treatment prevalence of asthma were lower than industrial complex regions. But allergic rhinitis was higher. The allergen skin test prevalence was 26.0% and the most common allergen was dust mite (D. *pteronyssinus* 18.0% and D. *farinae* 17.3%). The concentration of heavy metals were 1.57 ㎍/dℓ for Pb in whole blood, 0.82 ㎍/g-creatinine for Cd, 0.98 ㎍/g-creatinine for Hg and 15.78 ㎍/g-creatinine for As(3+, 5+, MMA, DMA) in urine. The concentration of Pb-B was lower than, Cd-U and Hg-U were similar with, and As-U in Gangneung was higher than those in large scale industrial complex regions, Korea.
In the analysis of 11 kinds of VOCs, Vinyl Chloride, 1,3-Butadiene, Dichloroethylene were not detected. Anyway, the detection rate in the others was more than 70% except Chloroform(49.7%) and Trichloroethylene(19.0%). In 16 kinds of PAHs, 10 kinds showed more than 80% in detection rate and 0.01-0.21 ㎍/L in concentration, on the otherhand, Acenaphthylene and Acenaphthene were not detected. In 4 kinds of PCBs, it showed 52-78% of detection rate and 0.003-0.005 ㎍/L in concentration. The level of organic compounds was similar with other large scale industrial complex regions, Korea.
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WORKPLACE EXPOSURE TO TRAFFIC-DERIVED NANOSCALED PARTICULATES

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Background and Aims: Ambient air emissions of sub-micron particles infiltrate into indoor environments and play a major role in occupational exposure (Martuzevicius et al., 2008). Discriminating between particles of indoor vs. outdoor origin is therefore essential when assessing indoor air quality in urban environments. Our study aimed to determine occupational exposure to traffic-derived nanoscaled particulates in a typical Mediterranean environment.
Methods: Sub-micron particles were monitored by means of a multi-angle absorption photometer (MAAP) and a laser spectrometer (GRIMM 1107), providing black carbon (BC) and PM1 concentrations, respectively. The studied laboratory is located on the 5th floor of an 8-storey building in an urban background environment in Barcelona, Spain. The laboratory was not in use during the study period. Windows were kept closed at all times. Indoor BC and PM1 concentrations were compared with ambient BC and PM1 levels from an outdoor monitoring station.
Results: Results evidenced the major impact of outdoor vehicular traffic emissions on indoor particulates: 70% of indoor BC and 73% of indoor PM1 originated from outdoor emissions. This was probably due to due to inadequate insulation of the building. Outdoor/indoor penetration ratios were relatively constant for BC (1.29±0.08) but not for PM1 (1.95±0.38).
Conclusions: In occupational exposure assessment studies, it is advisable to monitor the variability of the penetration factors as a function of time in order to accurately discriminate the contribution to indoor air quality of particulates originating from indoor and outdoor sources. Printing and photocopying contributed with 25-30% (546 ng/m3) of total indoor BC. Dust re-suspension by worker passage was the main source of PM1 (15-20%, 1.1 µg/m3). Workplace exposure to indoor pollutants was determined during day and night work-shifts.
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CROSS SECTIONAL AND LONGITUDINAL ASSOCIATIONS BETWEEN PFOS AND PFOA IN THE MID OHIO VALLEY AND CLINICAL MARKERS OF DISEASE

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Background and Aims: Experimental data and epidemiological studies have suggested potential effects of PFCs, in particular PFOA and PFOS, on a number of clinical markers reflective of or predictive of chronic disease, including lipids, hormones and immune markers. While suggestive, results of cross sectional studies pose difficulties in interpretation due to uncertainties regarding causality. The aim of this presentation is to compare estimates derived from a cross sectional with a nested longitudinal study in the same population.
Methods: In the C8 Science Panel Community Study in the Mid Ohio Valley, associations between clinical markers and PFCs have been investigated in 67,000 participants with individual exposure, biomarker and questionnaire data from 2005-6. Within this population a nested sample of 755 participants was recruited for which clinical markers and PFCs were measured in 2010.Exposure to PFOA had largely stopped at or soon after the first survey and PFOS exposure was also largely reduced. By modeling the change in clinical markers versus change in PFCs, we may test more directly the dependence of biomarkers on PFC levels.
Results: PFOA serum levels in 2005-6 (mean 80 ng/ml) and PFOS (mean 25 ng/ml) were raised in comparison to typical US levels due to contaminated drinking water. Cross sectional analyses indicate significant associations with a number of clinical markers, including serum lipids, which increase with increasing PFOA or PFOS, and serum C Reactive Protein and Immunogobulin A, which fall with increasing PFOA or PFOS. Between the two surveys, the mean fall in PFOA was 54% and in PFOS was 56% (adjusted for age and time). We will also report longitudinal changes in biomarkers.
Conclusions: The collection of longitudinal data is expensive and therefore the nested study was smaller than the cross sectional study, leading to wider confidence intervals. Longitudinal studies address evidence of causality more directly.

SOIL CONTAMINATION BY ORGANOCHLORINE PESTICIDES AND HEALTH AFTER-EFFECTS

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Background and Aims: The problem of contaminated areas and stocks of inappropriate-for-use pesticides, including obsolete organochlorine pesticides is of top-priority for the Republic of Armenia. The problem is aggravated by obsolete organochlorine pesticides burial located in the vicinity of Yerevan, the capital of Armenia, in the zone of active landslide processes. The damage and a possible "breakthrough" of the contents ("innage") of the burial and the subsequent penetration of residues of buried obsolete pesticides into the environment might result in environmental pollution.
Another problem is pollution from sites of former pesticides shops and storehouses.
Methods: Generally accepted gas-chromatography method of analysis was applied to determine residues of organochlorine pesticides in samples of soil taken from evidently polluted sites in different regions of Armenia. Soil samples were analyzed for DDT and its metabolites, Hexachlorocyclohexane, Lindane, Hexachlorobenzene, Heptachlor.
Results: In soil samples taken near former pesticide storehouses Heptachlor content varied from 1.889 to 3.677mcg/kg, DDT ranged 0.266-40.310mcg/kg. The highest amounts of DDT were determined in samples from Armavir (40.10mcg/kg) and Etchmiadzin (8.32mcg/kg). DDE content in analyzed samples made 0.067-10.039 mcg/kg, DDD: 0.0022-1.039mcg/kg, Hexachlorocyclohexane residues were at 0.002-12.682mcg/kg, Lindane – 0.076-7.086mcg/kg, Hexachlorobenzene –0.063-13.992mcg/kg.
In samples from the territory of former pesticide shops Heptachlor was in the range of 1.611-2.758mcg/kg, DDT- 0.694-55.496mcg/kg, DDE- 0.038mcg/kg, DDD-1.067 mcg/kg, Hexachlorocyclohexane – 0.006-3.502mcg/kg, Lindane – 0.64-1.512mcg/kg, Hexachlorobenzene – 0.46-1.842mcg/kg.

Soil from the territory of the shops was less polluted than the soil near the storehouses.

Conclusions: Solution of the problem relevant to remediation of contaminated areas is of prime significance and urgency for Armenia, taking into account the important role of soil in the entire chain "environment – human health" as the main vehicle and probable carrier of pollutants The problem is more than serious due to the fact that its solution requires a continuous period of time.

ORGANOCHLORINE COMPOUNDS: TROPHIC CHAIN TRANSFER

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Background and Aims: Persistent Organic Pollutants (POPs) are capable to migrate for long distance, persist in the environment for long years, cumulate in environmental media, food-stuffs, and adipose tissues of animals and humans.
Methods: Generally accepted gas-chromatography method of analysis was performed to determine residues of Heptachlor, HCH, DDT, HCB in samples of food from different regions of Armenia.
Results: Despite the prohibitive actions, the residual amounts of DDT continue to be revealed in foodstuffs, environmental media (soil, surface water) and even human organism.
DDT content in eggs made 0.07-635.0 mcg/kg, in meat: 0.67-4.45 mcg/kg, in milk: 0.16-1.45 mcg/L, in cheese: 0.19-7.11 mcg/kg.
HCH in eggs made 0.07-1.72 mcg/kg, Lindane – 0.35-0.73 mcg/kg. In meat residues leveled 0.09-1.61 mcg/kg, while Lindane amounted 0.23-0.7 mcg/kg. In samples of milk HCH made 0.02-1.23 mcg/L; residues of Lindane 0.06-2.25 mcg/L. In cheese residues of HCH and Lindane were at 0.20-3.18 and 0.03-5.17 mcg, appropriately.
Monitoring on Hexachlorobenzene (HCB) in foodstuffs from different regions of Armenia signifies to presence of this pesticide in eggs within the range of 0.008-4.54mcg/kg. In samples of meat HCB ranged 0.028-9.16mcg/kg; residues in samples of milk leveled to 0.009-0.74 mcg/L, while in samples of cheese the compound made 0.1-15.65 mcg/kg.
Residues of Heptachlor in eggs made 0.023-0.12 mcg/kg, in meat 0.024-4.23 mcg/kg, in samples of milk 0.023-0.12 mcg/L. In samples of cheese Heptachlor was not revealed, except 1 sample (0.153 mcg/kg).
Conclusions: As residues of all investigated pesticides were revealed in eggs and meat, the findings testify to fresh application of POPs (DDT and HCH).
Contamination of agricultural lands and food-stuffs by pesticide residues poses threat for the environment and human health. Therefore, issues of pesticides management should not be considered as problems of exceptionally ecological significance.

HEAT VS. HEAT WAVE RELATED MORTALITY – ARE THE SUSCEPTIBLE GROUPS COHERENT?

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Background and Aims: Several recent studies explored the separate mortality effects of heat and the duration of heat waves. Some of them show large differences in the associated effects. However, few studies have investigated whether the effects related to heat and heat waves are homogeneous or heterogeneous in subgroups of a study population. We aim to study the effects of heat and a heat wave´s duration according to age, cause of death, social factors and medical history.
Methods: We studied the population of Stockholm, Sweden. We used Poisson models adjusting for over-dispersion, regressing daily ambient weather condition on daily deaths by strata of the population. We additionally adjusted for calendar effects, seasonality, influenza and long-term time trends using smooth functions and factor variables. We assessed the sensitivity of confounding by air pollution. To evaluate effect-modification of individual social and medical factors, we employed the case-only design.
Results: For natural causes of death, the effect of heat wave duration was estimated as a RR of 1.024 (1.010 to 1.038) per day in sequence, while the effect of elevated heat was estimated as a RR of 1.006 (1.001 to 1.010) per degree C. The effects varied by age and cause of death. Heat wave duration was significantly related to higher deaths in ages from 65 years and with cardiovascular and non-cardiorespiratory causes, while heat was found associated only with deaths in ages 80+ and with non-cardiorespiratory causes.
Men appeared to have lower RR to heat, while higher RR to heat wave duration compared to women. A recent hospitalization appeared to reduce the RR for both stressors. We found a strong effect-modification of the RR related to heat wave duration for the group having pre-existing mental disorders. A pre-existing cardiovascular hospitalization appeared to reduce the effect of both stressors.
Conclusions: The effect of heat and a heat wave´s duration differs among subgroups of the population in Stockholm, Sweden. A differentiation of heat exposure and heat wave duration can yield a better understanding of when a susceptible group is particularly vulnerable, and, thus, help targeting adaptive and preventive efforts with benefits for the public health.
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PRENATAL EXPOSURE TO DDT AND BIRTH OUTCOMES IN WOMEN RESIDING IN A MALARIA ENDEMIC AND NON MALARIA COASTAL REGIONS OF SOUTH AFRICA

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Background and Aims: DDTs are highly persistent and accumulate in the environment, food chain and humans. Use of DDT for indoor residual spraying (IRS) to control malaria vector is a subject of ongoing debate as DDT and its metabolites are considered to be endocrine disruptive chemicals. Potential risks to the developing foetus and young child are of concern. The objective of this study was to assess the extent of exposure to DDT and its metabolites in pregnant women residing in the malaria control and non malaria coastal regions of South Africa.
Methods: The study included totally 270 women admitted for delivery at the maternity sections of provincial hospitals who donated blood for chemical analyses and signed an informed consent form. They answered a socio-economic questionnaire by interview and allowed access to their post delivery records. Blood plasma samples were analysed for DDT and metabolites using the GCMS techniques. Birth outcomes and confounding factors were also evaluated.
Results: As expected, the highest levels of DDT and metabolites were found in delivering women residing in IRS area, but elevated levels were also observed in some women residing in non malaria region.
Conclusion: It is understood that exposures to contaminants may pose greater health risks to the populations in the southern hemisphere that is highly compromised by poverty and poor health status, compared to the northern hemisphere. This effect may be further potentiated by climate change. Findings of this investigation will inform policy makers both locally and internationally including the work within Stockholm Convention on POPs and Roll Back Malaria initiative. In conclusion, future monitoring and careful follow up of health in the area is needed. The distinct exposure patterns in study sites, makes this area very suitable for the implementation of birth registries.

CYTOGENETIC EFFECT MARKERS IN MOTHERS AND FETUSES EXPOSED TO ENVIRONMENTAL CHEMICAL MUTAGENS

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Background and Aims: Maternal exposure to environmental chemical mutagens (heavy metals, formaldehyde) may enhance risk for congenital malformations and chromosome aberrations in fetuses (newborns). We aimed to determine cytogenetic effect markers in mothers and fetuses exposed to environmental chemical mutagens using epidemiological study data.
Methods: A cytogenetic examination of 95 mother-newborn pairs exposed to environmental chemical mutagens including manganese, nickel, lead, formaldehyde (a study group), and 70 non-exposed dyads (a control group) was carried out analyzing metaphase chromosomes from mother and newborn's blood lymphocytes by the standard method. Blood chemical mutagen concentrations were determined applying atomic absorption spectrophotometry, liquid chromatography. The relationship between the frequency of chromosome aberrations, and the exposure to the chemical mutagens was assessed using epidemiological study data and calculating odds ratio (OR).
Results: The blood samples from the pregnant and parturient women were found to contain elevated formaldehyde, manganese, nickel, lead concentrations (1.5-12 fold increase compared to the reference levels) (p=0.001). Polymorphic chromosome changes were detected in 30% of the study group women that exceeded the control group indices by 5-fold. The probability (OR) of chromosome aberrations in newborns from the exposed women with chromosome polymorphism was higher (OR=6.7) compared to the control group. We determined the probability of chromosome aberrations in newborns whose mothers demonstrated high frequency of chromosome polymorphism associated with the exposure to formaldehyde and nickel (OR=10.5, p=0.001). The probability of numerous congenital malformations and chromosome aberrations was higher in newborns of women exposed to manganese, lead and nickel having an increased frequency of chromosome polymorphism (OR=2.7, p=0.001).
Conclusions: Exposure markers are elevated concentrations of manganese, formaldehyde, nickel, lead in the mothers and newborns' blood. Cytogenetic effect markers are high frequency of chromosome polymorphism in the mothers and associated chromosome aberrations in the newborns.

A NESTED CASE-CONTROL STUDY OF INTRAUTERINE EXPOSURE TO PERSISTENT ORGANOCHLORINE POLLUTANTS IN RELATION TO RISK OF HYPOSPADIA

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Background and aims: In western countries the prevalence of hypospadias varies from two to eight cases per 1,000 live births. Knowledge about risk factors for hypospadias is still scarce. However, environmental exposures to so called endocrine disrupting chemicals (EDCs) have been suggested as a risk factor. An important group of EDCs is persistent organochlorine pollutants (POPs). Due to the unique personal identification number present in the biobank databases and the national health registries in Sweden we have the possibility to investigate the association between POPs and hypospadias in relatively large studies.

Methods: The Malmö Microbiology Biobank (MMB) contains about 200 000 deep-frozen serum samples, stored after population-based serological screening for virus infections and rubella immunity during pregnancy week 14. Linkages between the Medical Birth Register, the Malformation Register and the In-patient Register resulted in 390 boys with hypospadia. For 237 (61 %) of them, sufficient amount of serum samples were found in the biobank. For each case a control boy was randomly selected from the MMB.

2,2',4,4',5,5'-hexachlorobiphenyl (PCB-153), the major DDT metabolite 1,1-dichloro-2,2-bis (*p*-chlorophenyl)-ethylene (*p,p´*-DDE) and hexachlorbenzene (HCB) were used as biomarkers of POP exposure.

Results: A 65 percent statistically significantly increased risk in the highest maternal exposure quartile of HCB as compared to the three lowest HCB exposure categories was observed. The pattern was, although not statistically significant, similar for maternal exposure for *p,p'*-DDE.

Conclusion: The present study indicates that *in utero* exposure to HCB and perhaps exposure to *p,p'*-DDE is a risk factor for hypospadia. The fact that HCB and *p,p'*-DDE may affect the androgen-signalling pathway should reinforce the concept that ECDs, though present at low doses, may affect human health negatively.

A META-ANALYSIS OF CORD SERUM CONCENTRATIONS OF PCB AND BIRTH WEIGHT

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Background and Aims Exposure to high concentrations of persistent organochlorines may cause fetal toxicity, but evidence regarding reproductive effects at lower concentrations is limited. Within the framework of the EC ENRIECO and OBELIX projects, we examined the hypothesis that polychlorinated biphenyls (PCBs) impair fetal growth.

Methods We used maternal and cord blood and breast milk samples in 7.990 women enrolled in twelve European birth cohorts from 1990-2008, and re-expressed all measurements as cord serum estimates of PCB 153. Using identical variable definitions, we performed linear regression analyses of birth weight on cord serum estimates of PCB 153 for each cohort. Analyses were adjusted for gestational age and a priori selected covariates. Summary estimates were obtained by meta-analysis.

Results The median concentration of cord serum PCB 153 was 134 ng/L (range of medians 20–485). In all cohorts except the two smallest, birth weight decreased with increasing cord serum concentration of PCB 153 after adjustment for potential confounders. The meta-analysis across all cohorts indicated a birth weight decline of 150 g (95% CI 50-250 g) per one µg/L increase of PCB 153, which is close to the range of exposure levels across the cohorts. The results did not change substantially in any of the sensitivity analyses in all or subsets of the cohorts. These included control for weight gain during pregnancy, restriction to full term babies, control for lipid concentration in serum and models based upon quadratic and loglinear transformations of exposure measures. Finally, we found no indication of effect modification of gender, tobacco smoking or concentration of the DDT metabolite p,p´-DDE.

Conclusions The findings suggest that low-level exposure to PCB or correlated exposures in Europe impairs human fetal growth.

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PHARMACEUTICAL COMPOUNDS IN SOILS IRRIGATED WITH RECLAIMED WASTEWATER: FATE IN THE AGRO-ENVIRONMENT

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Background and Aims: Irrigation with reclaimed wastewater accounts for more than 50% of total irrigation water in Israel. This unique situation of intensive irrigation with reclaimed wastewater and sludge application containing residues and active pharmaceutical compounds (PCs) provides an excellent opportunity to study the long-term exposure effects of these compounds in soils. The long-term introduction of PCs to arable land may affect the agro-ecosystem in various aspects which are not known to date. In this study we aimed to elucidate the behavior (transport, sorption-desorption and plant uptake) of pharmaceutical compounds in the agro-ecosystem and to evaluate the potential transport of the compounds to groundwater and more importantly to enter the food-chain via crops.
Methods: All the studied compounds were detected in reclaimed wastewater used for crop irrigation. Transport and sorption experiments were performed with soil layers sampled from a plots that have been irrigated with reclaimed wastewater for long period. Uptake by plants was studied in hydroponic greenhouse experiments using different soil types irrigated with fresh water or reclaimed wastewater
Results: Carbamazepine and diclofenac were significantly retarded in the 0-5 cm soil sample rich in soil organic matter. Carbamazepine was not affected by the water quality (freshwater vs. reclaimed wastewater), whereas diclofenac exhibited a higher retardation factor (RF) in the freshwater system. Naproxen exhibited significantly lower RFs than diclofenac but with a similar trend—higher retardation in the freshwater versus reclaimed wastewater system. In the 5-15 cm soil sample containing low soil organic matter, naproxen was highly mobile while carbamazepine and diclofenac were still retarded. In the 15-25 cm sample, all compounds exhibited their lowest RFs. The antibiotics sulfamethoxazole and sulfapyridine exhibited high mobility under both fresh and wastewater application and were not affected by sludge application.
Carbamazepine concentration in cucumber fruits and leaves was negatively correlated with the level of organic matter in the growing medium. The concentrations of carbamazepine in the roots and stems of cucumber plants were relatively low; most of it (76-84% of total uptake) was detected in the leaves. A greenhouse experiment using fresh water and reclaimed wastewater spiked, or not, with carbamazepine at 1 $\mu g\ L^{-1}$ (typical concentration in effluents) revealed that it can be taken up and bio-accumulated from its indigenous concentration in reclaimed wastewater. Our experimental data in hydroponic culture suggest that the uptake of carbamazepine can be considered passive and unrestricted and the translocation is governed by water mass flow; therefore, in the greenhouse experiments, the bioaccumulation factor for the fruits was significantly lower than the value calculated for the leaves.
Conclusions: Our data suggest that carbamazepine and diclofenac can be classified as slow-mobile compounds in soil organic matter-rich soil layers. When these compounds pass this layer and/or introduced into soil organic matter-poor soils, their mobility increases significantly (Chefetz et al., 2008). Other compounds based on their physico-chemical properties can be considered as highly mobile in soils. This study emphasizes the potential uptake of active pharmaceutical compounds by crops in organic-matter-poor soils irrigated with reclaimed wastewater and highlights the potential risks associated with this agricultural practice (Shenker et al., 2011).

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DEVELOPMENT OF INDICATORS FOR MONITORING THE IMPLEMENTATION OF INTERNATIONAL COMMITMENTS TO REDUCE HEALTH IMPACTS OF ENVIRONMENTAL FACTORS IN THE WHO EUROPEAN REGION

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Background and Aims: The WHO European Centre for Environment and Health develops and maintains the Environment and Health Information System (ENHIS) which entails indicators of exposure to and population health effects of priority environmental factors and related policy actions. ENHIS is being expanded in order to monitor the implementation of the commitments of the Fifth Ministerial Conference on Environment and Health in Europe (Parma, Italy, 2010) focusing on the protection of children's health.
Methods: Initial indicator proposals were developed by international experts focusing on the time-bound Parma Conference commitments. A minimum set of indicators to enable monitoring of these commitments was selected at a WHO technical meeting using a structured indicator evaluation approach. Current efforts concentrate on refining indicator methodologies and implementing pilot projects in selected countries.
Results: Indicators characterizing the school environment include access to properly maintained sanitation facilities, hygienic practices, mode of transportation to school, smoking in schools and on school grounds, exposures to dampness and moulds, ventilation rate in classrooms, and exposure to indoor chemical air pollutants, such as formaldehyde and nitrogen dioxide. These indicators require a periodic survey of schools across the European Region. The survey will employ a randomized clustered sampling design and be based, to the extent possible, on the existing national and international monitoring efforts to minimize the costs. New biomarker-based indicators are designed to characterize temporal trends in early life exposure to selected chemical pollutants. Policy indicators relying on national-level surveys will provide insights into actions and regulations aimed at reducing exposure to harmful environmental factors and promoting healthy behaviours.
Conclusions:ENHIS will rely on standardized application of surveillance and epidemiological methods across Europe, and serve as a main source of information on the effects of Parma commitments implementation. A baseline assessment report will be released in 2013.

GEOGRAPHIC AND GENDER DIFFERENCES IN AUTISM SPECTRUM DISORDERS AMONG CHILDREN: ANALYSIS OF THE DATA FROM THE NATIONAL REGISTRY IN TAIWAN

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Background and Aims: The prevalence of autism spectrum disorders (ASD) in the world has increased dramatically in the recent decades. However, data at the national level are limited, and geographic differences are seldom evaluated. We conducted a study to estimate the prevalence of ASD in Taiwanese children and to assess the geographic and gender differences.

Methods: According to the law, each city and county in Taiwan is mandated to certify the disabled residents and provide various services, and the Department of Interior maintains a registry of certified cases. The registry started to enroll cases of ASD since 1990 and publish summary data annually, which provide a unique opportunity to study epidemiology of ASD at the national level. We analyzed the data from 2000 to 2009.

Results: From 2000 to 2009, the registered cases increased from 2,062 to 9,160 annually, and the prevalence increased every year in all age groups. In each year there were more male cases than female cases, and the male-to-female ratio ranged from 5.99 to 6.80, with an increasing trend over time ($p < 0.01$). A higher prevalence was observed in the urban areas over the years, and the prevalence rate ratio ranged from 2.49 to 2.99, with a decreasing trend over time ($p < 0.01$).

Conclusions: The prevalence of ASD has been increasing in Taiwanese children. The risks were higher in rural areas than in urban areas and higher in boys than in girls. Further analyses of data on individual cases are desirable.

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RETROSPECTIVE EXPOSURE ESTIMATION AND PREDICTED VERSUS OBSERVED SERUM PERFLUOROOCTANOIC ACID CONCENTRATIONS FOR PARTICIPANTS IN THE C8 HEALTH PROJECT

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Background and Aims: People living or working in eastern Ohio and western West Virginia have been exposed to perfluorooctanoic acid (PFOA) released by the DuPont Washington Works facilities. The specific aim of this work is to estimate historical PFOA exposures and serum concentrations experienced by each of 45,276 non-occupationally exposed participants in the C8 Health Project who consented to share their residential histories.
Methods: Annual PFOA exposure rates were estimated for each individual based on predicted calibrated water concentrations and predicted air concentrations from a previously published environmental fate and transport model, individual residential histories, and default assumptions from the EPA Exposure Factors Handbook. Individual exposure estimates were coupled with a one-compartment pharmacokinetic model to estimate time-dependent serum concentrations.
Results: For all participants (n = 45,276), predicted and observed median serum concentrations in 2005-2006 are 21.6 and 24.3 ppb, respectively (Spearman's rho = 0.67). For participants who provided daily public well water consumption rate and who had the same residence and workplace in one of six municipal water districts for 5 years before the serum sample (n = 785), predicted and observed median serum concentrations in 2005-2006 are 30.3 and 39.3 ppb, respectively (Spearman's rho = 0.83).
Conclusions: Serum PFOA concentrations predicted by linked exposure and pharmacokinetic models are well correlated with observed 2005-2006 human serum concentrations for C8 Health Project participants. These individualized retrospective exposure and serum estimates may be useful for a variety of epidemiologic studies being conducted in this region.

RESIDENTIAL DISTANCE TO ROAD AND THE RISK OF INCIDENT CORONARY HEART DISEASE AND ALL CAUSE MORTALITY

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Background and Aims: Long-term exposures to ambient air pollution, especially from traffic sources, have been associated with increased cardiovascular morbidity and mortality. Few studies, however, have been able to also examine the effects of changes in pollution exposure on changes in risk. The current study explored the association of residential distance to road with incident CHD and all cause mortality risk during 20 years of follow-up in the prospective Nurses' Health Study cohort of US women.
Methods: Cases of incident coronary heart disease (CHD), defined as first nonfatal myocardial infarction or fatal CHD, and all-cause mortality were identified from 1988-2006. We calculated distance to road for each address 1986-2004 as a proxy for traffic pollution exposure. To examine the effect of changes in exposure to traffic, each consecutive pair of addresses was categorized as: (1) consistently exposed, (2) consistently unexposed, (3) move from exposed to unexposed, and (4) move from unexposed to exposed.
Results: Among the 79,134 women available for analysis, a total of 2,575 incident CHD cases and 9,074 deaths were identified over 1,141,417 person-years. In fully adjusted time-varying Cox proportional hazards models, women with a current address exposed to traffic were at an 8% (95%CI: -5%, 23%) higher risk of an incident CHD event and a 6% (95%CI: -1%, 14%) higher risk of all cause mortality, These risks were similar in women who were in the consistently exposed category. Although the numbers were small, there was a suggestion that the highest risks were seen among women who moved from unexposed addresses to exposed addresses.
Conclusions: Our results suggest an association between residential proximity to roadways and incident CHD and all-cause mortality. The risk was most notable in women who moved from an unexposed to an exposed address.

TRAFFIC-RELATED AIR POLLUTION, CHILDHOOD ASTHMA AND THE INFLUENCE OF CANDIDATE GENES INVOLVED IN OXIDATIVE STRESS

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Background and Aims: We combined previously collected data from two Canadian and four European birth cohorts to examine whether exposure to traffic-related air pollution interacts with a child's genetic profile to impact their risk of developing asthma.
Methods: Logistic regression was used to evaluate the association between traffic-related NO_2 (land use regression or dispersion model) and physician-diagnosed asthma or parent reported 'ever wheeze' at school age, stratified by *glutathione S-transferase P1* (*GSTP1*) and *tumor necrosis factor* (*TNF*) genotypes. Interaction terms were included to test for interaction between genotype and NO_2 in models for asthma and wheeze. Analyses were adjusted for gender, cohort, city, maternal age, parental atopic disease, and environmental tobacco smoke exposure (and intervention status for relevant studies).
Results: The combined dataset contained information for 4,902 children (380 asthma cases; 2,182 wheeze cases) and included three single-nucleotide polymorphisms (SNPs): rs1799811 (*GSTP1*; $C>T^{114}$), rs947894 (*GSTP1*; $A>G^{105}$) and rs1800629 (*TNF*; $G>A^{308}$). Pooled estimates for asthma by rs1799811 were elevated for carriers of the minor (CT,TT) alleles [OR per 10 $\mu g/m^3$ of NO_2: 2.12(95%CI: 1.12-4.00)] but not for major (CC) allele carriers [1.12(0.80-1.56)]. Accordingly, the interaction between rs1799811 and NO_2 was statistically significant (p-value=0.012) for asthma. The estimates for asthma for the remaining two SNPs were not statistically significant and interactions for both were also non-significant (p-value=0.152 for rs947894 and 0.051 for 1800629). Pooled estimates for wheeze, stratified by allele, were not statistically significant for any of the SNPs considered. Interactions for the *GSTP1* SNPs were not statistically significant in models for wheeze (p-value=0.889 for rs1799811 and 0.819 for rs947894), but the interaction for rs1800629 was significant (p-value=0.008).
Conclusions: In the largest study of its kind to date, we find that children with the rs1799811 minor alleles are at increased risk for developing asthma when exposed to traffic-related air pollution.

A FLEXIBLE SPATIO-TEMPORAL MODEL FOR AIR POLLUTION WITH SPATIO-TEMPORAL COVARIATES

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Background and Aims: We developed a spatio-temporal model for predicting ambient air pollution that combines unbalanced monitoring data with deterministic air quality model output. This work is part of the Multi-Ethnic Study of Atherosclerosis and Air Pollution (MESA Air) study, a prospective cohort study funded by the US EPA to investigate the relationship between chronic exposure to air pollution and cardiovascular disease.

Methods: The monitoring data includes three spatial "snapshots" at 174 locations; rotating monitors giving 2-3 measurements at 84 subject homes; and 25 time series of two-week averages at fixed and regulatory monitoring (AQS) sites. The data are unbalanced because at any given time measurements are available at only a subset of measurement sites. We also have geographic covariates and a spatio-temporal covariate based on the output from a source dispersion model for traffic-related air pollution (Caline3QHC; Wilton et al 2010).

We extended our unified hierarchical spatio-temporal model (Szpiro et al, 2010) to accommodate spatio-temporal covariates. We improved the estimation approach and developed several cross-validation strategies to make the fullest use of the available data. We assessed predicted NOx concentrations in Los Angeles.

Results: The model predicted well with cross-validated spatial R^2 of approximately 0.7 at subject homes. We successfully incorporated the source dispersion model output into the prediction model, but our implementation of Caline3QHC did not improve predictions in a model with road covariates. However, we found some evidence that Caline3QHC could replace the road covariates.

Conclusions: This spatio-temporal model for air pollution concentrations provides a flexible approach to combining irregularly sampled pollution monitoring data with geographic covariates and the output from deterministic air quality models. We successfully predicted long-term average NOx concentrations while taking full advantage of the unbalanced monitoring data available to the MESA Air study. This model has been implemented in an R-package, `SpatioTemporal`.

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Research and Analysis on the Current Situation of the Noise Pollution in Xi'an City's Acoustic Environmental Domains

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Background and Aims: To find out the noise pollution situation in the acoustic environmental domains in Xi'an city
Methods: Measure the noise level in Xi'an city's domains day and night during the period of January to June, from year of 2007 to year of 2009 and report the monitor result in the seasonal average equivalent sound level.
Results: The monitor result of the noise pollution in Xi'an city's five kinds of acoustic environmental domains is listed as follows: Special residential area's daytime noise in the first season is within the national standard, which exceeds the national standard in the second season from year of 2008, the night noise is all beyond it; the relevant indexes of Residential culture and education area are all exceed the national standard; The mixed area's daytime noise is within the limit in the recent years; while its nighttime noise is only within the national standards in 2010; The industrial area's daytime and nighttime is all beyond the limit; The area around the main transportation routes has qualified daytime noise for all four season, yet the night noise is beyond the limit.
Conclusions: The situation of noise exceeding the national limit exists in all domains in the city, and the night noise situation is more serious. Besides, the noise levels in the night time of the third season in the industrial area and the daytime of the second season of the mixed area have an obvious increase compared with other seasons, which might affect the Xi'an city residents' normal quality of life, and should be controlled.
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CHRONIC EXPOSURE TO TRAFFIC POLLUTION IS ASSOCIATED WITH REDUCED GLOMERULAR FILTRATION RATE

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Background and Aims: Chronic exposure to air pollution from traffic, as measured using residential distance to major roadway, has been associated with increased incidence of cardiovascular diseases endpoints. Considering that chronic kidney disease and cardiovascular disease share certain common risk factors, we hypothesized that chronic exposure to traffic pollution would be associated with a lower estimated glomerular filtration rate (eGFR).
Methods: Serum creatinine was drawn at the time of hospital presentation among 1120 consecutive patients hospitalized for stroke. We calculated eGFR using the Chronic Kidney Disease Epidemiology Collaboration equation. We calculated residential distance to the nearest major roadway as a measure of exposure to traffic pollution. We abstracted from medical records information on patient demographics, past medical history, and admission medications, and obtained data from the 2000 US Census on income and educational attainment as a measure of census track socioeconomic status. We used linear regression to estimate the association between residential distance to major roadway and eGFR, controlling for age, sex, race, smoking, diabetes, hypertension, heart failure, coronary artery disease, treatment with angiotensin converting enzyme inhibitors, and socioeconomic status. We considered distance to major roadway as both a categorical variable (0-50, 50-100, 100-200, 200-400, and >400 m) and a log-transformed continuous variable.
Results: Living closer to a major roadway was associated with a statistically significantly lower eGFR versus living farther away (p-trend=0.03). When considering distance to roadway as a log-transformed continuous variable, we found that living <=100 m versus >500 m from the nearest major roadway was significantly (p=0.007) associated with a 2.08 mL/min/1.73 m2 (95CI: 0.56-3.60) lower eGFR.
Conclusions: Chronic exposure to traffic pollution, as measured using residential distance to major roadway, was associated with lower eGFR in a population hospitalized for stroke, and the estimated effects were comparable to those of other predictors of eGFR.

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Effect modification of the association between nitrates and rectal cancer by drinking water hardness: evidence from an ecological study

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Background and Aims: The objectives of this study were to (1) examine the relationship between nitrate levels in public water supplies and increased risk of death from rectal cancer and (2) determine whether calcium (Ca) and magnesium (Mg) levels in drinking water might modify the effects of nitrate on development of rectal cancer.
Methods: A matched case-control study was used to investigate the relationship between the risk of death from rectal cancer and exposure to nitrate in drinking water in Taiwan. All rectal cancer deaths of Taiwan residents from 2003 through 2007 were obtained from the Bureau of Vital Statistics of the Taiwan Provincial Department of Health. Controls were deaths from other causes and were pair-matched to the cases by gender, year of birth, and year of death. Information on the levels of nitrate-nitrogen (NO_3-N), Ca, and Mg in drinking water was collected from Taiwan Water Supply Corporation (TWSC). The municipality of residence for cancer cases and controls was presumed to be the source of the subject's NO_3-N, Ca, and Mg exposure via drinking water.
Results: Relative to individuals whose NO_3-N exposure level was <0.38 ppm, the adjusted odds ratio (OR) (95% CI) for rectal cancer occurrence was 1.15 (1.01-1.32) for individuals who resided in municipalities served by drinking water with a NO_3-N exposure > or =0.38 ppm. There was no apparent evidence of an interaction between drinking water NO_3-N levels with low Mg intake via drinking water. However, evidence of a significant interaction was noted between drinking-water NO_3-N concentrations and Ca intake via drinking water.
Conclusions: Our findings showed that the correlation between NO_3-N exposure and risk of rectal cancer development was influenced by Ca in drinking water. This is the first study to report effect modification by Ca intake from drinking water on the association between NO_3-N exposure and risk of rectal cancer occurrence. Increased knowledge of the mechanistic interaction between Ca and NO_3-N in reducing rectal cancer risk will aid in public policymaking and setting threshold standards.

THE DEVELOPMENT OF A MULTIPOLLUTANT SCIENCE ASSESSMENT TO SUPPORT THE REVIEWS OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S NATIONAL AMBIENT AIR QUALITY STANDARDS

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Background and Aims: Standard setting, science assessments, and research related to evaluating and reducing the human health effects of exposure to air pollutants have largely focused on single-pollutant approaches. Nonetheless, it has long been recognized that human populations are exposed to a complex mixture of air pollutants that varies in time and space. This work describes efforts of the U.S. Environmental Protection Agency (EPA) to move toward multipollutant approaches to evaluating the human health effects of exposure to air pollution.
Methods: Scientists with EPA's National Center for Environmental Assessment (NCEA) are evaluating the feasibility of assessing the health effects of exposure to air pollutant mixtures as a part of ongoing reviews of the U.S. National Ambient Air Quality Standards (NAAQS). Overcoming the scientific and logistical challenges associated with conducting such an assessment will involve extensive collaboration with partners and stakeholders in government, industry, academia, and the broader research community.
Results: EPA has developed plans to conduct a multipollutant science assessment whereby the health effects of exposures to mixtures of air pollutants may be systematically evaluated. While legally mandated schedules for completing reviews of the NAAQS somewhat complicates the simultaneous assessment of all air pollutants for which NAAQS have been established, there is a clear need to more explicitly address multipollutant issues in the NAAQS review process. Initial plans, scope and approaches related to the development of the proposed multipollutant science assessment will be presented and discussed.
Conclusions: Although there are considerable scientific and regulatory challenges associated with adopting multipollutant approaches for the evaluation of air pollution-induced health effects, significant progress can be made in the near future through parallel advancements in multipollutant policy, health assessments and research. (Disclaimer: The views expressed are those of the authors and do not necessarily reflect the views or policies of the U.S. EPA.)

MORTALITY AMONG PFOA-EXPOSED WORKERS

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Background and Aims: PFOA is ubiquitous at low levels in the serum of residents of industrial countries, and is biopersistent. It is a suspected human carcinogen based on animal data, and some human evidence suggest it causes increased cholesterol. Few human data exist on health effects. Our aim is to determine if PFOA workers with high exposures show excess mortality from any cause. Among 1025 current workers in 2004 at the plant we have studied, those working in PFOA area had a median PFOA serum level of 494 ng/ml, while those who had never worked in a PFOA area had a median level of 114 ng/ml (Sakr et al. 2007) By comparison the US median serum level in the general population is 4 ng/ml). Previously mortality findings in this cohort have shown an excess of diabetes and kidney cancer compared to other Dupont workers, and some positive trends for heart disease mortality (Leonard et al. 2008, Sakr et al. 2009).
Methods: We have studied mortality through 2008 of 6027 workers occupationally exposed to high levels of PFOA during the period 1950-2004, in a chemical plant producing fluoropolymers. We have used a newly developed job-exposure matrix (JEM) which estimates serum levels over time based on the workers' job history. Observed PFOA serum levels over the period of 1979-2004 were available for 2125 workers directly and indirectly exposed (median 580 ng/ml , vs 5 ng/ml in the general population), as were data on plant usage of PFOA. Mortality was analyzed for 92 causes of death using the NIOSH life table and Poisson regression, using cumulative serum (ppm-days) as exposure.
Results: Results are not yet available but will be presented at the symposium.
Conclusions: To be presented at the symposium.
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ENVIRONMENTAL HEALTH RISKS AND BENEFITS CAUSED BY CLIMATE PROTECTION POLICIES IN EUROPE

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Background and Aims: Policies and measures for mitigation of climate change are nearly always chosen with considering only a few criteria like the reduction of CO_2-equivalent emissions, costs and acceptability. However, there are relevant side benefits or side detriments that are also important for the assessment, especially secondary environmental health impacts. 'Secondary' here means that they are not caused directly by climate change, but by changes in environmental pressures caused by mitigation policies. These secondary impacts should be taken into account when designing climate policies; it is thus the aim of the work described here to estimate these health impacts for important climate protection policies.

Methods: The health risks are determined using the 'integrated environmental health impact assessment' methodology developed in the EC projects INTARESE and HEIMTSA. For two scenarios, one with and one without the policies assessed, the changes in pressures to the environment (e.g. PM2.5 emissions) are determined. These are then transformed into concentrations in air or food using atmospheric and multimedia models. The last step is the estimation of health risks with the help of exposure-response- or intake-response-relationships derived from epidemiological studies.

Results: Results show that the health impacts of a number of climate change mitigation policies and adaptation measures are as important as the avoided climate change effects. Policies like e.g. promotion of wind energy or better efficiency of electronic equipment cause a significant reduction of health risks, while others, especially the use of wood stoves and the better insulation of buildings, might under certain conditions cause large negative health risks.

Conclusions: Thus using results of epidemiological studies within an integrated health impact assessment provides an important contribution to support decision making. A number of policies will improve their cost-benefit ratio, others would only be recommended, if accompanying measures like filters for wood stoves or mechanical ventilation systems in insulated buildings are foreseen.

HEALTH IMPACT ASSESSMENT OF MEASURES THAT REDUCE PM10 AND PM2.5 CONCENTRATIONS IN GERMANY

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Background and Aims: The most important environmental health risks in Europe are caused by exposure to fine particles. Current PM10 and PM2.5 concentrations result in an average reduction of life expectation of the European population of a few (ca 3 to 5) months. Furthermore the PM10 thresholds are frequently exceeded. Thus a further reduction of the fine particle concentration is necessary. However this should be done with efficient measures, i.e. measures with the lowest costs per unit of health risk reduced (e.g. expressed in DALYs – disability adjusted life years). The aim of this paper is to identify and assess measures applied in Germany to reduce health risks.

Methods: The 'impact pathway approach' is used to estimate health effects of the measures. First the change in emissions of primary PM10/PM2.5 and of PM precursors (NOx, SO2, NH3, VOC) caused by the measures is determined. Then using an atmospheric model the concentration of PM10 and PM2.5 is calculated for Europe. The increase in concentration in cities is taken into account by estimating an urban increment. The resulting concentration is then used to estimate different health impacts (e.g. years of life lost, cases of chronic bronchitis, respiratory hospital admissions and many others). These health endpoints are then aggregated to DALYs. For each measure the costs per DALY saved are calculated.

Results: Around 40 measures are ranked according to their efficiency and effectiveness. Important measures are identified in the agricultural sector, e.g. improved application and amount of fertilizer and manure, filter in hog houses or less animal protein (meat) consumption; and in the industrial sector , e.g. improved dust filters and DENOX plants.

Conclusions: Results show the usefulness of health impact assessments for supporting environmental policy decisions. However the results depend on assumptions about the relative toxicity of the different species contained in PM, thus further research is needed.

THE DEBATS STUDY: HEALTH EFFECTS OF AIRCRAFT NOISE NEAR THREE FRENCH AIRPORTS

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Background and Aims: A national survey carried out in 2005 shows that 6.6% of the French population are annoyed by aircraft noise (Lambert *et al*, 2009). While many surveys carried out both in France and abroad address aircraft noise annoyance or report adverse effects on sleep quality, much fewer consider at the same time the physiological effects of this noise exposure. DEBATS aims to characterize the relations between aircraft noise exposure and health status of the French population living in the vicinity of airports, both physically and mentally but also in terms of annoyance.
Methods: DEBATS is an on-going research program (2011-2016) involving residents around three French airports: Paris-Charles de Gaulle, Toulouse-Blagnac, and Lyon Saint-Exupéry. It includes an ecological study based on drug prescriptions, and on nonprescription drug sales, as well as a longitudinal field study following-up approximately 1,200 of these residents for four years. This study addresses the existence of a link between aircraft noise exposure (measured or calculated) and the measurements of different parameters related to health. In particular, annoyance and health status (current and past) are assessed by questionnaires, and physiological variables like blood-pressure or salivary cortisol are also considered within the frame of the study.
Results and Conclusions: While contributing to a wider and deeper knowledge of the French sanitary situation resulting from aircraft noise exposure, DEBATS will make it possible to assess the expected health benefits of the implementation of aircraft noise abatement policies around airports.
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A FURTHER EXAMINATION OF VULNERABLE SUBGROUPS OF TEMPERATURE AND MORTALITY IN CALIFORNIA: IS THERE A HARVESTING EFFECT?

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Background and Aims: Investigators have consistently demonstrated associations between elevated temperatures and mortality worldwide. Few have recently focused on identifying vulnerable subgroups, and far fewer have determined whether at least some of the observed effect may be a manifestation of mortality displacement. We examined mean daily apparent temperature and mortality in 13 counties in California during the warm season from 1999 to 2006 to identify vulnerable subgroups and to evaluate the potential effect of mortality displacement.
Methods: The time-series method using Poisson regression was applied for data analysis for single lags of zero to 20 days, and for cumulative average lags of five and ten days. The California Irrigation and Management Information System, the U.S. Environmental Protection Agency Air Quality System, and the National Climatic Data Center all provided weather data, while the California Department of Health Services, Health Data and Statistics Branch provided mortality data.
Results: Significant associations were observed for the same-day (excess risk = 4.3%, 95% confidence interval: 3.4, 5.2) continuing up to a maximum of four days following apparent temperature exposure for non-accidental mortality, cardiovascular mortality, respiratory mortality, and mortality among the elderly and children. Since no significantly negative effects were observed in the following single or cumulative days, evidence of mortality displacement was not found.
Conclusions: The effect of temperature on mortality appears to be an acute event with a potentially broad impact on the population with significant public health implications.

ASSOCIATION BETWEEN PLACE OF BIRTH AND ASTHMA PREVALENCE ACROSS MULTIPLE RACE/ETHNICITIES IN THE UNITED STATES

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Background and Aims: Asthma is a complex disease involving multiple genetic and environmental factors. The United States (US) has one of the highest prevalences of current asthma (8.2%) in the world; the US also has a large immigrant population representing diverse racial and ethnic groups. Migration studies can shed light on the role of environmental factors for asthma development and exacerbation. The objective of this study was to examine the association of birth-place with self-reported current asthma prevalence across multiple racial/ethnic subgroups in the US.
Methods: We analyzed nationally representative data from the 2001–2009 National Health Interview Survey on adults (• 18 years) with self-reported current asthma. Using SUDAAN, model-adjusted marginal estimates from multivariate logistic regression were used to compare the current asthma prevalence among US-born and foreign-born respondents.
Results: During 2001–2009, 7.1% (unweighted N=18,363) of adults had current asthma of whom 7.8% were foreign-born. After adjusting for confounders (e.g., age, sex, poverty level, health insurance, having a regular place of care) and averaging over the interactions, US-born adults had higher ($p<0.05$) current asthma prevalence (7.6%) as compared to foreign-born adults (4.7%). This difference was consistent across all race/ethnicities including Puerto Rican, Asian Indian, Filipino, Other Asian but was significant ($p<0.05$) among: whites (7.7% vs. 4.7 %), blacks (7.5% vs. 4.8%), Other Hispanics (6.7% vs. 3.2%), Chinese (8.1% vs. 3.0%), and Other/Multiple Race (17.1% vs.8.3%). Also, among foreign-born adults, current asthma prevalence was higher ($p<0.001$) among those who resided in the US for • 10 years (4.0%) compared to those residing for <10years (2.7%).
Conclusions: Greater exposure to environmental factors, acculturation, differences in healthcare access and diagnostic practices might contribute to the higher asthma prevalence among US-born adults and foreign-born adults who have resided in the US • 10 years. Continued identification and understanding of these factors can help design effective public health interventions among immigrant populations.

THE RELATIONSHIP BETWEEN POLLUTANT PROPERTIES AND HOSPITAL ADMISSIONS IN ATLANTA, GA

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Background and Aims: Methods that are based on the chemical properties or structures of pollutants offer an alternative approach to assessing health impacts from multiple pollutants. We performed a study to examine whether the odds of daily hospital admission differs by pollutant chemical properties. .
Methods: We categorized pollutants by chemical properties and examined their impacts on the odds of daily hospital admissions in two-stages. In the first stage we applied a case-crossover analysis of 65 pollutants using hospital admissions data from Atlanta counties (1998-2006), controlling for temperature and ozone. We regressed pollutant specific slopes from stage one on pollutant properties in stage two. We calculated uncertainty estimates using a bootstrap procedure. For comparison, we analyzed the association between hospital admissions and $PM_{2.5}$, ozone, elemental carbon, and organic carbon in case-crossover models. We also repeated the two-stage analyses, but running the first stage separately by pollutant while controlling for the same covariates including ozone. We based primary analyses on day of admission exposures.
Results: Ambient $PM_{2.5}$, ozone, EC, and OC were not associated with hospital admissions. 24-h transition metals and alkanes were associated with increased odds (0.26% and 0.37% per IQR, respectively) of hospital admissions for cardiovascular disease (CVD). Transition pollutants were positively associated with hospital admissions for ischemic heart disease, congestive heart failure, and atrial fibrillation. Respiratory-related hospital admissions were positively associated with alkanes. Aromatics and microcrystalline oxides were negatively associated with CVD- and respiratory-related hospital admissions. Results were comparable for alternative pollutant groupings and first stage models.
Conclusions: Transition metals were associated with increased odds of CVD-related hospital admissions. Alkanes were associated with increased odds of hospital admissions for CVD and respiratory disease, whereas aromatics were associated with decreased odds of these outcomes.

SEASONAL VARIATION IN MORTALITY FROM STROKE IN ENGLAND AND WALES, 1997 – 2005

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Background and aims: Seasonal variation in disease events has been widely reported and it has been described as being worse in Britain. Few studies have been done to examine seasonal variation in specific diseases. The aim of this study was to determine if there was a seasonal variation in mortality from stroke in England and Wales.
Methods: This study used mortality data for stroke from 1997 to 2005. The dataset consisted of all deaths in England and Wales whose underlying cause was due to stroke during the time period. Excess winter deaths for each year were determined by comparing the mortality count in the winter (December - March) and the non-winter months (preceding August – November and successive April - July). A comparison of the winter mortality ratio between the age-bands was also done.
Results: There was a pattern of increased mortality in the winter season for each of the years reviewed, which is in keeping with the pattern existing literature had described for mortality from all causes combined. This study also found that each year, there were around 3,100 excess winter deaths due to stroke and this is 20% more than expected during the winter season. An association was also found between winter mortality ratio and advancing age.
Conclusion: The results suggest that excess winter mortality due to stroke in England and Wales is substantial. In addition to general measures used to reduce excess winter mortality, interventions aimed at reducing excess winter mortality due specifically to stroke may be worthwhile.
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CASE STUDY OF VARIOUS RADON MITIGATION SYSTEMS INSTALLATION IN SOUTH KOREA

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Background and Aims: Radon is inert gas which causes lung cancer, and it is important to mitigate indoor radon gas as people stay indoors over 80% of their daily life. There are several radon mitigation systems such as Active Soil Depressurization(ASD) and Passive Soil Depressurization(PSD) which have been applied to buildings in America. However, buildings in Korea are different from ones in America due to the different geological structure. For this reason, it was necessary to develop other radon mitigation systems which can be applied to Korean-type of building structure.
Methods: According to radon level measured by Natural Radiation Environmental Health Center, Gangwon and Chungbuk area showed higher level than other areas, thus one elementary schools(initial radon level: 10 pCi/L) and one village office(initial radon level: 5.8 pCi/L) were selected considering radon level and positiveness of the leaders. ASD was applied to the elementary school, and Active Soil Pressurization(ASP) was applied to the office.
Results: It is not seriously difficult to install soil depressurization system in America, but geological structure in Korea generally shows clay bed, hence it is hard to install pipes and suck radon gas through them. In elementary school case, because radon suction was not successful(radon level after ASD installation: 31.2 pCi/L), instead of depressurizing the underground, ASP that is, positive-pressure was slightly blown into indoors so that underground radon cannot penetrate through the building, was used. Radon level after the installation in the elementary school and the office stayed under 2.0 pCi/L(1.5 and 1.9 pCi/L, respectively).
Conclusions: Even though the problem with energy cost can be an issue, it cannot be a problem if indoor radon level can be monitored continuously and connected to the system. Therefore, delicate diagnose and assessment are essential before installing radon mitigation system. Moreover, to perform diagnose and assessment prior to building construction is preferred.

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EFFECTS OF THE METAL COMPONENTS OF AIR PARTICLES ON PEAK EXPIRATORY FLOW RATE OF THE SCHOOLCHILDREN

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Background and Aims: The acute effect of the metal components of air particles on schoolchildren's pulmonary function has not been adequately evaluated. This study was conducted to explore the relationship between the metal elements in ambient particulate matter and the peak expiratory flow rate (PEFR) of the exposed schoolchildren in China.

Methods: Panel study design. 225 primary schoolchildren in Baotou city were recruited for the studies in 2005 and in 2006, respectively. In the study the PEFR values of the subjects were measured with a mini-wright peak flow meter, three times a day and recorded by themselves for 40 days continuously with a standard procedure. The basic information such as gender, age, height, weight, asthma attack and family history of chronic respiratory disease, etc. were collected by the questionnaire from the children and their parents. The daily mass concentration of PM10 and PM2.5 was monitored every day. The contents of K, Ca, Na, Mg in the PMs were determined with X ray emission spectrometry, while Pb, Cr and Cd were determined with Atomic Absorption Spectroscopy. The SPSS 13.0 was used for statistical analysis of the data.

Results: A negative correlation was observed between the average PEFR values of the subjects and the concentration of Ca, Na, Mg both in PM10 and PM2.5 ($P<0.01$).The PEFR level was negatively associated with one lag-day level of Pb both in PM10 and PM2.5 ($P<0.01$).The level of Cr in PM2.5 had a negative effect on the average PEFR values ($P<0.01$), while the effect was shown more significantly 1 day after exposure to Cr ($P<0.01$).

Conclusions: It suggested that the concentrations of metal elements in PM such as Na, Mg, Ca, Pb and Cr are negatively associated with PEFR values of the exposed schoolchildren.

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Yun-Chul Hong, Seung-Sik Hwang, Jin Hee Kim, Kyoung-Ho Lee, Hyun-Jung Lee, Kwan-Hee Lee,Seung-Do Yuand Dae-Seon Kim (2007) Metals in Particulate Pollutants Affect Peak Expiratory Flow of Schoolchildren . Environ Health Perspect 115:430–434.

COMMUNITY HEALTH BUILDING: ENVIRONMENTAL APPROACH

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Background and Aim: The concept of environment focuses on that dimension of traditional concern to urban planning, and recently of increasing concern to the public--the quality of the physical environment natural and man-made. The aim of this project was to identify community environmental problem and to develop appropriate solutions to maintain and enhance the quality of life for the community citizens.

Methods: Action-Research Method was used for this project. The project was started with the organization of a committee with 15 community volunteers composed of city officials, environmental planning professions, and private citizens. The committee initiated its activities by discussing the steps to the process. These general guiding steps are proposed to facilitate the community health assessment process. The collection of environmental health issues from the community by using Community-as-Partner Model, with some modifications to meet local needs. The data collection methods include person-on-the street interviews, community randomized telephone surveys, and the use of key community professionals as informants.

Results: Two major environment problems defined for the community. (1) The lack of landscaping on the perimeter of roadways. (2) Visual clutter on the barrenness of the land. Implementations include utilize natural elements as points of street landscaping, transform barrenness land into community center. Suggestion: Community citizens should be committed to protecting the environment for future generations and implementing a full programme of measures to deliver on its ambitions for an eco-friendly economy.

Conclusions: This project is helping to create environmental awareness in the community; to built strong coalitions among the participants; and it is also helping to target the main environmental needs of the community. In addition, the strong positive community involvement indicates that the identified issues will be followed-up and the desired outcomes will be attained.

THE ERA-ENVHEALTH NETWORK

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Background and Aims: Reducing uncertainties about the links between environment and health (E&H) and taking action through protection and prevention measures is necessary. For these measures to be effective, cooperation between all concerned actors must be improved and research driven by a common set of priorities. ERA-ENVHEALTH enhances European coordination of E&H research programming.
Methods: The network of 16 E&H research programmers from 10 countries started in September 2008 and has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 219 337. To establish sustainable collaboration, an integrated step-by-step approach is implemented to evaluate methods, define priorities and respond to these through joint activities. The originality of ERA-ENVHEALTH is that it launched a first call early on to experiment joint funding and assess its implementation.
Results: Collaboration between ERA-ENVHEALTH partners has enabled the development of a shared vision and improved exchange of knowledge and expertise through access to information at the European level via its website and databases for experts and research programmes. To experiment joint funding and have a better use of resources, two projects are now running, funded by three partners under the first common call, on: "Health vulnerability resulting from future climate change impacts on soil-water ecosystems, land use and water resources at regional scale". The consortium has analysed the collected data on research programmes and is identifying common priorities for collaborative research and activities, including a second common call.
Conclusions: ERA-ENVHEALTH brings dynamism to E&H research in the EU by promoting collaboration and fostering innovative ideas, and by increasing its visibility as a key area for research. With the development of new programmes and changes to existing ones, an increase is expected in the diversity of disciplines involved in research and in multinational projects on E&H issues.
References:
The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 219 337. This publication reflects only the author's views and the Community is not liable for any use that may be made of the information contained therein.

SECONDHAND TOBACCO SMOKE: A SOURCE OF LEAD EXPOSURE IN US CHILDREN AND ADOLESCENTS

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Background and Aims: Secondhand tobacco smoke (SHS) remains a major source of indoor pollution worldwide. Lead is a tobacco constituent measured in mainstream and sidestream smoke. Our goal was to evaluate the relationship between SHS exposure (number of smokers at home and serum cotinine) and blood lead levels in US children and adolescents who participated in the National Health and Nutrition Examination Survey, 1999-2004. We also evaluated lead dust concentrations as a potential mediator between SHS and blood lead levels.
Methods: We analyzed data from 6,830 participants 3 to 19 years of age who were not active smokers and had SHS exposure information and blood lead measurements. We performed linear regression models on log-transformed blood lead levels by serum cotinine quartiles or number of smokers at home adjusted for socio-demographic and household characteristics. Stratified analysis by participant characteristics was used to evaluate the consistency of the findings across categories.
Results: Median (interquartile range) blood lead levels were 1.1 (0.8-1.7) µg/dL. After multivariable adjustment, participants in the highest quartile of serum cotinine (≥0.44µg/L) had 28% (95% CI 21, 36%) higher blood lead levels compared to those in the lowest quartile (<0.03 µg/L). Similarly, blood lead levels in children who lived with 1 and ≥2 smokers were 14% and 24% higher, respectively, compared to those living with no smokers. In participants with lead dust information available (3 to 5 years of age), the association between SHS and blood lead levels remained similar before and after adjustment for lead dust concentrations.
Conclusions: SHS may contribute to increased blood lead levels in US children. Lead dust does not appear to mediate this association, suggesting inhalation as a major pathway of exposure. Eliminating SHS exposure could reduce lead exposure in children. These findings have important public health implications for lead and SHS prevention programs.

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ACCESS TO SERENE NATURE CONTRIBUTES TO IMPROVED MENTAL HEALTH AMONG WOMEN - RESULTS FROM A LONGITUDINAL COHORT STUDY IN SOUTHERN SWEDEN

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Background/aims: Despite the fact that average life length is increasing internationally, escalating problems with mental disturbances are reported, especially among women. One way of approaching this issue is by promoting public health through the means of restorative environments. The aim of this observational study was to explore whether number of recreational values and/or any certain characters of the nature could determine change in mental health in a population and whether any difference could be found due to gender.
Methods: We used data from a large health survey distributed to a stratified sample of a southern Swedish population at two occasions (1999/2000 and 2005), facilitating a longitudinal analysis. People from rural, suburban, or smaller town areas were studied (n=9230). Geographical residence codes for every individual were linked to preformed evaluations of restorative landscape characters. Any change in number of recreational characters within 300 meters distance, or change in any single character between baseline and follow-up, was correlated to change in mental health by logistic regression models. Mental health was measured by the General Health Questionnaire (GHQ-12).
Results: On average (in varied subsets of the data) access to a large number of recreational characters was rare, and we found no impact on mental health development from change in number of recreational characters between the two occasions. The specific nature character *Serene* turned out to be a significant factor for women: the odds of improved mental health was 4,5 :1 if access to Serene was gained at follow-up. For men no significant explanation model was found.
Conclusions: The study showed that the character *Serene* in nature might be a specific mental health factor for women which could render a positive development in public health. This may influence landscape and urban planning as well as health policies and potentially create a higher life quality.

AIR QUALITY EFFECTS OF THE AMSTERDAM ENVIRONMENTAL TRAFFIC ZONE

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Background and Aims: An environmental traffic zone, constraining access into the city for older and more polluting trucks, was implemented in Amsterdam. The objective of this study was to assess if implementation of this environmental traffic zone reduced traffic related air pollution along one of the major connecting routes into the city.
Methods:A monitoring station of the Amsterdam Air Quality Monitoring Network is situated adjacent to a major street connecting the city centre and the ring highway. The main food wholesale distribution center is located along this road, resulting in a relatively high volume of truck traffic. Daily mean concentrations (NO_2, PM10, and Elemental Carbon) in the first year since the intervention were compared with concentrations in the prior year.
Results: Concentrations at roadside were high, the annual mean NO_2 concentration was well above the EU Limit Value. Preliminary results show that, since the intervention and taking changes in background concentration into account, the traffic contribution to NO_2 has decreased by 5.0 $\mu g/m^3$ (95%-CI: -6.9 – -3.1), for PM10 the difference was -0.3 • g/m^3 (-1.1 – 0.5) and for EC -0.2 • g/m^3 (-0.5 – 0.0). The time span of the study will be prolonged and future analyses will furthermore incorporate correction for long term time trend and meteorological conditions.
Conclusions: In conclusion, these preliminary analyses demonstrate decreased concentrations of traffic related air pollution as a result of the implementation of an environmental traffic zone in Amsterdam.

IDIOPATHIC ENVIRONMENTAL INTOLERANCE ATTRIBUTED TO ELECTROMAGNETIC FIELDS (IEI-EMF): A SYSTEMATIC REVIEW OF IDENTIFYING CRITERIA.

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Background and Aims: The lack of validated criteria for defining and assessing IEI-EMF affects the quality of the research into the disorder and increases methodological heterogeneity. Therefore, it is difficult to compare or integrate the findings of different studies. The main aim of this review was to define and summarize the criteria that previous studies have employed to identify IEI-EMF subjects.
Methods: A literature search was performed in April 2010 using a combination of keywords related to 'electrosensitivity,' exposure and health outcome. Databases included were EMBASE, Medline, Psychinfo, Scopus and Web of Science. Additionally, citation analyses were performed for key papers, reference sections of relevant papers were searched, conference proceedings were examined and a literature database held by the Mobile Phones Research Unit of King's College London was reviewed.
Results: Eighty studies were included. The criteria predominantly used in the studies to identify IEI-EMF samples were: 1. Self-report of being (hyper)sensitive to EMF. 2. Attribution of symptoms to at least one specific EMF source. 3. Absence of any medical disorder capable of accounting for these symptoms 4. (Hyper)sensitivity to EMF could be either generalized (attribution to various EMF sources) or mobile-phone specific, visual display unit-specific or even domestic appliance-specific. 5. Symptoms occur soon after the individual enters the "exposed area" or uses an EMF source. 5. Report of a negative impact in daily life functioning 6. Avoidance behaviour towards EMF source(s).7. Increased symptom report. Symptom assessment was mainly based on non-standardized scales which are incomparable between studies. Experimental studies used a larger number of criteria compared to the observational ones.
Conclusions: Remarkable heterogeneity has been found regarding the criteria being used by the reviewed studies due to explicit differences in their conceptual framework. Further work is required to produce consensus criteria for research purposes. This could be reflected by the development of an international protocol.

OCCUPATIONAL NOISE EXPOSURE AND HEARING LOSS AMONG FIREFIGHTERS IN THE UNITED STATES

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Purpose: To assess noise exposure level, prevalence of hearing loss, and use of hearing protective devices (HPDs) among firefighters.
Methods: Focus group discussions were conducted to identify common noise sources of firefighting service. Sound pressure levels were measured and task-based exposure assessment modeling (T-BEAM) was used to estimate noise exposure potentials among firefighters. Exposure durations were based on firefighters' average response times. Demographic and work related survey and hearing tests were completed by a total of 237 firefighters in multiple states in the US.
Results: Ventilation, extraction, and fire suppression were the primary fire fighting job assignments identified. Tools required for these job assignments include chainsaws, circular saws and pneumatic chisels, sirens, axes, generators, fire truck engines, and water hoses. T-BEAM showed that firefighters have a risk potential of 85 dBA time-weighted average (TWA) on any given day. The survey and hearing test participants were predominantly middle aged (mean age=44years), Caucasian (88%), and males (94%) with an average of 17 years of work experience in fire services. About 37% showed hearing loss in the noise sensitive frequencies, 4 and 6 kHz. Firefighters with hearing loss reported significantly longer years of working in fire services ($t=5.83$, $p< 0.001$). The poorest hearing was shown in the left ear at frequencies of 2-6kH ($p<0.05$). The participants reported using HPDs 38% of the time that was needed, despite the importance of using it during all loud noise.
Conclusion: This study demonstrated a considerable noise exposure, high prevalence of hearing loss, and low use of HPDs in firefighters. More comprehensive hearing conservation programs should be implemented to reduce hearing loss, which is a costly, dangerous, and potentially career-ending disability for firefighters.

BISPHENOL-A AND T REGULATORY CELL COUNTS IN AN INNER-CITY BIRTH COHORT

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Background and Aims: Bisphenol-A (BPA), an endocrine disruptor widely used in food containers, has been associated with altered T regulatory and Th2 cytokine pathways. As these are critical for asthma pathogenesis, we hypothesized that BPA exposure would be associated with reduced numbers of T regulatory cells and increased risk of wheeze and asthma.
Methods: We recruited 400 mother-child pairs and measured BPA in spot urine collected from the mother prenatally and child at ages three, five and seven. Wheeze in the past twelve months was assessed via standardized questionnaires and current asthma was diagnosed by allergist based on standardized exams and pulmonary function tests. Specific IgE to aeroallergens was measured via ImmunoCAP. Child T regulatory cell counts are being assayed via flow cytometry for CD4+CD25+CD62LFOXP3 expression. Relative risk regression analyses controlled for maternal asthma, exposure to environmental tobacco smoke, gender, and ethnicity.
Results: BPA was detectable in >93% of urine samples at all four time points. BPA concentrations in maternal prenatal urine were inversely associated with wheeze and risk of asthma at age 5 (n=316, RR 0.74, CI (0.59, 0.93), p = 0.01; n=295, RR 0.75, CI (0.57, 0.97), p = 0.03, respectively). There was no association between BPA and atopy. By contrast, urinary BPA concentrations at ages three and five years were associated with increased risk of asthma ($p \leq 0.01$), and BPA concentrations at age five years were associated with increased risk of wheeze at age seven years (p=0.03) (1). Results on T regulatory cell counts will be reported.
Conclusions: Childhood wheeze and asthma are inversely associated with BPA in prenatal urine and positively associated with BPA in child postnatal urine.

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ENERGY, LIMITS TO GROWTH AND PUBLIC HEALTH: WHAT IS THE ROLE OF ENVIRONMENTAL EPIDEMIOLOGY?

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Background and Aims: The literature concerning impending energy insecurity, food prices and climate change is growing rapidly. These problems reflect manifestations of "limits to growth", including climate change, though what is "limited" in this case is not carbon emissions, but the capacity of Earth to absorb waste gases without great harm to the climate, ecology and, ultimately, civilisation (hence health). Limits to growth interact. For example rising energy prices lift fertiliser costs and divert agricultural capacity from food to fuel. Climate change impairs crop yields and harms nutrition synergistically in other ways such as by reducing water quality. Collectively, the diverse phenomena of "limits to growth" will place increasing and eventually immense strain on the capacity of global public health services to maintain global life expectancy, especially given the background of rising population size.
Methods: A limited literature search was conducted in health journals (using PubMed, Google Scholar and specific journals) searching for the following terms: "peak oil", "energy scarcity", "limits to growth", "ecological footprint", "global environmental change", "peak health", "peak phosphorus" and "civilisation collapse". The term "climate change" was excluded because the research question studied here is broader.
Results: Within the broader medical and public health literature there is a limited awareness of peak oil, however papers are mainly restricted to or in response to one research group. In the epidemiological literature, including environmental epidemiology, these topics are scarcely mentioned, apart from several articles in the mid 1990s.
Conclusions: Rising energy prices and other manifestations of limits to growth are important environmental determinants of health. Environmental epidemiologists need to urgently consider these dimensions, and to embrace interdisciplinary approaches to consider how to prevent what Homer-Dixon calls "synchronous failure".
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ASSOCIATION BETWEEN AMBIENT AIR POLLUTION AND BLOOD MARKERS OF INFLAMMATION AND COAGULATION IN INDIVIDUALS WITH POTENTIAL GENETIC PREDISPOSITION ON THE DETOXIFYING PATHWAY

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Background and Aims: The pathophysiological pathways linking particulate air pollution to cardiovascular disease are still not fully understood. We examined the association between ambient air pollutants and blood markers of inflammation and coagulation in three potentially susceptible populations.
Methods: Three panels of non-smoking individuals were examined: 1) with type 2 diabetes mellitus (n=83), 2) with impaired glucose tolerance (n=104), and 3) with a potential genetic predisposition on the detoxifying pathway (n=87) defined by the null polymorphism for *glutathione S-transferase M1* (*GSTM1*) in combination with a certain single nucleotide polymorphism on the *C-reactive protein (CRP)* or the *Fibrinogen* gene. Study participants had blood withdrawn up to seven times, scheduled every 4-6 weeks between 3/2007 and 12/2008. In total, 1765 blood samples were investigated for CRP, interleukin 6 (IL-6), soluble CD40 ligand (sCD40L), fibrinogen, myeloperoxidase (MPO), and plasminogen activator inhibitor-1 (PAI-1). Hourly means of $PM_{10,}$ $PM_{2.5}$ (particle diameter<10µm and <2.5µm, respectively), particle number concentrations and nitrogen dioxide were collected at a fixed monitoring site and individual 24 hour averages calculated. Associations between air pollutants and blood markers were analysed using additive mixed models adjusting for long-term time trend and meteorology.
Results: For the panel with potential genetic susceptibility sCD40L and PAI-1 showed negative associations with all air pollutants within 24 hours before blood samples were taken (lag 0). Clear positive associations were seen for CRP and MPO especially with lags of 1 to 3 days (% change of geometric mean and 95% confidence interval for lag 1: 14.5 [5.3;24.6] and 4.9 [0.7;9.3] per interquartile range of $PM_{2.5}$, respectively). Results for IL-6, fibrinogen and the two other panels were less conclusive.
Conclusions: Patients with potential genetic susceptibility showed a clear association with ambient air pollutants. Our results support the idea that systemic inflammation may aggravate atherosclerotic disease, especially in susceptible populations.

PRENATAL EXPOSURE TO DDE AND LOWER RESPIRATORY TRACT INFECTIONS (LRTIS) IN INFANTS: THE INMA PROJECT

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Background and Aims: Growing evidence suggests that prenatal exposure to organochlorine compounds (OCs), mainly polychlorinated biphenyls (PCBs) and dichlorodiphenyl dichloroethylene (DDE), may increase the risk of respiratory infections in children through suspected immunotoxic mechanisms. Our aim is to examine, in the largest study so far, whether prenatal exposure to DDE increases the risk of LRTI in infants, and to isolate these effects from those of other OCs.
Methods: The study is based on a cohort of 2150 mother-child pairs in Spain. Maternal serum concentrations of DDE and other OCs were measured during pregnancy. Parental reports of physician-confirmed diagnosis of LRTIs were obtained when children were 12-14 months old. Analyses were carried out separately for children from Spanish (N=1342) and Latin-American (N=79) mothers because of their different exposure profiles.
Results: 35.4% of the children born to Spanish mothers developed at least one LRTI episode during their first 12-14 months of life. DDE exposure (median=116.3 ng/gr lipid) was associated with a higher risk of LRTIs (relative risk (95%CI) for 3rd quartile DDE exposure= 1.32 (1.08, 1.62)), which persisted after adjustment for other OCs (RR (95%CI) for 3rd quartile DDE = 1.38 (1.12, 1.71)). No association was found for other OCs. Stratified analyses showed that findings were homogeneous by study region, maternal smoking, maternal history of asthma and atopy, duration of predominant breastfeeding and maternal diet. Children born to Latin-American mothers, with much higher exposure to DDE (385.0 ng/gr lipid), showed a similar, but not statistically significant, increase in risk of LRTI with DDE exposure.
Conclusions: Prenatal exposure to DDE is associated with higher risk of LRTIs in infants. Since LRTIs cause substantial morbidity in infancy and are a possible risk factor for subsequent childhood asthma, especial attention should be paid in countries where dichlorodiphenyltrichloroethane (DDT) is nowadays used for malaria control.
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A CHAMBER STUDY OF AIRWAY AND SYSTEMIC EFFECTS AFTER EXPOSURE TO TWO KINDS OF WOOD SMOKE

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Background: Air pollution increases cardiovascular morbidity and mortality. One hypothesis is that local airway inflammation is a pathway to systemic inflammation, and in the long term atherosclerosis and cardiovascular events. Wood smoke contributes significantly to indoor and outdoor air pollution. The composition is complex, depending on e.g. combustion technique. We examined health effects of two kinds of wood smoke in a controlled chamber study of human subjects.
Methods: Thirteen subjects were exposed to filtered air and two sessions of wood-smoke, one week apart, with smoke from the start-up or the burn-out phase of the wood-burning cycle. The particle mass concentrations were 295 µg/m^3 and 146 µg/m^3; number concentrations 140 000/cm^3 (68% ultrafine) and 100 000/cm^3 (40% ultrafine) respectively. Blood, urine and breath condensate were collected before and on several occasions after exposure, and analyzed for biomarkers of inflammation, coagulation and oxidative stress. Exhaled nitric oxide (FENO) was measured. Net effects of wood smoke compared to filtered air were evaluated.
Results: Clara Cell protein 16 (CC16) increased in serum four hours after exposure to smoke from the start-up phase, and in urine the next morning. There was a net increase of FENO270 after wood smoke in both sessions, but mainly due to a decrease after filtered air. Other markers of airway inflammation were not affected by exposure. No consistent increase was seen for markers of systemic inflammation and coagulation. Urinary isoprostane and plasma-fibrinogen unexpectedly decreased after exposure.
Conclusions: The results indicate that airway effects appear at relatively low levels of exposure to wood smoke, while signs of systemic inflammation, previously shown at higher exposures, do not. Effects could only be shown after smoke from the start-up phase. CC16 is a sensitive marker in both serum and urine for effects of air pollution, but its function and significance need to be clarified.

INFLUENCE OF LOCAL FACTORS IN THE RELATIONSHIP BETWEEN DAILY MORTALITY AND TEMPERATURE DURING HEAT WAVES PERIODS IN CASTILE- LA MANCHA (1975-2003)

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Background and Aims: Climate model projections foresee that the principal changes -particularly insofar as temperature extremes are concerned- will occur in the interior of mainland Spain, where Castile-La Mancha is situated. The characteristics that modulate and determine the relationship between high temperatures and health must therefore be ascertained in the greatest possible detail, so that really effective prevention plans can be designed to address temperature extremes. This study sought to characterise and quantify the impact of heat waves on mortality in Castile-La Mancha.
Methods: We examined the effect of heat waves on daily non-accidental-cause mortality across all age groups in the Castile-La Mancha region (Spain) from 1975 to 2003. Quantitative analyses were performed using autoregressive integrated moving average (ARIMA) models, with other covariates, such as pressure trends, relative humidity, and duration and chronological number of heat waves.
Results: For each degree centigrade that temperatures exceeded the designated provincial thresholds in Castile-La Mancha, the percentage increase in mortality amounted approximately 12% over the daily mean, albeit with provincial variations. The longest heat waves were associated with daily mortality, with those at the end of summer causing the lowest mortality. Meteorological situations most closely associated with increases in mortality were cyclonic conditions accompanied by low humidity.
Conclusions: The reported health benefits of implementing heat wave prevention plans are undeniable; it is also evident that these must be optimised through in-depth knowledge of the relationship between temperature and health. The influence of variables, such as heat-wave duration or time of appearance, is important in the total increase in mortality during temperature extremes. Since parameters, such as humidity or pressure trends, can play very different roles in different geographical settings, they should be analysed separately from temperature.

NITROGEN DIOXIDE SPATIAL DISTRIBUTION IN ELCHE, A CITY ON THE SPANISH MEDITERRANEAN COAST

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Background and Aims: Because of the unique characteristics of urban areas, important gradients in atmospheric pollutant concentrations can exist. As such, a complete characterization of different zones in a city requires an elevated number of sampling points. The use of diffusive sampling techniques (Ferm & Svanberg, 1998) is an attractive and potentially effective complement to conventional air quality monitoring networks around urban conurbations. This allows adequate spatial resolution to reflect the peculiarities of such a complex environment (Stevenson *et al.*, 2001).
Methods: Eighty-two sampling sites were distributed within the city of Elche (Valencian Community) at locations with different characteristics (vehicular emissions, ventilation, etc.). Systematic samplings of NO_2 concentration measurements (each exposure period was five days) were carried out during winter 2009. To gain an understanding of the meteorological conditions in the city, various meteorological parameters were measured, including wind direction and wind speed, temperature, and solar radiation.
Results: A comparison of the measurements performed under different environmental conditions shows a similar relative behaviour between NO_2 dosimeters, indicating that the relative level of each point is characteristic of the site where it is placed (highly polluted areas, etc.), and therefore characteristic of the specific urban structure.
Conclusions: The behaviour of the measured contaminants shows that the changes in concentration depend mainly on the prevailing environmental conditions (the meteorological conditions dilute and disperse emitted compounds).
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THE INTRODUCTION OF LONDON'S CONGESTION CHARGE ZONE AND CHANGES IN ROAD CASUALTIES

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Background and Aims: In 2003, a Congestion Charging Zone (CCZ) was introduced in central London, UK, with the aim of tackling worsening traffic congestion. Although the CCZ was not introduced as a measure to benefit public health, there has been much interest in its impact on health, particularly in terms of air pollution and road traffic casualties. This paper quantifies the changes in road traffic casualties following the introduction of the CCZ in London.
Methods: Observational study based on analysis of geographically-coded road casualty data, 1993-2006. Analyses were made of longitudinal changes in counts of road casualties within each of 119,029 road segments with non-zero casualty counts, using conditional fixed-effects Poisson models. Estimates of the effect of introducing the CCZ on casualties were adjusted for changes in counts of casualties outside the zone, and for the effect of the introduction of 20 mph speed zones.
Results: The introduction of the CCZ was associated with an appreciable fall in the number of casualties in the zone relative to other areas within charging hours: a fall of around 16% (95% confidence interval: 11-21%) in all casualties within charging hours, not observed outside charging hours (4% increase, 95% CI: -1-9%). There were relatively large reductions in the number of car occupant and powered two-wheeler rider casualties. We found an appreciable increase in the number of cyclists injured inside the CCZ (30% increase, 95% CI: 9-52%) that appears broadly to parallel an increase in the numbers of people cycling in London.
Conclusions: The introduction of the CCZ in London has been accompanied by a small but important decline in road casualties overall, partly offset by an increase in cyclist casualties that broadly reflects increasing cyclist numbers. These changes would appear to represent part of an appreciable net benefit to population health of the CCZ.

ALLOSTATIC LOAD MODIFIES THE EFFECT OF BLOOD LEAD LEVELS ON HYPERTENSION AMONG MIDDLE-AGED ADULTS IN THE U.S.

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Background and Aims: Lead and chronic stress exposures can independently affect hypertension risks but synergistic effects may also be possible.
Methods: We examined whether chronic stress, operationalized as allostatic load (AL), modifies the effect of lead exposure on hypertension outcomes in a nationally representative sample of 6,511 middle-aged U.S. adults (aged 40-65 years) participating in the National Health and Nutritional Examination Survey (NHANES) 1999-2006. AL was defined as the aggregate score of 7 components, reflecting physiologic dysregulation of the cardiovascular, inflammatory, and endocrine systems.
Results: The median (interquartile range) blood lead concentration was 1.70 µg/dL (1.19 - 2.50). Multivariate logistic regression models demonstrated that higher blood lead levels were associated with significantly higher risk of diastolic hypertension, but not systolic or general hypertension. In models stratified by AL, positive associations between lead and hypertension were observed in high AL but not low AL participants. Among the high AL group, adults in the highest quintile of lead exposure had elevated odds of systolic (Odds ratio (OR) = 1.62, 95% confidence interval (CI): 1.11, 2.38) and diastolic (OR = 2.59; 95% CI: 1.57, 4.25) hypertension compared to adults in the lowest lead quintile.
Conclusions: Our results suggest that the effect of lead on hypertension is stronger among those who are chronically stressed. Future research should assess the implications of cumulative exposures to environmental and social stressors for regulatory decision-making in order to better protect the health of vulnerable populations who often face disproportionate and elevated exposures to multiple chemical and non-chemical hazards.

EFFECT OF PFOA ON REPRODUCTIVE HEALTH OUTCOMES

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Background and Aims: Research on the potential effect of perfluorinated chemical (PFC) exposure and reproductive health endpoints, particularly fetal growth, has proliferated in the past 5 years. Results on pregnancy outcomes have been notably inconsistent. Less extensive information on other health endpoints is available. We examined several reproductive health measures in a sizable number of pregnancies exposed to elevated levels of PFOA..
Methods: Two sources of data were used to examine the association between PFOA and pregnancy outcomes: (1) A survey of residents conducted in 2005-2006 included a complete reproductive history from women, combined with residential history information and estimated historical exposure to assign PFOA blood levels to the mother at the time of pregnancy. (2) Birth records from residents of the area were obtained from health departments for the periods and places when geographic identifiers (Zip Code or street address) were computerized, then linked by space and time to estimate blood PFOA level at the time of pregnancy.
Results: Estimated PFOA levels were around background through the 1970s then rose to markedly elevated levels in the subsequent 30 years, with a mean and median of 49.2 and 13.3 ng/ml, respectively, after 2000. The survey of residents identified 41,456 pregnancies, with 9.2% ending in miscarriage and 1.3% in stillbirth. Among live births, 3.8% reported preeclampsia, 12.7% preterm birth, 2.0% term low birth weight, and 3.8% birth defects. Expected associations were found for advanced maternal age and smoking, providing some confirmation of data quality. We will report results on the association between PFOA exposure and these pregnancy outcomes.
Conclusions: Given the large study size, elevated exposure levels, and combination of self-reported and record-based assessment, we will have the most extensive information generated thus far regarding PFOA and pregnancy. Limitations include the quality of self-reported outcome information and uncertainty in exposure assignment.

VULNERABILITY TO TEMPERATURE-RELATED MORTALITY IN SEOUL, KOREA

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Background and Aims: Temperature's effect on mortality and vulnerability to these risks may vary by population and region. This study examines the relationship between temperature and cause-specific mortality for Korea. We investigated whether some subgroups are particularly vulnerable with respect to sex, age, education, and place of death for Seoul, Korea for the period 2000-2007.

Methods: We applied time-series models allowing nonlinear relationships for heat- and cold-related mortality, and generated exposure-response curves. We also present results comparing mortality risk at mean daily temperatures of 25 ^{o}C to 15 ^{o}C (90th to 50th percentile of temperatures in Seoul) and 29^{o}C to 25^{o}C (99th to 90th percentile) for heat effect. For the cold effect, we present results comparing mortality risk at -1 ^{o}C to 15 ^{o}C (10th to 50th percentile) and -4^{o}C to -1^{o}C (1st to 10th percentile). We considered exposure timeframe, co-pollutants, cause of death, and susceptibilities.

Results: Both high and low ambient temperatures were associated with daily mortality in Seoul, Korea. Mortality risk was 10.2% (95% confidence interval 7.43, 13.0%) higher at the 90th percentile of temperature compared to the 50th percentile. Mortality risk was 12.2% (3.69, 21.3%) comparing the 10th and 50th percentiles of temperature. Cardiovascular deaths showed a higher risk to cold, whereas respiratory deaths showed a higher risk to heat effect. We identified susceptible populations such as female, the elderly, those with no education, and deaths occurring outside of a hospital for heat- and cold-related total mortality.

Conclusions: Our findings provide supportive evidence of a temperature-mortality relationship and vulnerability to temperature effects in Korea.

EXPLORING CHILD PASSENGER SAFETY PRACTICE IN CHINA UNDER RAPID MOTORIZATION

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Background and Aims: China is undergoing rapid motorization and becomes the largest market where most new cars in the world are sold. Many child passengers lose their lives when traveling in motor vehicles in China, e.g., 2,000 fatalities in 2004. Since little was known for child passenger safety practice in China, this study aims to describe where child passengers are seated and whether restraints are used; and investigate the influence of children and/or parental attributes on seating position and restraint use.

Methods: Toll gate observation for child passengers aged ≤12 years was conducted in Shanghai during 2009. Another parent survey for kindergarten enrolled children aged 2-7 years was conducted during 2008-09. The adjusted relative risks (RR) comparing rear with front seating position among child passengers were evaluated using multivariate binomial regression with robust variance estimation. The adjusted RR comparing any restraint use with no restraint use was also evaluated.

Results: Both observation and survey studies revealed common front seating practice and low restraint use among child car passengers. Younger age (≤4 years), single child in a car, and parental license status were associated with decreased likelihood of rear seating position; whereas tertiary education for mothers was associated with increased likelihood of rear seating selection for child passengers. Children traveling with drivers using no restraints were less likely to be restrained; whereas parents having drivers license were more likely to use restraints for their child passengers.

Conclusion: This study demonstrates common front seating and low restraint use as ignored safety concerns, and identified risk factors influencing restraint use and seating position for child passengers. These findings call for urgent attention and appropriate intervention targets to improve child passenger safety in China under rapid motorization.

SAFETY MEASURES AND HEALTH HAZARDS AMONG COAL MINERS

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Background and Aims: Coal is a naturally occurring mineral and a large source of fossil fuel throughout the world. Its importance in Pakistan increases as other fuels, like petroleum are scares and expensive coal is abundant and cheap. Coal dust comprise of carbon, hydrogen, oxygen,nitrogen, sulphur, quartz and some traces of iron, lead and copper. These particles are not degradable and deposit in lung throughout the life of coal mine worker. These particles resulting in fibrosis of lung, initially starting as chronic bronchitis and asthma and finally end up as coal mine worker pneumoconiosis. Almost no significant work is done at major levels either from the government or from private sector, regarding studying the health hazards and their effects among mine workers of Pakistan.The objectives of our study was to find out safety measures practices by coal miners and the occupational health hazards which are suffering from coal mine extraction.

Methods: A cross-sectional descriptive type of study has been carried out. Population targeted during this case study was the coal miners of Lakhra Coal field, Sindh. Random sampling was done and Sample size was 100 coal mine workers. The questionnaire we devised for this study which was then presented to individuals with different educational status, field of work and family background. SPSS software is used for data analysis.

Results: Out of 100 participants, 77% are illiterate. Half (50%) of the workers think that they have risk to their health in this job. Majority of workers (>90%) are not using proper safety measures. 53%of the workers think that safety measures are necessary and required during their work. Nearly 60%of the workers have the back pain and pain in their hands. 39%of the workers have heart burn. Less than 60% of the workers have the symptoms of lung disease like cough and trouble in breathing. Majority 83%of the workers are addicted out of them 76%are addicted to naswar. 84%of the workers have not got any training before joining to job.

Conclusions: Majority of the diseases found in coal mine workers are due to the improper use of safety measures. Proper supply of protective measures, regular medical check up, and different health based educational programs help to improve the quality of the life of coal mine workers.

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DNA DAMAGE AND DECREASE OF SPERM QUALITY IN MEN OCUPATIONALLY EXPOSED TO POLYCYCLIC AROMATIC HYDROCARBONS (PAH's)

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Background and aims: Over the last decade, concerns have been mounting over declining levels of semen quality (1). Polycyclic aromatic hydrocarbons (PAHs) constitute a group of genotoxic, lipophilic, and endocrine-disrupting chemicals that are distributed in the environment. **T**he aim was to evaluate the association between the urinary levels of 1-hydroxypyrene with the DNA damage, with sperm quality and with the frequency of CYP1A1, GSST1 and GSTM1 pdymorphisms.

Methods: A cross-sectional study was designed to evaluate the adverse effects of PHAs. A total of 71 subjects, 36 occupationally exposed and 35 unexposed men were included in our study. Semen, blood and urine samples were taken to volunteers to evaluate: sperm quality, 1-hydroxypyrene urinary levels (Biomarker of exposure PAH's), DNA damage and the frequency of polymorphism CYP1A1, GSTT1 y GSTM1.

Results: DNA damage was significantly higher in occupationally exposed subjects ($p < 0.05$). The frequency of genotypes of the enzymes tested was not statistically different between both groups. The sperm quality was significantly lower in the exposed group ($p < 0.05$). 1-hydroxypyrene urinary levels were higher in the exposed group ($p=0.01$). Sperm/ml, total count of sperm and CYP1A1 (m4) polymorphism were negatively associated with 1-hydroxypyrene.

Conclusion: PAH exposure decreases sperm quality and induce DNA damage.

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HEALTH EFFECTS OF EXPOSURE TO WATER-DAMAGED HOMES AFTER FLOODING IN JAPAN

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Background: Torrential downpours and intense typhoons have been on the rise in recent years in Japan, possibly because of climate change due to global warming. Localized torrential downpours can cause serious flooding along rivers and other waterways. Flooding in the aftermath of torrential downpours or typhoon creates poor conditions ideal for indoor air quality such as dampness or mold growth in the water-damaged home, resulting in public health concerns about the possible adverse health effects associated with the poor indoor air quality. Furthermore, the water-damaged home also would cause insomnia, stress-related disorders due to the psychological suffering. We conducted a questionnaire survey on the physical and psychological conditions associated with exposure to water-damaged homes in Japan.
Methods: We randomly selected 593 households in six sites flooded within past 5 years and then distributed a questionnaire to 1 adult per household. Those households include two flooded level homes of flooded below floor level and flooded above floor level, and no water-damaged home as control. The survey was carried out from October 2010 through February 2011.
Results: Total 379 responses were obtained (response rate=63.9%). Indoor dampness, mold, strong odor, poor health conditions and insomnia were significantly increased in water-damaged home compared to the non-damaged home located in the same sites. Those effects were gradually decreased over six months; however the significant differences of those effects were remained. Strength of dampness and poor health conditions were increased in association with higher flooded levels in after a week of flooding.
Conclusions: Poor indoor air quality and health conditions were associated with exposure to water-damaged homes. Those effects were remained over six months after flooding and increased in water-damaged home with higher flooded levels. This study suggests that the rapid actions on public health and environmental hygiene for water-damaged home should be taken after flooding.

HEALTH RISK ASSESSMENT OF ARSENIC INTAKE OF BEIJING RESIDENTS THROUGH DRINKING WATER

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Background and Aims: Multiple studies have showed an association between long-term exposure to arsenic by drinking water and development of cancer and Non-cancer adverse effects. However, few studies were conducted to assess on arsenic intake of the general population from drinking water in China. To understand the effects for arsenic in Beijing residents, a pilot survey was conducted to assess the health risk in which the ingestion rate and exposure duration of the individuals should be require computing Average daily dose (ADD).
Methods: We conducted a multi-stage sampling survey to interview 270 Beijing residents in winter (November to December) in 2009 and in summer (June to August) in 2010. Subjects were required to answer questions about water intake and tap water samples were collected to analyze at current residence. Hazard Quotient (HQ) and Oral reference dose (RFD) was computed according to a health risk assessment model.
Results: The concentration of arsenic ranged from <0.1ug/L to 26.20 ug /L, 5(1.9%) of all samples were higher than 10 ug/L. The arsenic concentration of arsenic in summer was slightly higher than of in winter. A positive correlation between ADD and concentration, exposure duration, ingestion rate were observed .However, a negative but non-significant correlation between ADD and body weight was also observed. For non-cancer effects, Only 1 (0.4%) of ADD exceeded the oral reference Dose (3×10-4 mg /Kg. d). For cancer risks, there was 6 (1.4%) residents who had chance risk when compared to the highest safe standard (1 in 10,000), additionally, there was 175 • 65% • residents when using the lowest safe standard for cancer risk (1 in 1000, 000).
Conclusions: Part of Beijing residents faced the health risk for arsenic through drinking water, among them who lived in the northeast of Beijing for long years may be at the greatest risk.
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AN OUTBREAK OF HAND, FOOT, AND MOUTH DISEASE CAUSED BY COXSACKIEVIRUS A16 IN A KINDERGARTEN

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Background and Aims: Hand, foot, and mouth disease(HFMD) is a common viral illness of infants and children. HFMD outbreaks occur regularly in the spring and summer in China. On March 9, we found 4 HFMD cases during 3 days in a class of one kindergarten from surveillance network in Beijing, China. To develop control measures, we began an investigation to identify the cause of the outbreak

Methods: We searched cases by following-up the children's health through Telephone from February 28 to March 12. We interviewed with health doctor and class teacher to know living activities of children. We search attendance records of the children. A retrospective cohort study was used to identify exposure factors.

Results: From February 28 to March 12, 73 %(16) of 22 children developed a case in the kindergarten. The incidence rate of boys is 2.5 times of the girls(95%CI: 1.17-5.34) • The incidence rate of block A is 2.2 times of the non-block A (95%CI: 1.15-4.20) .The stool of cases were still contained coxsackievirus A16 virus when cases were ill after 3-5 weeks, 85 %(11) Of 13 case specimen was positive. The risk of children who need to be reminded washing their hands was 2.29 times the children who do not have to remind ((1.05-4.98).

Conclusions: Coxsackievirus A16 virus caused the outbreak in a kindergarten through close contact between Children. Parents of infants and young children should prepared plastic bags to prevent the environment contamination caused by fecal when they go out.

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FINE PARTICULATE MATTER CONSTITUENTS AND CARDIOPULMONARY MORTALITY IN A HEAVILY-POLLUTED CITY

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Background and Aims: Although ambient $PM_{2.5}$ has been linked to adverse human health effects, the chemical constituents that cause harm are unknown. No previous studies exist in developing country to investigate the health impact of $PM_{2.5}$ constituents. This study aimed to examine the short-term association between $PM_{2.5}$ constituents and daily mortality in Xi'an, a heavily-polluted Chinese city.
Methods: We obtained daily mortality data and daily concentrations of $PM_{2.5}$, organic carbon (OC) and elemental carbon (EC) between January 1, 2004 and December 31, 2008. We also measured concentrations of fifteen elements between January 1, 2006 and December 31, 2008, and ten water-soluble ions between March 22, 2006 and March 23, 2007. We analyzed the data with over-dispersed generalized linear Poisson models.
Results: During our study period, the mean daily average concentration of $PM_{2.5}$, OC and EC in Xi'an were 182.2 $\mu g/m^3$, 28.3 $\mu g/m^3$, and 12.0 $\mu g/m^3$. We found consistent associations of mortality with $PM_{2.5}$ mass, OC, EC, S, Cl, Ni, Na^+, K^+, Mg^{2+}, Cl^-, and NO_3^-. Many of the constituents demonstrated higher excess risks than $PM_{2.5}$ mass. For transition metals, mortality risk associated with Ni was particularly elevated. Even below the levels of proposed $PM_{2.5}$ standard in China (24-hour average: 75 • g/m^3), we were still able to observe apparent health effects of $PM_{2.5}$.
Conclusions: This first study in developing countries adds to the growing body of evidence linking $PM_{2.5}$ constituents with mortality and indicates that excess risks may vary with the specific $PM_{2.5}$ constituents.

COMMUNITY WELLBEING AND THE TRIP TO WORK: INTEGRATING EPIDEMIOLOGY, POLICY AND COMMUNITY KNOWLEDGE USING PARTICIPATORY SYSTEM DYNAMICS MODELLING

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Background and Aims: Achieving healthy and sustainable urban planning requires integration of epidemiological knowledge with other kinds of information in ways that are useful for decision-makers. Informed participation in decisions by a range of stakeholders is also needed for effective policy implementation. Few methods have been described to meet these requirements. The *Community Wellbeing and the Trip to Work* project tested one such method to influence transport policy. We aimed to improve understanding of policy levers required to align health and sustainability outcomes in urban commuting, using a collaborative learning approach with decision-makers and wider stakeholders.
Methods: We used participatory system dynamics (PSD) modelling to explore commuting and wellbeing in Auckland, New Zealand's largest metropolis. This is a sprawling city of 1.4M people, where commuting is mostly by car; public transit ridership and walking are less common; and bicycling is rare. We considered commuting as a complex system comprising feedback, time lags and unexpected consequences. We developed a qualitative and a simulation model of the commuting system demonstrating the likely impacts of policies to change bicycle commuting on a range of outcomes.
Results: Both models provided policy insights. Quantitative simulations compared "business-as-usual" with two bicycling investment scenarios. Investment costs were integrated with health and environmental outcomes. Economic estimates of costs and benefits were compared. A range of stakeholders could explore the structural reasons for success or failure of policies.
Conclusions: PSD allowed the integration of epidemiologic and other knowledge to simulate transport policy outcomes. Learning about the dynamics of commuting and wellbeing improved understanding of factors leading to policy resistance or success. However, the more technical simulation process left some community stakeholders feeling disengaged. Further work will explore how accessibility of the simulation model can be improved through interfacing and web-based tools. PSD is a potentially useful tool to improve evidence-based integrated assessment in urban planning policy.

IMPACT OF EXTREME TEMPERATURE ON HOSPITAL ADMISSION IN SHANGHAI, CHINA

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Background and Aims: No previous study exists in China examining the impact of extreme temperature on morbidity outcomes. This study aimed at investigating the impact of heat wave and cold spell on hospital admission in Shanghai, China.
Methods: Daily hospital admission data between January 1, 2005 and December 31, 2008 were collected from the Shanghai Health Insurance Bureau. Heat wave was defined as a period of at least 7 consecutive days with daily maximum temperature above 35.0 °C and daily average temperatures above the 97 percentile during the study period. Cold spell was defined as a period of at least 7 consecutive days with daily maximum temperature and daily average temperatures below the 3 percentile during the study period. We calculated excess cases of hospitalization and rate ratios (RRs) to estimate the impacts of heat wave and cold spell on hospital admission.
Results: We identified one heat wave period (from 24 July to 2 August, 2007) and one cold spell period (from 28 January to 3 February, 2008) between 2005 and 2008. Heat wave was associated with 2% (95% CI: 1% - 4%), 8% (95%CI: 5% - 11%), and 6% (95%CI: 0% - 11%) increase of total, cardiovascular and respiratory hospital admission. Cold spell was associated with 38% (95%CI: 35%, 40%), 33% (95%CI: 28%, 37%) and 32% (95%CI: 24%, 40%) increase of total, cardiovascular and respiratory hospital admission. The differences between heat wave and cold spell-related hospital admission were statistically significant for all causes and cardiovascular causes, but not for respiratory causes.
Conclusions: Both heat wave and cold spell were associated with increased risk of hospital admissions in Shanghai. Cold spell seemed to have a larger impact on hospital admission than heat wave. Public health programs should be tailored to prevent extreme temperature-related health problems in the city.

ESTROGEN RECEPTOR ALPHA (ER-α) AND CYTOCHROME P450 17 (CYP17) GENOTYPES, AND PLASTICIZER EXPOSURE ON THE OCCURRENCE OF LEIOMYOMA

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Background and Aims: Evidence has shown that polymorphisms of various genes known to be involved in estrogen biosynthesis and function including CYP17, CYP1A1, estrogen receptor-alpha and -beta, are associated with estrogen dependent diseases. Phthalates are considered estrogenic endocrine disruptors and may act as a risk factor for estrogen dependent diseases (EDDs) in recent studies. We aim to assess the gene-environmental interactions on EDDs.

Methods: We recruited 44 patients with endometriosis or adenomyosis, 36 patients with leiomyoma and 68 healthy controls from a medical center in Taiwan between 2005 and 2007. Urine samples were collected and analyzed for seven phthalate metabolites using liquid chromatography tandem mass spectrometry. Peripheral lymphocytes were used for DNA extraction to determine the genotype of CYP17, CYP 1A1, ER-α and ER-• .

Reasults: Patients with leiomyoma had significantly higher levels of total urinary mono-ethylhexyl phthalate (• MEHP; 52.1 vs. 29.6 • g/g creatinine (• g/g-c)), mono-*n*-butyl phthalate (MnBP; 75.4 vs. 51.3 • g/g-c) and monoethyl phthalate (MEP; 103.7 vs. 59.3 • g/g-c) than the controls, whereas patients with endometriosis or adenomyosis only had an increased level of urinary MnBP. Subjects who carried the ER-α W allele and CYP17 A2 allele showed a significantly increased risk for leiomyoma (OR = 9.98, 95%CI: 1.30-76.52, p=0.027) after adjustment for age, GSTM1, MEHP and cigarette smoking, as compared to those with ER-α and CYP17 wild type. We suggested that both CYP17 and ER-α polymorphism may be a modifier for phthalate exposure in the development of leiomyoma.

Oxidative stress pathway genes, particulate matter, and lung function decline

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Background and Aims

Rather than investigating gene-environment interactions with single nucleotide polymorphisms (SNPs), ambient air pollution and smoking effects on lung function decline might be better explained by assessing interactions across entire genes and pathways.

Methods

Decline in forced expiratory volume in one second (FEV1) was regressed on 11-year cumulative exposure to particulate matter <10µm in diameter (PM10) or packyears of smoking, additive SNP effects, and a multiplicative term SNP*exposure in 669 adults from the SAPALDIA cohort. Interaction p-values of 12'679 SNPs from 152 oxidative stress genes and 14 pathways were projected onto gene- and pathway-levels using the adaptive rank truncation product (ARTP) method. Effect estimates for one interquartile range (IQR) contrast in exposure were compared between PM10 and packyears for top-SNPs of significant genes (significance threshold alpha=0.05). Percentage of outcome-variability explained was calculated by including all top-SNPs and interaction terms simultaneously into initial regression models.

Results

Seven genes (*CP, CYP1A2, ERCC1, NDUFA13, PRDX3, PSMB5, RAC1*) significantly interacted with PM10 on FEV1 decline, seven other ones (*AOX1, BCL2, MAP2K1, NOXO1, PSEN1, PTK2B, TPO*) and pathway 'apoptosis' (p=0.001) with packyears. A change of 84.7µg/m^3*years PM10 over 11 years (IQR) yielded beta-estimates of 41.7-97.7ml for the interaction term, 134.4-321.9ml for SNPs, and 20.6-134.6ml for PM10 main effect, with a minimal $p_{interaction}=4.8x10^{-5}$. Corresponding estimates for an IQR of 9.7 packyears were 86.2-206.6ml, 28.0-51.6ml, 23.4-288.6ml, and $p_{interaction}=9.8x10^{-5}$. Full interaction models explained 24.9% outcome variability for PM10, 26.4% for packyears, and 30.7% for both exposures combined compared to 19.6% and 19.1% without interaction terms, and 19.9% without genetic factors.

Conclusions

Including gene environment interaction in a pathway analysis substantially increased the percentage of explained outcome variability. On the population level, PM10 exposure presented a similar impact on FEV1 decline as tobacco smoke regarding effect sizes and percentage variability explained, but susceptibility genes differed between exposures.

ASSESSING THE RISKS OF WATER CONTAMINATION AND HOTSPOTS OF DIARRHEA IN SOUTHERN INDIA USING GIS

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Background and Aims: Recent studies in southern India show that 'treated' drinking water is contaminated with fecal coliforms and storage practices increase contaminations.This study aims to identify potential points of contamination of drinking water supply, assess the water quality, and examine associations with diarrhea in children in rural and urban areas of Vellore District, India.
Methods: The rates of diarrhea were assessed using 6-month surveillance in a cohort of 240 children (<5y.o.) in two rural (32%) and two urban (68%) areas in Vellore (12°55'60N, 79°7'60E). Water supply systems, drainage and sewage networks, households, points of potential water contamination were mapped and identified; physical characteristics of 147 public water taps were determined; 42 water samples from the public distribution system, water from households and overhead storage tanks were collected and analysed. Hotspots of diarrhoea were detected using Cluster/Outlier Analysis (Anselin Local Moran's I).
Results: 377 points of potential contamination (urban: 91%) were detected; 57 drinking water taps (38.8%) were at serious risk of contamination with sewage. All water tap samples had excessive nitrites and no free residual chlorine; 81% of water tap samples and 70% of household water samples had faecal coliforms. The incidence of diarrhea was higher in urban areas compared to rural: 2.07/1000 vs 1.66/1000 person-days, OR=1.26(95%CI:0.76,2.09). Statistically significant hotspots of diarrhea were detected in one rural village and two urban areas, where 87.5% of families used water taps at serious risk of contamination within 85 meters from their homes.
Conclusions: Widespread contamination of 'treated' drinking water exists in both rural and urban areas at source and point of use. Hotspot clustering of diarrhoea is more prevalent in urban households proximal to taps at risk of contamination. Public water distribution systems are difficult to monitor: GIS can be used to predict potential contamination and guide targeted intervention.
References: Brick T, Primrose B, Chandrasekhar R, Roy S, Muliyil J, Kang G (2004). Water contamination in urban south India: household storage practices and their implications for water safety and enteric infections. International Journal of Hygiene and Environmental Health; 207(5):473-480.

VERY HIGH CORRELATIONS BETWEEN FRESH WEIGHT AND LIPID-ADJUSTED PCB-153 SERUM CONCENTRATIONS – IRRESPECTIVE OF FASTING STATUS, AGE, BODY MASS INDEX, GENDER, OR EXPOSURE DISTRIBUTIONS

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Background and aims: Persistent organochlorine pollutants (POPs), such as PCBs, DDT and dioxins, are lipophilic pollutants accumulated in the food chain. These compounds have in epidemiological studies been associated with health hazards, not only detected among highly exposed populations, but also among populations with lower exposure levels. The exposure window might be crucial and it is, accordingly, important to analyze exposure concentrations in samples collected at the window of interest. This makes the use of stored blood samples extremely interesting. However, the blood volumes available from stored samples in biobanks are often less than 0.2 ml, which means that the researchers in epidemiological studies have to select a limited number of biomarkers representing the POP exposure and abstain from analyses of lipid concentrations. This raises the question of the necessity of lipid adjustment and the implications for interpretation of health effects. The aim of the present study was to evaluate how well the correlation between fresh weight and lipid adjusted concentrations is?
Methods: We have performed a number of epidemiological studies were we have used the PCB congener 2,2',4,4',5,5'-hexachlorobiphenyl (PCB153) as a biomarker for POP exposure. In all studies fresh weight as well as lipid adjusted PCB-153 concentrations is known. The variety of the cohort members (in total 1628) in the different studies give us the possibility to better understand how well these measures correlate.
Results: When all individuals were included in the analyses a correlation coefficient of 0.95 between fresh weight and lipid adjusted serum concentrations was obtained. Restricting the analyses to specific subgroups (based on gender, fasting status, age and bmi) gave correlation coefficients between 0.90 and 0.97.
Conclusions: This study do strongly support the use of samples from biobanks in epidemiological studies for analyzing PCBs even though it is not possible to lipid adjust the analyses.

IMPACT OF TRAFFIC AIR POLLUTION ON RESPIRATORY SYMPTOMS IN A CHILDREN COHORT IN FLORENCE, ITALY: A BAYESIAN ANALYSIS

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Background and Aims: The associations between traffic related air pollution and the development of long term respiratory health problems in children is an important issue that has been extensively studied. Recently methods that assess exposure combing spatial air pollution measurements and geographic information system based modeling, i.e. dispersion models, have been favoured.
In this work we study the effect of traffic air pollution on respiratory symptoms in a cohort of children in Florence, Italy.
Methods: Exposure to traffic related pollution for a cohort of children from different schools in Florence, part of the Italian Studies on Respiratory Disorders in Children and the Environment Phase 2, is assessed with a dispersion model in combination with four models to differently weight exposure by distance. A Bayesian hierarchical logistic regression model with school-level heterogeneity is used to study the effect of traffic related air pollution on cough or phlegm and asthma. Risk factors, as second-hand smoking, familiarity of asthma and rhinitis, and socio-economical status, are included in the analysis.
Results: No evidence of increasing risk of asthma with urban air pollution was found, while for cough or phlegm, borderline significant ORs were observed, providing evidence of an association in the cohort.
Conclusions: Familiarity of asthma, exposure to second-hand smoking, and deprivation showed the greatest effect on enhancing the probability of developing respiratory disease symptoms. However, by adjusting for these variables, also a remarkable effect of traffic related air pollution measured by carbon dioxide on cough or phlegm was observed, especially for emissions weighted by the negative exponential function of distance.

OXIDATIVE STRESS PATHWAY GENES, ENVIRONMENTAL TOBACCO EXPOSURE AND ASTHMA

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Background and aims. Studies on environment by gene interactions are challenged by multiple comparisons and contrasting findings from analyses conducted at the single nucleotide polymorphism (SNP) level. Until now, joint examination of several genes was performed at the functional level, but not at the pathway analysis level which consider protein interactions.

Methods. A four-step strategy is proposed:
1) Bioinformatic step based on **G**ene **O**ntology (GO) to define a) a list of genes with a given function (here response to oxidative stress) and b) the pathways in which these genes are involved (such as 'Metabolism of Xenobiotics by Cytochrome P450')
2) Selection step to choose candidate pathway(s) based on the biological knowledge of response to environmental hazard
3) Association analyses step performed at 1-the SNPs, 2-the genes and 3-the pathways levels
4) Validation of our findings in other epidemiological studies.

Results of steps 1 to 3 will be presented for 1900 subjects from the EGEA study, using genotypes from genome-wide data (Illumina 610quad, 2M imputed SNPs), and considering asthma, ETS and candidate pathways involved in response to oxidative stress.

Results.

Step 1: 190 genes were defined through GO browser (**GO** term 0006979) and 75 by literature search, corresponding to 285 different pathways according to Ingenuity Pathway Analysis software.

Step 2: 12 pathways (including 106 genes, 10-26 genes/pathway) were retained by taking into consideration biological knowledge regarding both the environment (ETS) and the disease (asthma), such as 'NRF2-mediated Oxidative Stress Response', 'apoptosis', ...

Step 3: Effect estimates for SNP allele dosage, ETS exposure and their interaction on asthma will be presented. Comparisons will be made between methods used for the gene/pathway approach (classical and the adaptive truncated product method to combine p-values).

Conclusions. Beyond collaboration between studies, interdisciplinary approach is needed to develop pathway approach in environmental epidemiology. (Supported by BIO_2NEA, IAGO.)

LOW-LEVEL ENVIRONMENTAL LEAD EXPOSURE IN CHILDHOOD AND ADULT INTELLECTUAL FUNCTION: A FOLLOW-UP STUDY

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Background: Early life lead exposure might be a risk factor for neurocognitive impairment in adulthood.
Objectives: We sought to assess the relationship between early life environmental lead exposure and intellectual function in adulthood. We also attempted to identify which time period blood-lead concentrations are most predictive of adult outcome.
Methods: We recruited adults in the Boston area who had participated as newborns and young children in a prospective cohort study that examined the relationship between lead exposure and childhood intellectual function. IQ was measured using the Wechsler Abbreviated Scale of Intelligence (WASI). The association between lead concentrations and IQ scores was examined using linear regression.
Results: Forty-three adults participated in neuropsychological testing. Childhood blood-lead concentration (mean of the blood-lead concentrations at ages 4 and 10 years) had the strongest relationship with Full-Scale IQ (ß = -1.89 ± 0.70, p = 0.01). Full-scale IQ was also significantly related to blood-lead concentration at age 6 months (ß = -1.66 ± 0.75, p = 0.03), 4 years (ß = -0.90 ± 0.41, p = 0.03) and 10 years (ß = -1.95 ± 0.80, p = 0.02). Adjusting for maternal IQ altered the significance of the regression coefficient.
Conclusions: Our study suggests that lead exposure in childhood predicts intellectual functioning in young adulthood. Our results also suggest that school-age lead exposure may represent a period of increased susceptibility. Given the small sample size, however, the potentially confounding effects of maternal IQ cannot be excluded and should be evaluated in a larger study.

SCIENTIFIC COOPERATION FOR A GLOBALIZED AWARENESS ON ENVIRONMENTAL HEALTH RISKS AND POLICIES: DEVELOPING NECOBELAC NETWORK TO PROMOTE SCIENTIFIC COLLABORATIONS IN ENVIRONMENTAL EPIDEMIOLOGY

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Background and Aims: An increasing burden of environmental risks is affecting population's health worldwide. Scientific evidence on health effects of hazardous exposures and local knowledge of public health issues do not necessarily meet to address mitigation policies. Economic and cultural barriers limit access to research results globally and the widest diffusion of health information for promoting a shared awareness and empowerment for healthy working and living environments. NECOBELAC is an ongoing collaboration network of European and Latin American-Caribbean (LAC) countries to spread know-how in scientific writing and to provide the best tools for exploiting open access information for public health.
We propose to implement the NECOBELAC network to face specific environmental health issues through a well-established and high-impact training and dissemination methodology.
Methods: NECOBELAC training methodology relies on two training levels: training for trainers and training at local level. To maximize the training impact a core group of European and LAC institutions performed courses for trainers; these trainers replicate training activities at local level utilizing NECOBELAC online contents addressing local needs and priorities.
Results: NECOBELAC mid-term results are corroborated by the effectiveness of the adopted training methodology. Training for trainers were performed in Europe (Italy, Spain) and Latin America (Brazil, Colombia) for a total of 120 participants who are performing numerous training activities at local level in their countries. In this framework, scientific collaborations are developed among institutions of involved countries operating in public health, such as the national health Institutes in Italy and Colombia that collaborate on environmental health issues (asbestos, hazardous waste disposal, polluted sites).
Conclusions: The existence of the NECOBELAC network and the excellent achieved results encourage and motivate this implementation plan. The environmental health issues selected within by this Italian-Colombian cooperation rely on both maturated experiences on public health and currently scientific debates and are of broad impact for society.

PRENATAL ORGANOPHOPHOSPHATE AND CHILD NEURODEVELOPMENT: RESULTS FROM THE MOUNT SINAI CHILDREN'S ENVIRONMENTAL HEALTH AND DISEASE PREVENTION RESEARCH CENTER

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Background & Aims: Prenatal exposure to organophosphate pesticides has been shown to negatively impact child neurobehavioral development. Paraoxonase 1 (PON1) is a key enzyme in the metabolism of organophosphates. We undertook an investigation of the relationship between biomarkers of organophosphate exposure, PON1, and cognitive development at ages 12 and 24 months, and 6 to 9 years.
Methods: The Mount Sinai Children's Environmental Health Study enrolled a multiethnic prenatal population in New York City between 1998 and 2002 (n= 404). Third trimester maternal urines were collected and analyzed for organophosphate metabolites (n = 360). Prenatal maternal blood was analyzed for PON1 activity and genotype. Children returned for neurodevelopment Bayley Scales of Infant Development assessments at ages 12 (n = 200) and 24 months (n = 276), and for psychometric intelligence tests between 6 and 9 (n = 169) years.
Results: Prenatal total dialkylphosphate metabolite level was associated with a decrement in mental development at 12 months among blacks and Hispanics (log10 • DAP Beta = -3.29, 95% CI -5.88, -0.70). Effects were enhanced among children of mothers who carried the PON1 Q192R QQ genotype which imparts slow catalytic activity for the chlorpyrifos oxon (interaction p-value < 0.01; QQ log10 • DAP Beta = -4.71, 95% CI -7.59, -1.83). In later childhood, increasing prenatal total dialkyl- and dimethylphosphate metabolites were associated with decrements in perceptual reasoning in the maternal PON1 Q192R QQ genotype and followed monotonically decreasing trend with increasing prenatal exposure (interaction p-value = 0.09; QQ log10 • DAP Beta = -7.52, 95% CI -14.53, -0.51).
Conclusion: Prenatal exposure to organophosphates negatively impacts cognitive development, which was apparent at assessments as early as 12 months and continued through early childhood. A critical affected domain is perceptual reasoning. PON1 status is an important mediating factor in identifying populations most susceptible to these deleterious effects.

ATTEMPTS TO DISCRIMINATE AMONG COMBUSTION SOURCES IN ASSESSING THE HEALTH EFFECTS OF AIR POLLUTION

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Background and Aims: When executing epidemiological studies relating pollutants to human health (mortality) researchers confront numerous measures of air pollution to consider. Researchers confront both multiple measuring techniques that create series of data for ostensibly the same pollutant measured at the same or neighboring sites (for example, PM2.5, DFPSS and PM2.5 TEOM) and/or measurements of many different, but potentially related pollutants (for example, EC and OC). We discuss steps we have employed, findings of our methods, and suggestions for other researchers.
Methods: We have grouped pollutants using a process that begins with initial analysis of each of the pollutants individually using the same models: 1) average of lag 0 and lag 1 for each pollutant; and 2) pollutant individually as lag 0 through lag 4 or more). Upon review of the results we have clustered the pollutants by the patterns of the estimated coefficients using UNMIX (Lewis, et al., JAWMA 2003), PMR (Ramadan, et al. Chemometrics 2003), knowledge of the source of the pollutants, plus/minus and strength of the coefficients, and Spearman correlation coefficients of the various pollutant series. We also execute two-three pollution models for pollutants that are highly correlated to observe the impact of the multiple pollutants in the same model.
Results: UNMIX and PMF created different factors with only factors created by PMF illustrating significant results. These results were used to identify pollutants considered in subsequent models. In this study, it appeared the significant factors were driven by the chloride ion.
Conclusion: The use of source factors can help identify specific pollutants for further study. This study illustrates the need for researchers to beware of labels of factors and to investigate using multiple methods.

LUNG CANCER AND ELEMENTAL CARBON EXPOSURE IN US TRUCKING INDUSTRY WORKERS

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Background and Aims: An elevated risk of lung cancer in truck drivers has been attributed to vehicle exhaust exposure. We established a large retrospective cohort of trucking company workers to assess the association of lung cancer mortality and elemental carbon (EC, as a measure of vehicle exhaust exposure).
Methods: Work records were obtained for 31,135 male workers age 40+ employed in the unionized US trucking industry in 1985. Lung cancer mortality was assessed through 2000 using the US National Death Index. An industrial hygiene review and current exposure measurements were used to develop annual historical estimates of EC by work location for all job groups. Cox proportional hazards models adjusted for age, race, calendar year, decade of hire, region of the country, and the healthy worker survivor effect were used to examine the association of EC exposure and risk of lung cancer mortality. Exposures were categorized as the cumulative sum of exposure and the cumulative sum disregarding the 5 years of exposure prior to death, i.e., with a 5- year exposure lag.
Results: 779 lung cancer deaths occurred during 424,668 years of person-time. With a 5-year exposure lag, compared to those in the lowest quartile of EC exposure, the hazard ratios were 1.32 (95%CI: 1.01-1.71), 1.37 (95%CI: 1.02-1.85), and 1.37 (95%CI: 0.99-1.91) for those in the second, third, and fourth quartiles, respectively.
Conclusions: Trucking industry workers with regular exposure to vehicle exhaust from diesel and other types of vehicles on highways, city streets, and loading docks have an elevated risk of lung cancer with greater EC exposures. However, the relationship between cumulative EC exposure and lung cancer risk does not appear to be linear.

Background
Previous studies suggest that exposure to pesticides increases the risk of childhood acute lymphoblastic leukaemia (ALL). The aim of this analysis was to investigate whether professional pest treatments in or around the home before birth or during childhood increased the risk of childhood ALL.

Methods
The Australian Study of Causes of Acute lymphoblastic Leukaemia in Childhood was a national population-based, multicentre case-control study of children younger than 15. Cases were eligible if diagnosed with ALL between July 2003 and December 2006. Controls were recruited by national random digit dialling between 2003 and 2006. Data from 366 cases diagnosed and 841 frequency-matched controls were analyzed using unconditional logistic regression, adjusting for study matching variables and potential confounders, to calculate odds ratios (ORs). A meta-analysis of our findings with the published findings of previous studies was also conducted.

Results
The ORs for professional pest control treatments were 1.24 (95% CI 0.86, 1.78) in the year before pregnancy, 1.37 (95% CI 0.89, 2.10) during pregnancy and 1.23 (95% CI 0.91, 1.65) for those done after the child's birth. The ORs for exposure after birth were highest when it occurred between the ages of two and three years. ORs were elevated for termite treatments before birth. ORs were higher for Pre-B than T cell ALL and for ALL of the ETV6-Runx-1 subtype than other cytogenetic subtypes. The pooled OR from a meta-analysis of this study with three previous studies of professional pest control treatments during pregnancy was 1.42 (95% CI 1.03, 1.95).

Conclusions
Our results, and those of our meta-analysis, provide some evidence of an increased risk of ALL for professional pest control treatments done during the index pregnancy and possibly in the child's early years. The analysis of pooled data from international collaborations may provide more certainty regarding these potentially important associations.

ENVIRONMENTAL DRIVERS OF ROSS RIVER VIRUS IN SOUTH-EAST TASMANIA, AUSTRALIA: TOWARDS STRENGTHENING PUBLIC HEALTH INTERVENTIONS

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Background and aims: Ross River virus (RRV) is the most common and widespread mosquito-borne disease in Australia [1] and is predominantly identified and managed through passive surveillance. Here, the proactive use of environmental datasets to improve community-scale public health interventions in south-eastern Tasmania is explored. The potential for RRV to become an emerging public health issue in Tasmania due to projected climate changes is discussed.
Methods: RRV cases for the south-eastern Tasmania study area were obtained from the Tasmania Department of Health and Human Services (DHHS) for the 1993-2009 study period. Climate data (1993-2009) were obtained from the Australian Bureau of Meteorology (BOM) [2]. Tide data were obtained from the National Tidal Centre and Australian Hydrographic Service. Known environmental drivers (temperature, rainfall, and tide) of the RRV vector *Aedes camptorhynchus* were analyzed against cumulative case records for 5 adjacent Local Government Areas (LGAs) (1993-2009).
Results: Fisher's exact analysis showed years with above average rainfall were significantly correlated with [Tasmania-wide] RRV outbreak years. From Spearman's correlation, correlations between the five LGA RRV cases and three key environmental variables separately varied for 0, 1, 2 and 3 month lag periods. Negative binomial regression analyses showed that, allowing for a 0 to 3 month lag period, temperature was the most significant driver of RRV cases at 1 month lag, contributing to a 23.2% increase in cases above the long-term case average.
Conclusions: This research serves as an initial study of environmental drivers of RRV in SE Tasmania. Using these results for future studies and modeling to develop warning systems for local councils could prove very valuable. Implementing these early warning systems might help to prioritize funding towards interventions such as mosquito spray programs and/or public outreach campaigns. These steps will help to further guide public health policy and public health officials to reduce the overall disease burden.

References

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THE POTENTIAL ROLE OF EPIGENETICS IN MEDIATING AIR POLLUTION EFFECTS

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Background and Aims: Epigenetics investigates heritable changes in gene expression that occur without changes in DNA sequence. Several epigenetic mechanisms, including DNA methylation and histone modifications, can change genome function under exogenous influence. Results obtained from animal models indicate that in utero or early-life environmental exposures produce effects that can be inherited transgenerationally and are accompanied by epigenetic alterations. The search for human equivalents of the epigenetic mechanisms identified in animal models is in progress.
Results: Published evidence from human studies of air pollution indicating that epigenetic alterations mediate effects caused by exposure to environmental toxicants will be presented. In these investigations, our own results have shown that air pollution exposure is associated with altered methylation of human repetitive elements or genes. In recent preliminary studies, we have shown alterations of histone modifications in subjects exposed to metal-rich airborne particles. Original data will be presented demonstrating that altered DNA methylation in blood and other tissues is associated with environmentally-induced disease, such as cardiovascular disease and asthma.
Conclusions: On the basis of current evidence, possible models for the interplay between air pollution exposure and the human epigenome will be proposed and discussed.

ACUTE EFFECTS OF AIR POLLUTION ON PEDIATRIC ASTHMA ADMISSIONS IN ATHENS, GREECE

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Background and Aims: Several studies have reported adverse acute effects of air pollution on health, but most of them have focused on particulate pollution. We investigated the short term effects of particulate matter with aerodynamic diameter <10μg/m^3 (PM_{10}), sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and ozone (O_3) on asthma emergency admissions in children aged 0-14 years old in Athens, Greece during 2001-2004. We explored effect modification patterns by season, sex, age and by the presence of desert dust transported mainly from the Sahara area.
Methods: We used daily time series data of pediatric asthma admissions from all the major children's hospitals in Athens and of the air pollutants as provided by the fixed monitoring stations' network. The associations were investigated using Poisson regression models allowing for overdispersion, controlling for seasonality, weather, day of the week, influenza and holiday effects. We applied separate stratified analysis by season, gender and age group.
Results: A 10 μg/m^3 increase in PM_{10} was associated with a 2.54% increase (95% confidence interval (CI): 0.06%, 5.08%) in the number of pediatric asthma admissions (during desert dust days: 4.12% (95% CI: 0.11%, 8.30%); non-desert days: 2.06% (95% CI: -1.01%, 5.21%)), while the same increase in SO_2 was associated with a 5.98% (95% CI: 0.88%, 11.33%) increase. O_3 was associated with a statistically significant increase in asthma admissions among older children in the summer. Our findings provide limited evidence of an association between NO_2 exposure and asthma exacerbation. Statistically significant PM_{10} effects were higher during winter and during desert dust days, while SO_2 effects occurred mainly during spring.
Conclusions: Our study confirms previously reported PM_{10} effects on emergency hospital admissions for pediatric asthma and further provides evidence of stronger effects during desert dust days. We additionally report severe effects of SO_2, which in Athens are at a moderate level.

"UNSPINNING" EPIDEMIOLOGICAL RESULTS FOR POLICY MAKERS

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Background and Aims: Environmental health policy decisions are partially influenced by: 1) the strength of evidence for, and 2) the magnitude of an environmental risk. However, the epidemiological literature is rife with adjectives pertaining to these two features, that play on well-known psychological quirks, in order to either alarm or reassure policy makers and the public. Through a publicly vetted process in California we developed a vocabulary to minimize this kind of "spinning" of results.
Methods: Staff of the California Department of Public Health developed "Risk Evaluation Guidelines" that laid out a proposed vocabulary for characterizing evidence and the magnitude of risk. These guidelines were submitted for public comment as well as review by an external advisory committee of scientists from various disciplines. After revision and acceptance by the committee these terms were used in a risk evaluation of low frequency magnetic fields (EMF).
Results: We avoided the common locution: "there is no evidence that…" Instead, we proposed terms to characterize the volume, the quality, and the consistency of the "evidentiary base" as well as the magnitude and the direction of observed effects. We reported estimated magnitudes of effects in both their psychologically reassuring and alarming formats. We were also careful to report facts relevant to "fairness" such as the existence of unequal exposures or the existence of effect modification in disadvantaged groups.
Conclusions: These detailed specifications for vocabulary can be found in the "Risk Evaluation Guidelines" and their actual use can be found in the "Risk Evaluation." Both of these documents received public review before finalization. They can be found on-line at the reference below. Stakeholders on both sides of the EMF issue considered these documents to have avoided "spinning." This vocabulary deserves wider use.
References:
www.ehib.org/emf

THYROID FUNCTION, PFOA AND PFOS IN CHILDREN LIVING NEAR A CHEMICAL PLANT

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Background and Aims: Altered thyroid hormone levels following exposure to perfluorocarbons (PFCs) have been found in some animal studies. Published epidemiological findings are not consistent and most prior studies have focused on adults. We investigated if concentrations of two PFCs, perfluorooctanoate (PFOA) and perfluorooctane sulfonate (PFOS), were associated with thyroid function among 10,725 children (aged 1-18 years) living near a Teflon manufacturing facility in the Mid-Ohio Valley, USA.

Methods: Serum levels of thyroid-stimulating hormone (TSH), total thyroxine (TT4), and T3 uptake were measured and free thyroxine index (FTI) was calculated as biomarkers of thyroid function during 2005-2006, at the same time as serum levels of PFCs were measured. We estimated modeled in utero PFOA concentrations. Child-mother pairing allowed maternal serum concentrations of PFOA estimated at pregnancy to be used as a proxy for in utero exposure to PFOA for 52% of children. We performed multivariate regression analyses between thyroid disease status or thyroid hormone levels and PFOA/PFOS concentrations.

Results: At survey, median serum PFOA and PFOS concentrations were 29.3 and 20 ng/mL, respectively, and modeled in utero PFOA concentration was 17.1 ng/mL. The prevalence of reported thyroid disease was 0.5%, and the prevalence of subclinical hypothyroidism and hyperthyroidism based on thyroid hormone levels was 2.6 and 1.0%, respectively. We found a positive association between serum TT4 or FTI and LnPFOS in children (TT4: β=0.19, 95% CI=0.12, 0.26; FTI: β=0.04, 95% CI=0.02, 0.06). Findings for PFOA will also be presented in the conference but must first be shown to the local community.

Conclusions: Our results demonstrate a possible association between altered thyroid hormone levels and PFOS concentrations. This study comprises by far the largest population to date of children studied with such levels of PFOA, in relation to markers of thyroid function.

TEMPORAL CHANGES IN HOSPITALIZATION RATES DUE TO CARDIO-VASCULAR, RESPIRATORY DISEASES AND DIABETES IN URBAN ADULT POPULATION LIVING NEAR INDUSTRIAL PARK

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Background and Aims: In the Bedouin population – as previous studies presented – an increase in birth defects, mortality (perinatal and general), and respiratory hospitalization associates with residential proximity to a local chemical industrial park (IP). The aim of this study was to analyze whether an association between residential proximity to the IP and cardio-respiratory diseases and diabetes hospitalization rates exists for other populations living Beersheba subdistrict in Southern Israel.
Methods: A semi-ecological study has being conducted during 1995-2004 years, in which residential proximity to the IP was used as a surrogate exposure estimate**.** The dichotomic distance “<20 km from IP” was considered as “proximal” or “exposed”, while its complement part “20 + km from IP” was denoted as “distant” or “unexposed”. Such definition was based on the most far-off yet verified odour complaint related to the IP emissions. Given that after the year 2000 levels of the monitored daily emissions dropped along with the decrease in verified odour complaints from 58.2% to 41.3%, we divided the study period into two times before and after 2000 year. Negative binomial regression was used to assess incidence rate ratios (IRR) adjusted to confounders.
Results: Cardio-vascular gender-specific hospitalization rates were significantly higher for "proximal" localities than for "distant" ones throughout the study period. Independently, gender, age and locality type were associated statistically significant with the cardio-vascular hospitalization rates. All population characteristics predicted significantly respiratory hospitalization rates thru the study period, except for residential proximity to the IP, which was found associated statistically with the respiratory outcome in only 1995-1999 with IRR=1.174 (CI: 1.074-1.283). Diabetes hospitalization rates were associated significantly with locality type, but only during 1995-1999 years.
Conclusions: We found that after year 2000, there was a significantly decrease in the respiratory and cardiovascular diseases hospitalization rates in residents living near the IP.

HEAT AND CAUSE-SPECIFIC MORTALITY IN ADULTS AND INFANTS

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Background and Aims: Mortality has been shown to increase with extremely hot ambient temperatures. A fine stratification of mortality causes can be useful for improving preventive policies. Infants are often identified as a vulnerable population to extreme heat conditions; however, results on heat and infant mortality are scarce, with no studies reporting on cause-specific mortality.
Methods: The study includes all deaths in the Catalonia region (Spain) during the warm seasons of 1983-2006 (503,389 deaths). The case-crossover design was used to evaluate the association between the occurrence of extremely hot days (days with maximum temperature above the 95th percentile) and mortality. Adult and infant mortality were stratified into 66 and 8 causes of death, respectively
Results: Three consecutive hot days increased total daily mortality by 19%. The percent of all deaths that was attributable to heat was 1.59%. About 40% of those deaths did not occur during heat wave periods. The mortality causes with elevated risk included most cardiovascular and respiratory diseases, mental and nervous system disorders, some infectious and digestive system diseases, diabetes, and some external causes including suicide. In infants, the effect of heat was observed on the same day and was only detected for conditions originating in the perinatal period (Relative Risk: 1.53; 95% confidence interval: 1.16-2.02). Within perinatal causes, cardiovascular, respiratory, digestive system and haemorrhagic and haemotological disorders were the causes with stronger effects.
Conclusions: Heat contributes to an increase in mortality via several causes. In infants, the first week of life is the most critical window of vulnerability.
References:

PATTERNS OF AGE OF PUBERTY IN RELATION TO PFOA AND PFOS AMONG CHILDREN IN THE MID-OHIO VALLEY

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Background and Aims: Animal studies have suggested that some perfluorocarbons (PFCs), including perfluorooctanoate (PFOA) and perfluorooctane sulfonate (PFOS), may alter sexual maturation. Relationships of human PFC exposure with puberty are not clear. We conducted a study to investigate whether PFOA and PFOS affect pubertal status based on sex steroid hormone levels and self-reported menarche.
Methods: We analyzed patterns of puberty in a 2005-2006 survey of residents with PFOA water contamination from the Mid-Ohio Valley (3,076 boys and 2,931 girls, aged 8-18 years). Participants were classified as having reached puberty based on either hormone levels (total >50 ng/dL and free >5 pg/mL testosterone in boys, and estradiol >20 pg/mL in girls) or onset of menarche. We estimated the odds of reaching puberty and the fitted median age of reaching puberty in relation to serum PFOA and PFOS levels measured when puberty status was assigned, after controlling for other potential explanatory factors. Further analyses of puberty in relation to in utero levels of PFCs are ongoing and will be presented.
Results: Median PFOA and PFOS levels were 26 and 20 ng/mL in boys, and 20 and 18 ng/mL in girls, respectively. For boys, odds to reach puberty were reduced with increasing PFOS (delay of 190 days between the highest and lowest quartile). For girls, odds of post-menarche were lower with higher exposure to PFOA or PFOS (130 and 138 days of delay, respectively).
Conclusions: This is the first study indicating a possible association between delay of puberty and current serum levels of PFOS in boys and PFOA/S in girls. Exposure was assessed at the same time as puberty was classified and this work is being extended to assess timing of puberty in relation to estimates of PFC levels in utero.

NEW POLLEN INDEX FOR CHARACTERIZING POPULATION EXPOSURE TO AIRBORNE POLLEN LOAD AT DIFFERENT GEOGRAPHICAL LEVELS

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Background and Aims: The ongoing spread of *Ambrosia artemisiifolia* in Europe is an increasing problem for human health and as an agricultural and non-agricultural weed. Hungarian Aerobiological Network (HAN) has monitored the airborne pollen of ragweed for 18 years, these data are a sound basis to create indicators to monitor the changes of the ragweed pollen season in time and space and the population exposure.
Methods: HAN has 18 monitoring sites out of which 8 sites were selected being representative for the characteristic macroclimate types of the country. The relevant population was defined as the population living around the monitoring site in a circle of 17.5 km. The start and end of the pollen season (1% resp. 99% of cumulative daily pollen count) was defined, daily pollen concentration were categorised into 7 groups (0-9, 10-29, 30-99, 100-299, 300-499, ≥500 pollen grains/m^3 resp. missing value).
Two sub-indices were defined and computed by year. Rate of time of population exposure to pollen concentration categories (TR) and rate of population (PR) exposed to different categories of daily pollen concentration at selected monitoring sites during the pollen season TR(x) and PR(x) indicate, what percentage of the total population is exposed to a given pollen concentration category (x) in what percentage of days of the total pollen season.
Results: Based on selected pollen data for 2010, 52.2% of the population was exposed to daily pollen concentration over 30 grains/m^3 (evoking allergic symptoms in every patient) during 40.8% of days of the season (32 days). 3.7% of the population was exposed to ≥500 grains/m^3 (extremely high category) for 4.8% of days.
Conclusions: In the future the indices can be used to examine spatial differences and time trends.
This project is supported by the New Hungary Development Plan (Project ID:TÁMOP-4.2.1/B-09/1/KMR-2010-0005).

MODELLING OF THE ASSOCIATION OF HEALTH IMPACTS OF EXPOSURE TO 2007-HEATWAVE AND THE EFFECT MODIFIERS AT SMALL AREA LEVEL IN HUNGARY

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Background and Aims: There is few evidence of the association between socio-economic factors and human adaptive capacity to climate change. The authors studied, whether the 2007 heatwave had different health impacts on sub-regional levels.
Methods: Daily total and cardiovascular mortality data were gained from the Central Statistical Office. The daily mean temperature data at 25km grids were derived from the European Climate Assessment & Dataset. Using Kriging, a continuous surface was interpolated from grid data to predict a daily mean temperature surface across the country for every summer day in 2007. Time clusters of mortality were studied by SatScan, excess mortality at small area level by Rapid Inquiry Facility module of ArcGis, the association between mortality, temperature, socioeconomical factors by spatial regression analysis using WinBUGS. Age-specific national death rates were used for standardized mortality rates. Small-area factors were defined by using population-weighted averages of temperature, socio-economical factors.
Results: A time cluster of daily mortality was identified between 18-25th July for the total and ≥50 years population. A 30% of excess mortality was detected during the heat wave period compared to the summer mortality rates excluding the heat wave period. Risk of excess total mortality (SMR 1.78) was the highest on the hottest day. No significant differences were seen in the spatial distribution of excess mortality, spatial fraction was 0.2086. A significant association was detected between excess mortality (for both causes) and socioeconomic status adjusted for density of population, whilst there was no statistically significant association between excess mortality and population density adjusted for deprivation.
Conclusions: During the heatwave high temperature, regardless to spatial differences, caused significant excess mortality, the impact was modified by socio-economical status.
The study was funded by EC DG Sanco EUROHEIS2/No2006126 and by by the New Hungary Development Plan (Project ID: TÁMOP-4.2.1/B-09/1/KMR-2010-0005).

METHODS FOR THE ASSESSMENT OF FOOD AND PHYSICAL ACTIVITY ENVIRONMENTS: BROOKLYN SENIORS AND THE BUILT ENVIRONMENT (BSBE) STUDY

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Background and Aims: Methods to evaluate the food and physical activity environment within the same study remain sparse. It is hypothesized that the types of local food retailers will affect individuals' dietary intake and both density and types of neighborhood infrastructure will influence walking. Therefore, methods to assess all features of local urban residential environments were developed.
Methods: One-thousand four hundred residents of Brooklyn New York, aged 60 years or older, were recruited during 2009-2011. Using Arc-GIS, participants' residential addresses were geocoded and 600-meter buffer zones were created, representing individuals' immediate residential environments. Using walking audits, information on the presence of the following types of places was collected. The categories of places include: (a) General (schools, places of worship, post office, medical, bank, libraries, service industries, retail industries); (b) Food (bodegas, franchised fast food, small grocery stores, specialty food stores, supermarkets, restaurants, tavern/bars, liquor stores, food vendors, convenience stores); (c) Physical Activity (parks, gyms, other physical activity resources); (d) Land Use (vacant commercial, land, residence and office spaces, residential, parking lots, factory/warehouse); and (e) Public Transportation (bus stops, subway stops).
Results: Using data from the New York City Department of Transportation, 38,122 street segments in Brooklyn were identified. A segment is the road length between two adjacent intersections. Some street segments were excluded such as alleys or paper streets, resulting in a total of 35,122 eligible segments. There is an average of 56 street segments (standard deviation (SD)=16.0) per buffer zone. Within each buffer zone, examples from each category of places include an average of 0.41 banks (SD=0.82); 1.3 supermarkets (SD=1.2); 6.3 green space entrances (SD=6.1); 10.4 vacant commercial spaces (SD=7.2); and 10.7 bus stops (SD=16.0).
Conclusions: Characterizing neighborhood infrastructure will allow for a robust evaluation of neighborhood variations and mechanisms of built environments affecting wellness among older adults.

RETROSPECTIVE EXPOSURE ASSESSMENT OF PERFLUOROOCTANOIC ACID (PFOA) SERUM CONCENTRATIONS AT A FLUOROPOLYMER MANUFACTURING PLANT

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Background and Aims: A retrospective exposure assessment was conducted as part of an epidemiologic study of the morbidity and mortality of workers exposed to C8, the ammonium salt of perfluorooctanoic acid (PFOA).
Methods: A serum database of 2125 measurements of serum PFOA from workers in the plant was used to model retrospective exposures. Eight job category/job group combinations were modeled using linear mixed models to account for repeated measures along with several variable combinations including a 4 knot restricted cubic spline (RCS) function to reflect the influence of process changes over calendar time on exposure, cumulative years worked in potentially exposed jobs, and the amount of C8 used or emitted by the plant over time.
Results: The trends in serum PFOA levels over time reflect a complex plant history including changes in production levels and engineering controls instituted to decrease C8 exposures. Nevertheless, the models were successful in fitting the serum data, finding a consistent 2-3% increase in serum PFOA level per cumulative prior years worked in a potentially PFOA exposed job. With one exception, all the models included either the amount of C8 used in the plant or the amount of C8 emitted by the plant in the year the sample was collected as a predictor. Both of these were significant positive variables resulting in a 3% increase in serum PFOA level per increase in 1000 pounds of C8 emitted/year or an increase in serum PFOA level of 1% per 1000 pounds C8 used/year.
Conclusion: The approach described here represents an improvement in the specificity of exposure characterization for this cohort. The retrospective models for serum levels described here allow use of employee work histories to predict annual serum levels for the full unsampled cohort for use in the exposure response modeling.

IMPACT ON CHILDHOOD RESPIRATORY HEALTH BY RESIDENTIAL EXPOSURE TO HIGHWAY TRAFFIC EXHAUST IN AN ALPINE VALLEY IN SWITZERLAND

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Background and Aims: Little is known about residential exposure to air pollution from trans-alpine highway traffic and its impact on respiratory health. Our previous questionnaire study showed significant associations between respiratory symptoms and highway exposure in adults and children. The current pediatric asthma panel study is focusing on the short-term relationship between residential air pollution exposures and respiratory heath outcomes.
Methods: From November 2007 to June 2009 13 children (ages 7–13) with asthma participated in monthly health monitoring including measurements of exhaled NO (eNO) and oxidative stress markers in exhaled breath condensate (eBC) as well as outdoor and indoor air pollution monitoring. Asthma symptoms, medication use, allergies, exposure to tobacco smoke, and a time-activity diary of the child for the day before the health monitoring were recorded. Measurements of NO2 at 13 locations in the community and PM10 at two fixed and four mobile locations were used to model the home outdoor exposures. Linear mixed regression models are used to assess the association between levels of eNO and eBC markers and modeled traffic air pollution exposures. In addition different source contributions (e.g. diesel trucks, gasoline cars, biomass burning, etc.) to PM10 are quantified by source apportionment methods enabling assessment of their association with respiratory health.
Results: Associations between eNO and pollutants were analyzed for same day and different lag-day measurements. Preliminary results showed an increase of eNO levels per interquartile range of pollutant of 4% (CI: -1.7, 9.9) for elemental carbon, 2.4% (CI: -3.1, 8.3) for NO2 and 1.7% (CI: -2.8, 6.4) for PM10 at lag1 day. Analysis between the respiratory health markers and source apportioned PM10 results is currently underway.
Conclusions: Our first results demonstrate that air pollution from the trans-Alpine highway traffic is likely a significant risk factor for adverse respiratory effects in school children.

THE EFFECTS OF PARTICULATE MATTER SOURCES ON DAILY MORTALITY IN BARCELONA, SPAIN

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Background and Aims: Dozens of studies link acute exposure to particulate matter (PM) air pollution to premature mortality but questions remain about which species and sources in the PM mixture are responsible. While a few studies exist on the effects of species and sources in U.S. cities, European cities, which have a higher proportion of diesel engines and denser urban populations, are not well characterized. Information on the effects of specific sources could aid in targeting pollution control and in articulating the biological mechanisms of PM. Our study examines the effects of various sources on daily mortality in Barcelona, a densely populated city in the northeast corner of Spain.
Methods: Source apportionment using positive matrix factorization was developed for both PM2.5 and PM10 (PM less than 2.5 and 10 microns in diameter, respectively) from 2003 to 2007 and eight different factors were identified. A ninth factor measuring overall traffic was also formed by adding several of the other factors. Case-crossover regression analysis was used to determine the independent effects of daily exposure to each factor on both all-cause and cardiovascular mortality. We also examined multi-source models.
Results: T he results indicate that several sources of PM2.5 including vehicle exhaust, fuel oil combustion, secondary nitrate/organics, minerals, secondary sulfate and road dust were associated with all-cause and cardiovascular mortality. In the multi-source model, traffic (the sum of vehicle exhaust, road dust and 70% of nitrate), minerals and sulfate were all associated with these outcomes.
Conclusions: These results suggest that mobile sources, re-entrained dust, fossil fuel combustion and urban dust (construction/demolition, unpaved areas etc.) are important contributors of the observed adverse health linked to PM. Also, in some cases. the risks for the respective interquartile range in the concentrations were higher for specific sources than for PM2.5 mass.

SEASONAL VARIATION IN THE DIAGNOSIS OF PRIMARY BILIARY CIRRHOSIS

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Background and Aims: The aetiology of the autoimmune liver disease primary biliary cirrhosis (PBC) is unclear. Both genetic and environmental factors are likely to be involved. We have previously reported evidence of space-time clustering suggesting that a transient environmental agent may be involved in aetiology. The study aim was to further examine whether a transient environmental agent may contribute to the aetiology of PBC. We have analysed seasonal variation with respect to month of diagnosis using population-based data from northeast England over a defined temporal period (1987-2003).
Methods: Monthly expected (*E*) numbers of cases were calculated under an assumption of a uniform distribution throughout the year. Observed counts (*O*) were compared with the expected numbers. The chi-squared heterogeneity test was used to test for overall non-uniform variation and also for individual months. Poisson regression analysis was used to fit a sinusoidal (harmonic) model to the data, using month of diagnosis as a covariate in the model.
Results: The study analysed 1030 cases of PBC (931 females, 99 males) who were diagnosed during the period 1987 to 2003. The overall chi-squared heterogeneity test showed marginally statistically significant evidence for departure from the uniform distribution ($P = 0.062$). Detailed analyses of individual months showed that there was a marked and highly statistically significant peak for diagnoses in the month of June ($O = 115$, $E = 84.7$, $O/E = 1.36$, $P = 0.001$). Furthermore, Poisson modelling showed that there was evidence of sinusoidal patterning with a June peak ($P = 0.012$) with goodness of fit ($P = 0.302$) and estimated amplitude of 0.111 (standard error = 0.044).
Conclusions: These highly novel results provide further evidence for the involvement of a transient environmental agent in the aetiology of PBC, at least in some patients. Candidate agents include infections, atmospheric pollution or dietary factors.

INCREASING INCIDENCE OF THYROID CANCER IN GREAT BRITAIN, 1976 – 2005: AGE-PERIOD-COHORT ANALYSIS

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Background and Aims: Reasons for recent increases in the incidence of primary thyroid cancer have not been explained. This study aimed to fully examine temporal trends in the incidence of primary thyroid cancers diagnosed in 0-49 year olds in parts of Great Britain (GB) during the period 1976-2005.
Methods: Case data on thyroid cancer were obtained from four regional cancer registries in GB (Northern and Yorkshire, North West, Wales and Scotland). Age-standardised incidence rates (ASRs) and 95% confidence intervals (CIs) were calculated. Negative binomial regression was used to examine the effects of age, sex, drift (linear trend), non-linear period and non-linear cohort.
Results: The study analysed 4327cases of thyroid cancer aged 0-49 years. For males, the overall ASR was 3.9 per million persons per year (95% CI: 3.6-4.1). For females, the overall ASR was 12.5 (95% CI: 12.0-12.9). The best fitting negative binomial regression model included age (P<0.001), sex (P<0.001) and drift (P<0.001). Non-linear period (P=0.42) and non-linear cohort (P=0.71) were not statistically significant. For males aged 0-14 years, the ASR increased from 0.2 per million persons per year in 1976-1986 to 0.6 in 1996-2005. For males aged 15-29 and 30-49 the ASRs increased from 1.9 to 3.2 and from 7.3 to 12.6 per million persons per year, respectively. For females aged 0-14 years, the ASR increased from 0.3 to 0.5 per million persons per year. For females aged 15-29 and 30-49 the ASRs increased from 7.0 to 12.3 and from 21.2 to 40.0 per million persons per year, respectively.
Conclusions: There has been a linear increase in the incidence of thyroid cancer, which has led to a doubling of the number of cases diagnosed over a twenty year time span. The reasons for this increase are not well understood, but it is consistent with findings from other countries.

TRAFFIC-RELATED AIR POLLUTION AT HOME AND SCHOOL AND LUNG FUNCTION IN CHILDREN WITH ASTHMA: THE CINCINNATI ANTI-IDLING CAMPAIGN STUDY

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Background and Aims: Diesel idling is a significant contributor to the concentration of traffic-related air pollution (TRAP) at schools. Previous anti-idling campaigns have been implemented, though the impact on air quality and health has been infrequently assessed. The objective of this analysis was to determine the association between exposure to TRAP at the homes and schools of asthmatic children on lung function prior to a community-based anti-idling campaign.

Methods: Four schools were selected to participate in the anti-idling campaign. Asthmatic children attending these schools and their caregivers were enrolled and completed a questionnaire and spirometry. Ambient air sampling was conducted prior to the anti-idling campaign at each school to measure the concentration of elemental carbon (EC), a marker of TRAP. Exposure to EC at the home address of each child was estimated using a land-use regression model. The association between time-weighted EC exposure and Forced Expiratory Volume in 1 second (FEV_1), Forced Vital Capacity (FVC), and Forced Expiratory Flow (FEF_{25-75}) was examined by linear regression and adjusted for height, weight, asthma medication use, number of school buses, gender, race, age, environmental tobacco smoke, and household income.

Results: A total of 102 children completed spirometry and a caregiver questionnaire. The average concentration of EC sampled at the schools was 0.62 $\mu g/m^3$ and was significantly greater than the estimated EC concentration at the children's homes (0.52 $\mu g/m^3$, $p < 0.01$). One interquartile (0.20 $\mu g/m^3$) increase in time-weighted EC exposure was associated with significant deficits in FEF_{25-75} [-0.26 L/s (95% CI -0.46, -0.05)] and decreased FEV_1 [-0.09 L (95% CI -0.20, 0.01)]. Exposure to EC was not associated with FVC.

Conclusions: Exposure to TRAP at homes and schools is associated with deficits in lung function among asthmatic children. The impact of the anti-idling campaign will be assessed by post intervention air sampling and repeated measurement of lung function.

SERUM DIOXIN CONCENTRATIONS AND CANCER RISK IN THE SEVESO WOMEN'S HEALTH STUDY

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Background and Aims: 2,3,7,8-Tetrachlorodibenzo-para-dioxin (TCDD), a widespread environmental contaminant, disrupts multiple endocrine pathways. The International Agency for Research on Cancer (IARC) classified TCDD as a known human carcinogen, based upon predominantly male occupational studies of increased mortality from all cancers combined.
On July 10, 1976, as a result of a chemical explosion, residents of Seveso, Italy, experienced the highest levels of TCDD in a human population. In 1996, we initiated the Seveso Women's Health Study (SWHS), a retrospective cohort study of the reproductive health of the women. We previously reported a non-significant increased risk for all cancers combined with individual serum TCDD level, based on 21 cases. Herein we report results for risk of cancer from a subsequent follow-up of the cohort in 2008.
Methods: In 1996, we enrolled 981 women who were 0 to 40 years in 1976, resided in the most contaminated areas, Zones A and B, and had adequate archived sera collected soon after the explosion. For each woman, TCDD concentration was measured in the archived serum by high-resolution mass spectrometry. A total of 833 women (85%) participated in the 2008 follow-up study. All cancer cases were confirmed by medical record. We examined the relation of serum TCDD with cancer incidence using Cox proportional hazards models.
Results: In total, 66 (6.7%) women had been diagnosed with cancer. The average age at diagnosis was 48.8 (±11.3) years and geometric mean serum TCDD level was 95.3 (±4.0) ppt, lipid-adjusted. The adjusted hazard ratio for cancer associated with a ten-fold increase in serum TCDD levels ($\log_{10}$TCDD) was 1.80 (95% C.I. 1.29-2.52).
Conclusions: Individual serum TCDD is significantly positively related with cancer incidence in the SWHS cohort, more than 30 years after exposure. This all-female study adds to the epidemiologic evidence that TCDD is a multi-site carcinogen.

MERCURY EXPOSURE IN REMOTE FISH EATING POPULATIONS AND CARDIOVASCULAR RISK FACTORS

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Background and aims: More and more data suggest that the cardiovascular system should be considered a potential target for mercury. For example, work conducted in the Faeroe Islands in children and in Greenland suggests associations between mercury exposure and blood pressure and heart beat variability which are known risk factors for cardiac health. Other studies conducted in Europe suggest association between mercury and increase risk of myocardial infarction.
Methods: We have studied three large remote fish eating communities in the Arctic, sub Arctic and South Pacific which are exposed to high doses of mercury (3 adults and 1 child cohorts) Mercury was measured in blood as well as potential confounding nutritional factors and Paraoxanase (PON) 1 activity. Heart Rate Variability (HRV) and blood pressure were also measured.
Results: Mercury concentrations in blood averaged 86, 75, 49 and 81 nmol/L in adults from Nunavik, (Arctic Québec), French Polynesians, James Bay Crees Indians and Inuit newborn respectively.
In most of these studies we found that mercury exposure was associated with decrease HRV and increase blood pressure. For example, in Inuit adults, we found that a 10 percent increase in blood mercury was associated with an increase of 0.2 mm Hg in systolic blood pressure after controlling for other factors. Concerning biomarkers, our results in Inuit adults suggest that in a multiple regression model adjusted for age, HDL-C, omega-3 fatty acids, and *PON1* variants, blood mercury concentrations were negatively associated with PON1 activities [beta = -0.022, standard error (SE) = 0.005, $p < 0.001$), whereas blood selenium concentrations were positively associated with PON1 activities (beta = 0.024, SE = 0.004, $p < 0.001$).
Conclusion: Since heart diseases represent the most important causes of death, even a slight negative impact on the cardiovascular system could be of greater public health relevance than any other health effects related to mercury exposure.

PRENATAL BPA BIOMARKER LEVELS AND NEURODEVELOPMENT IN THE MOUNT SINAI CHILDREN'S ENVIRONMENTAL HEALTH CENTER

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Background & Aims: Some studies have suggested that prenatal exposure to BPA negatively impacts child neurobehavioral development. We undertook an investigation of the relationship between BPA biomarker levels and child cognitive and behavioral development at 12 and 24 months, and 4-9 years.
Methods: The Mount Sinai Children's Environmental Health Study enrolled a multiethnic prenatal population in New York City between 1998 and 2002 (n= 404). Third trimester maternal urines were collected and analyzed for BPA metabolite level. Children returned for Bayley Scales of Infant Development assessments at ages 12 (n = 200) and 24 months (n = 276), and for behavioral assessments and psychometric intelligence tests between 4 and 9 (n = 169) years. Results were additionally analyzed according to creatinine tertile to examine sensitivity to urinary dilution.
Results: There were no associations between BPA metabolite levels and the MDI or PDI at 12 or 24 months overall. Within the most dilute strata of creatinine, a slight and imprecise negative association between BPA and MDI at year 1 was observed. Likewise, there were no overall effects with IQ domains. However in the most dilute and concentrated creatinine concentrations, there were suggestions of effects that went in opposite directions for verbal and perceptual reasoning. There were small and imprecise effects of BPA on the BASC aggression and atypicality domains overall. Stratified by creatinine concentration elevated effects were found in the most dilute and concentrated creatinine strata for a number of behavioral domains. For the four domains in which these elevated effects were found for both dilute and concentrated urines, the effect estimates switched direction in all cases.
Conclusion: We observed heterogeneity in BPA biomarker effect estimates according to urinary dilution on several instruments administered independently over several years. In many cases, the most extreme effects were observed in the most dilute tertile of creatinine. Urinary creatinine can fluctuate substantially within and between women over the course of pregnancy. Future studies should carefully consider urinary dilution when analyzing and interpreting their BPA biomarker data.

Accounting for model uncertainty in estimating the relative risk of mortality associated with heat waves.

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Background and Aims: Estimating the risks heat waves pose to human health is a critical part of assessing the future impact of climate change. While uncertainty in climate model predictions has been studied thoroughly, model uncertainty in estimating the subsequent health effects has not been well explored. This work assesses the contribution of model uncertainty and develops an approach to systematically incorporate model uncertainty into heat wave risk estimation.
Methods: We propose a flexible class of time series models to estimate the relative risk of mortality associated with heat waves and conduct Bayesian model averaging (BMA) to account for the multiplicity of potential models. Methods are applied to data from 105 U.S. cities for the period 1987-2005. We identify those cities having a high posterior probability of increased mortality risk during heat waves, examine the heterogeneity of the posterior distributions of mortality risk across cities, assess sensitivity of the results to the selection of prior distributions, and compare our BMA results to a model selection approach.
Results: Our results show that no single model best predicts risk across the majority of cities, and that for some cities heat wave risk estimation is sensitive to model choice.
Conclusions: While model averaging leads to posterior distributions with increased variance as compared to statistical inference conditional on a model obtained through model selection, we find that the posterior mean of heat wave mortality risk is robust to accounting for model uncertainty over a broad class of models.
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APPLICATION OF SPATIO-TEMORAL REGRESSION MODEL ACCOUNTING FOR ASIAN DUST (DESERT DUST) TO REGULATORY AIR QUALITY DATA IN JAPAN

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Background and Aims: A 2-stage spatio-temporal regression model has been developed for predicting pollutants, although its application has been limited to western countries. Moreover, most of the models utilized only meteorological factors as the temporal predictors. In Asian countries, Asian dust originating from the desert of Mongolia or China should be considered as an additional temporal predictor since some polluted events due to Asian dust has been reported. Thus, we created the spatio-temporal model accounting for the temporal variation of Asian dust in Hiroshima, Japan.
Methods: We used the monthly-mean nitrogen dioxide (NO_2), sulfur dioxide (SO_2), photochemical oxidant (O_x), and suspended particulate matter (SPM) concentrations between 2005 to 2010. We also obtained the daily Asian dust concentration by Light Detection And Ranging in Matsue. First, we selected spatio-predictors including road type, traffic intensity, land use, and physical component by using land use regression model. Next, we constructed a 2-stage spatio-temporal model including meteorological predictors to predict the monthly-level each pollutant. Then we added the Asian dust concentration as an additional temporal-variable into the models.
Results: The mean concentrations of NO_2, SO_2, O_x, and SPM were 17.2ppb, 3.7ppb, 27.5ppb, and 28.1μg/m^3, respectively. The mean concentration of Asian dust (120m-150m height from the ground) was 30.1μg/m^3. The correlation between each pollutant and Asian dust were 0.18, 0.24, 0.39, and 0.32, respectively. R^2 for NO_2 was 0.85 in the spatio-temporal regression model and 0.84 in Asian-dust model, respectively. R^2 of other pollutants were also greatly improved after introducing temporal-predictors as well as Asian dust, e.g. R^2 for the SO_2, O_x, and SPM was 0.83, 0.91, and 0.86 in Asian-dust model, respectively.
Conclusions: This result suggests that pollutants could be predicted moderately well by the spatio-temporal model even in Asian countries. Further studies which examine the role of the Asian dust would be required.

ENVIRONMENTAL TOBACCO SMOKE AND PARKINSON'S DISEASE IN THE CALIFORNIA TEACHERS STUDY

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Background and Aims: Epidemiologic studies have consistently demonstrated inverse associations between cigarette smoking and Parkinson's disease (PD) risk, leading to speculations about potential neuroprotective effects of smoking. However, it has been hypothesized that behavioral and genetic factors may influence propensity to initiate and maintain smoking in PD.
Methods: We examined cigarette smoking behavior and environmental tobacco smoke (ETS) exposure using questionnaire data obtained at baseline from 403 self-reported female PD cases at a ten-year follow-up and 4,045 randomly selected age- and race-matched female controls in the California Teachers Study.
Results: The study population was an average 60.1 ± 12 years at baseline, predominantly white (91.5%) and largely non-smoking, with 63.3% reporting having never smoked; 46.4% had been exposed to ETS in their lifetime. Women who smoked did so for an average of 22.1 years, with cases smoking two years less than controls (20.4 ± 13.7 vs. 22.2 ± 14.6 years, respectively). Women who had ever smoked were less likely to report PD at follow-up (OR = 0.87, 95% CI = 0.70, 1.08), an effect which was driven by former smokers (OR = 0.86, 95% CI = 0.69, 1.08). Any ETS exposure was not associated with PD (OR = 1.02, 95% CI = 0.76, 1.37) compared to no personal or environmental smoke exposure. Adulthood ETS exposure was not inversely associated with PD (OR = 1.15, 95% CI = 0.83, 1.60).
Conclusions: These results suggest that cigarette smoke and its components at least as inhaled as ETS may not be protective against PD, per se, although one cannot rule out a survival disadvantage for smokers with PD. Other explanations for the documented inverse associations between smoking and PD should continue to be explored, such as possible dysfunction in reward pathways resulting from disruptions in the dopaminergic system early in the course of PD.

PHTHALATE EXPOSURE AND THYROID FUNCTION IN PRE-PUBERTAL CHILDREN FROM CENTRAL TAIWAN

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Background and Aims: Thyroid hormone is essential for development of pre-pubertal children. Toxicological evidence shows the probable thyroid-like function of some phthalates *in vitro* and *in vivo*, and some studies report that exposure to phthalates may alter thyroid hormones in women and men. However, little information is available on whether exposure to phthalates is correlated with thyroid function in children during pubertal development.

Methods: We studied 186 children, included 85 boy and 101 girls, born to previously established pregnant women cohort in 2009. We measured seven phthalate metabolites (MMP, MEP, MnBP, MBzP, MEHP, 5OH-MEHP, 5oxo-MEHP) in urine samples of children 8-9 years using LC-MS/MS. Serum sample was analyzed for 3,5,3'-triiodothyronine (T_3), thyroxine (T_4), thyroid-stimulating hormone (TSH) and thyroxine-binding globulin (TBG) using radioimmunoassay.

Results: The urinary levels of MnBP and MEHP in Taiwanese children at 8-9 years old were 3 folds higher than those in American children. In girls, we found that T_4 is significantly and negatively correlated with urinary 5OH-MEHP (β: -0.225, 95%CI: -1.57~-0.27, p=0.006), the metabolites of DEHP, after adjustment for TBG, urinay MBzP using step-wise multiple regression. In boys, we found that T_3 is marginal significantly and positively correlated with urinary MEHP (β: 0.258, 95%CI: 0.011~0.063, p=0.006) after adjustment for TBG and maternal education. It is indicated that phthalate exposure, especially for DEHP, in pre-pubertal children may alter thyroid function in different manner between genders.

PRENATAL EXPOSURE TO MULTIPLE HEAVY METALS AND NEONATAL NEUROBEHAVIORAL DEVELOPMENT IN SHANGHAI, CHINA

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Background: Epidemiological studies examining the effects of prenatal heavy metals exposure on neonatal development at the population-based level are limited.
Objective: To explore prenatal exposure levels to heavy metals and examine whether exposure is associated with neonatal development.
Methods: A stratified multi-stage cluster sampling methodology was used to investigate 1652 mother-infant pairs from 2008 through 2009 in Shanghai. Cord blood concentrations of Pb, Hg, Mn, Cd, As ,Tl and NBNA (Neonatal Behavioral Neurological Assessments) were tested. We defined three different exposure levels (low, medium and high) according to the normal range values.
Results: The median blood Pb, Hg, Mn, Cd, As and Tl concentrations were 41• g/L, 1.88• g/L, 4.1• g/L, 0.03• g/L, 0.86• g/L and 0.02• g/L, respectively, which all were in the normal range. Increasing exposure to Cd, Hg, Mn, As and Tl during pregnancy was associated with decreasing NBNA scores. High level-exposure (exceeding the normal range) of Hg, Mn, Cd and Tl had lower NBNA scores compared to medium and low levels (both in the normal range), which implied that the normal range of these heavy metals was safe for the newborns' development. The mean decreasing scores of NBNA was 0.61, 1.24, 1.50 and 0.84 (total score = 40) with high-level exposure of Hg, Mn, Cd and Tl, respectively. The medium-level exposure (in the range of normal) to As had lower NBNA scores compared to low-level exposure, which implied that the normal range of As was not safe to the newborns' development. However, prenatal Pb high-exposure did not affect NBNA scores either by single or multiple factor analysis. In addition, important contribution factors for heavy metals pollutants were diet, lifestyle and housing renovation.
Conclusions: prenatal heavy metals except Pb exposures were associated with NBNA. The adverse effect of medium-level As warrants the need to further investigate the safe range of As.

EFFECTS OF ARSENIC EXPOSURE ON CHILD IMMUNE RESPONSE AND COGNITIVE DEVELOPMENT

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Background and Aims: Inorganic arsenic, a potent toxicant and carcinogen, is frequently present in drinking water, but little is known about consequences of early-life exposure. Our on-going large mother-child cohort study in rural Bangladesh, where arsenic concentrations in drinking-water and food vary considerably, aims at evaluating health effects of pre- and postnatal arsenic exposure. Initially, prenatal arsenic exposure was found to be associated with low birth weight and increased risk of infant mortality and morbidity. Arsenic-related impaired thymus development indicated immunosuppression, why we follow the children's health and development.
Methods: We measured arsenic metabolites in urine twice in pregnancy (first and third trimesters) and twice during childhood (1.5 and 5 years) in 2000 mother-child pairs. Placenta and cord blood at delivery (sub-sample) were analysed for immune (immunohistochemistry) and inflammatory markers (multiplex cytokine assay). Cord blood T cell receptor excision circles (TRECs) were measured by Real Time-PCR. We assessed child development of about 1700 children at 5 years using Wechsler Preschool and Primary Scale of Intelligence (IQ) and morbidity by 14 days recall.
Results: Immunosuppression of arsenic was indicated by reduced number of T cells and increased expression of inflammatory cytokines in the placenta, and altered TRECs and cytokine levels in cord blood. We also found that arsenic exposure was significantly negatively associated with verbal and full scale IQ (multivariable-adjusted models) in a sex-dependent manner. A urinary arsenic concentration of 100 µg/L was associated with decrements of 1-3 points in VIQ and FSIQ in girls, but not in boys.
Conclusion: Early-life arsenic exposure adversely affects children's immune function and cognitive development. Many children continue to be exposed in Bangladesh, in spite of extensive mitigation efforts, and we plan to follow-up these children at an older age.
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PAST ARSENIC EXPOSURE, ARSENICAL SKIN LESIONS AND ABNORMALITY OF LUNG FUNCTION IN SOUTHWESTERN TAIWAN

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Background and Aims: Several epidemiological studies have shown the association of artesian water consumption with respiratory symptoms and decreased lung function. The purpose of this study was to examine the association of past arsenic exposure from drinking water with lung function after 15-year cessation of contaminated water ingestion.

Methods: The study subjects were recruited from the arseniasis area with arsenic level in deep-well water as high as 0.79-0.93 mg/L in Southwestern Taiwan. A total of 787 subjects participated in community health examinations during 1991-1993. Lung function was measured with a portable spirometer by skilled technicians and skin lesions were clinically diagnosed by experienced physicians.

Results: Among male smokers with either hyperkeratosis or skin cancers (Bowen's disease, squamous cell carcinoma, basal cell carcinoma), the average adjusted forced expiratory volume in 1 second (FEV1) was reduced by 237.6 ml (95%CI, 50.0-425.2, p=0.01) but forced vital capacity (FVC) was not significantly reduced (adjusted mean of reduction: 297.7ml, 95%CI,-101.9-297.4, p=0.34). Male nonsmokers with or without arsenical skin lesions were not associated with decreased lung function. Female nonsmokers with hyperkeratosis and/or skin cancers were associated with reduced FEV1 (adjusted mean of reduction: 134.7ml, 95%CI, 21.2-248.1, p=0.02) but not with FVC. Dose-response relationship of arsenic exposure with decreased FEV1 as well FEV1/FVC was shown in male smokers and female (FEV1 mean of reduction: 36.1 ml and 194.3ml among the groups of cumulative As exposure (CAE) 0.1-19.9 and 20+, respectively in male smokers; 116.7 ml and 146.1 ml among CAE 0.1-19.9 and 20+, respectively in female).

Conclusions: Markedly interaction of cigarette smoking with arsenical skin lesions was observed to significantly decrease FEV1 and FEV1/FVC among male. Among non-smokers, female with hyperkeratoses and/or skin cancers was more susceptible to As-induced pulmonary effects than male. After 15-year cessation of contaminated water ingestion, dose-response relation of arsenic exposure with decreased lung function could still be observed in male smokers and female.

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POST-TRAMATIC STRESS DISORDER AMONG WORKERS 12 MONTHS AFTER OCCUPATIONAL INJURIES

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Background/Aims: After a traumatic event, a significant proportion of victims develop psychiatric disorders. This study aimed to determine the rates of chronic post-traumatic stress disorder and other psychiatric disorders 12 months after occupational injuries.

Methods: A two-staged survey study was conducted. The first stage of investigation involved a self-reported questionnaire including Brief Symptom Rating Scale (BSRS-50) and Post-traumatic Symptom Checklist (PTSC), which was sent to injured workers at 12 months after injury, for screening of mental conditions. Phone interview by a psychiatrist using Mini-International Neuropsychiatric Interview (MINI) was done among those who: (1) scored BSRS of ≥ 2 standard deviations higher than the norm; (2) reported “severe” level or higher among the three items of PTSC; or (3) reported “moderate” levels to two items of PTSC or more. The prevalence rates of PTSD and other psychiatric disorders were estimated by multiplying the percentage of diagnosed disorder among those completed MINI interview by the percentage fulfilling criteria for such interview.

Results: A total of 1233 workers completed the self-report questionnaire (response rate 27.9%). Among them, 167 (13.5%) fulfilled the criteria for MINI interview and were invited. A total of 106 (63.5%) completed the phone interview. The prevalence rates of chronic PTSD, major depression, comorbid PTSD and major depression, and either PTSD or major depression were 3.2%, 2.0%, 1.9%, and 3.3%, respectively.

Conclusion: This study showed that at 12 months after occupational injuries, a significant proportion of workers suffered from chronic psychiatric disorders.

Keywords: occupational injury, major depression, post-traumatic stress disorder (PTSD)

HYPERURICEMIA RISK IN SUBJECTS WITH MODERATE TO HIGH LEVELS OF PCDD/FS EXPOSURE

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Background and Aim: Hyperuricemia, the predisposing condition for gout, has been associated with hypertriglyceridemia and diabetes mellitus (Berkowitz 1966), and also be a risk factor for the development of coronary artery disease (Abbott et al. 1988). PCDD/Fs have been found to cause renal toxicity in experimental animals and elevate uric acid in epidemiology studies. The potential role of PCDD/Fs exposure as a preventable risk factor has raised attention of public health, especially since it's ubiquitous worldwide. We aimed to investigate and clarify the effect of moderate-to-high exposure to PCDD/Fs on hyperuricemia risk.
Methods: This cross-sectional study recruited 1657 healthy participants near a deserted pentachlorophenol factory (Chang et al. 2010). Renal function related factors were measured to examine associations with serum PCDD/Fs. We also investigated associations between serum PCDD/Fs and hyperuricemia risk. We compared associations of serum PCDD/F levels and estimated glomerular filtration rate (eGFR, renal function index) in both gender under and above 50-years-old.
Results: The eGFR reduces gradually with serum PCDD/F levels in all groups (men < and ≥ 50 50-years-old, women < and ≥ 50-years-old), especially for a sudden falling observed in men over than 50 years old. Serum PCDD/Fs were significantly increased with uric acid in male participants (Men: β= 0.230, p= 0.008; Women: β=0.035, p= 0.753; All: β= 0.148, p= 0.037). In addition, we further found that male participants with higher serum PCDD/F levels had a higher hyperuricemia risk than did the reference group (serum PCDD/F levels <11.4 pg WHO_{98}-TEQ_{DF}/g lipid) after adjusting for confounding factors (25 th to <50 th percentile, adjusted Odds Ratio (AOR) = 1.87 [95% CI = 1.13-3.10]; 50th to <75 th percentile, AOR = 2.44 [1.46-4.09]; ≥75 th percentile, AOR = 3.29 [1.89-5.74]).
Conclusions: We hypothesize that accumulated PCDD/Fs may reduce urate excretion and may heighten the risk of hyperuricemia in the general population.
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ORGANOPHOSPHATE TRIESTERS IN HOUSE DUST AND ITS RELATION TO ALLERGIC SYMPTOMS

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Background and Aims: Organiophosphate triesters (OPE) are a range of compounds widely used as plasticizers and additive flame retarders. To date, only a limited number of studies have examined OPE levels in house dust and their relation to inhabitants' health. The aim of this study was to measure OPE levels in house dust and to evaluate the relationship between exposure to OPE and recent allergy medication in inhabitants.
Methods: Dust samples were collected from the living room of 182 single family dwellings in 6 cities in Japan. The "floor" samples were collected from floor and shelves lower than 35 cm from the floor, and "multi-surface" samples were collected from anything above 35 cm from the floor, such as shelves, furniture, walls, ceilings, etc. After being extracted by acetone, samples were analyzed by GC/FPD to determine the concentrations of 11 compounds. All inhabitants living in the target dwellings were given self-administered questionnaires to assess their allergic medication within the past 2 years.
Results: Collected dust weight that exceed 25 mg was included into the results. The prevalence of asthma, atopic dermatitis, and rhinitis was 4.8%, 9.9% and 18.2%, respectively. TBEP was detected from all samples; the median value was 580 µg/g in floor and 111 µg/g in multi surface dust, followed by TCiPP; 8.69 µg/g and 25.8µg/g, respectively. Significant associations between the prevalence of atopic dermatitis and TBP, TCiPP, TCEP, TEHP, and TDCPP in floor dust (per $\log_{10}$-unit, odds ratio: 1.93-2.26) was obtained after adjustment, but not with multi-surface dust. The prevalence of asthma and allergic rhinitis was related to TBP.
Conclusions: The results suggested that exposure to OPE may cause dermatitis. The levels of OPE in this study were relatively higher compared to previous studies in Europe and the US, and thus further studies of OPE should be conducted.
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EFFECT OF FARM MILK ON DEVELOPMENT OF ASTHMA AND ALLERGIES

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Background and Aims: Several epidemiological studies found consumption of farm milk to be inversely associated with the occurrence of hay fever, pollen sensitization. GABRIELA, a large cross-sectional multi-centre study, offered for the first time the opportunity to relate analytically measured milk components to asthma and atopy outcomes in children and possibly explain the previously reported protective farm milk effect.
Methods: In four rural regions of Germany, Austria, and Switzerland, farm and milk exposure of 7606 5–13 year old children was assessed by a detailed questionnaire and they also provided blood samples to determine specific IgE levels. Viable bacterial counts, whey protein levels, and total fat content were analysed in 800 milk samples that were collected at the participant's homes. Associations of milk consumption and asthma, atopy, hay fever, and atopic dermatitis were computed by stratified weighted logistic regression analyses adjusted for potential confounders.
Results: Raw milk consumption, that was reported in questionnaires, was inversely associated with asthma (aOR: 0.59, 95%-CI: 0.46–0.74), atopy (0.74, 0.61–0.90), and hay fever (0.51, 0.37–0.69) independent of other farm exposures. Consumption of exclusively boiled farm did not show a protective effect. The heating status of consumed milk as reported by parents was in very good agreement with objective measurements. Total viable bacterial counts or total fat content of milk were not significantly related to asthma or atopy. Yet, increased levels of the whey proteins were inversely associated with asthma but not with atopy. Significant inverse dose-response relations were observed for lactoferrin (p–value for linear trend = 0.02), TGF-beta2 (0.02), alpha-lactalbumin (0.02), and beta-lactoglobulin (0.04).
Conclusions: The protective effect of raw milk consumption on asthma seems to be associated with the whey protein fraction of unprocessed farm milk. Relevant immunomodulatory compounds of farm milk and underlying mechanisms need to be explored in more detail.

ASSESSMENT IS TO ACT – COLLABORATIVE CREATION OF SOCIAL KNOWLEDGE IN ENVIRONMENTAL HEALTH ASSESSMENT AND POLICY-MAKING

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Background and aims: This presentation describes a recent doctoral thesis. It presents the research underlying the work at the National Institute for Health and Welfare (THL), and several projects, in developing novel methods and tools to support societal decision making. Particularly the aim has been to improve effectiveness of environmental health assessment by means of increased openness.
Methods: The research question was: "how can scientific information and value judgments be organised for improving societal decision making in a situation where open participation is allowed?". This question was considered in the context of environmental health, but also in regard to benefit-risk analysis of food and plant-based food supplements, and also beyond these fields. The search for answers built on epidemiology and toxicology as well as different conventions of assessment and risk research. This knowledge was complemented with insights from other disciplines, particularly epistemiology, cognition science, collaborative information technology, and industrial engineering and management.
Results: The tendencies towards deeper engagement between experts and policy-makers, broader participation, and more pragmatic, yet multidisciplinary, assessment framing indicate the incapability of conventional assessment approaches to address the complexity of environmental health. Policy-making, assessment, and participation are not separate, but intertwined aspects of a societal process of knowledge creation and use, which should be open for everyone. Recent advances in theories of learning and collaborative information systems provide means to facilitate such processes. Evaluation of these processes and their outputs is meaningful only according to their societal outcomes. These insights are implemented in open assessment method and Opasnet web-workspace (http://en.opasnet.org).
Conclusions: Environmental health assessment and policy-making are two perspectives to the same social knowledge process. The former answers questions, the latter explores questions and implements knowledge in practice. Openness in this intertwined process is meaningful and possible. However, the methodological and technical enablers alone are not enough, also a cultural change is required.

ACCURACY OF GPS-TRACKING DEVICES IN EXPOSURE ASSESSMENT STUDIES

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Background and Aims: Current lightweight Global Positioning System (GPS) receivers can be used to track an individual's location over several days to weeks. These tracking devices are increasingly used in epidemiological studies for time-allocation analyses to assess exposure to air pollution or electromagnetic fields. There is little information about the accuracy of these devices and to which extent e.g. different wearing or transport modes affect the performance of a GPS.
Methods: We tracked 12 individuals on two days during their commute to work. The tracked routes included different transport modes (walking, biking, car, bus, train). Each individual carried three different GPS tracking devices simultaneously on the left shoulder and a second set of identical GPSs in a backpack. We assessed the performance by first digitizing the true paths travelled by the participants with aerial imagery and subsequently computing the distance of the locations logged by the GPS to the true paths.
Results: The median error for walking was 3.7m (IQR 1.6-7.6m), biking 2.9m (IQR 1.3-5.9m), train 4.8m (IQR 2.3-8.9m), bus 4.9m (IQR 2.2-9.5m) and car 3.3m (IQR 1.5-5.9m). A higher accuracy (~1m) was observed for wearing the GPSs on the shoulder versus backpack for the transport modes biking and walking. Although 86% of all logged locations fell within 10m of the true path, about 1% of the errors were larger than 50m. Complete signal loss also occurred, in particular in the train where 28% of the total distance was not tracked.
Conclusions: The average accuracy of the GPSs was high. Thus, tracking devices are useful tools for time- and location-based exposure assessment. However, large GPS errors might affect estimates of exposures in the case of exposures with extreme high spatial variability such as radiofrequency fields from mobile phone base stations.

EXCESS MORTALITY IN EUROPE FOLLOWING A FUTURE LAKI-STYLE ICELANDIC ERUPTION

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Background and Aims: Historical records show that the 1783–1784 Laki eruption in Iceland significantly increased air pollution and posed a health hazard far beyond the borders of Iceland. Given the reasonable likelihood of a recurrence of such an event, it is important to assess its potential impact on public health. We quantified the potential health effects caused by a future Laki-style eruption similar in magnitude to earlier eruptions.
Methods: We combined estimates of air pollution impacts of a potential eruption using advanced global aerosol models and concentration–response functions from the air pollution epidemiology literature. Since the eruption might impact air quality for up to a year, we estimated the mortality impacts from both short- and long-term exposure to fine particles (PM2.5 or particulate matter less than 2.5 microns in diameter).
Results: Averaged over the first three months of the eruption, European-mean PM2.5 concentrations would more than double from current levels. In addition, mean annual concentrations would increase by more than 50 percent. Based on current epidemiological studies, these changes are associated with an additional 139,000 cardiopulmonary deaths (95% confidence interval = 51,000 - 224,000).
Conclusions: Based on our models, a volcanic air pollution event similar in magnitude to those recorded in earlier times, could be a severe health hazard, increasing excess mortality in Europe on a scale that likely exceeds excess mortality due to seasonal influenza. Moreover, the death toll of such an eruption would be larger than that of all but five of the world's earthquakes since 1900.

ASSESSMENT OF INDOOR RADON CONCENTRATIONS WITH A RADON PREDICTION MODEL

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Background and Aims: Whether indoor radon exposure is associated with childhood cancer is unclear. Within the framework of a cohort study on residential radon and childhood cancer, we aimed to develop a prediction model to assess indoor radon concentrations in Switzerland.
Methods: Our study is based on 45,437 measurements from the Swiss radon database collected between 1994 and 2004 all over Switzerland. Thereof, 36,053 (80%) randomly selected measurements were used for model development and the remaining 9,015 measurements for an independent model validation. We fitted a multivariable log linear regression model and selected relevant predictors according to knowledge from the literature, on the adjusted R^2 and on the AIC criteria.
We evaluated the prediction model by calculating Spearman rank correlation between measured and predicted values. Additionally, we categorized the predicted values into three categories (50th, 50th-90th and 90th percentile) and compared with measured categories using weighted Kappa statistic.
Results: Most relevant predictors for indoor radon levels were tectonic units, soil texture and construction year of the building, followed by degree of urbanisation, floor of residency and housing type (p-values: <0.001).
Median predicted radon values was 70 Bq/m³ (interquartile range 59 – 79 Bq/m³) in the lowest exposure category, 122 Bq/m³ (104 – 145 Bq/m³) in the medium category, and 209 Bq/m³ (194 - 239 Bq/m³) in the highest category. Spearman correlation was 0.45 (95%-CI: 0.44; 0.45) for the development dataset and 0.44 (95%-CI: 0.42; 0.45) for the validation dataset. Kappa coefficients were 0.30 and 0.29 for the development and the validation dataset, respectively.
Conclusions: There is a substantial variability in residential radon levels. Validation of the prediction model in an independent dataset demonstrated that the model is robust. However, random exposure misclassification is unavoidable and has to be taken into account when interpreting the results from the future cohort study.

THE PRESSURES OF URBAN SPRAWL, ENVIRONMENTAL CONDITIONS AND THE EFFECTS ON HEALTH IN THE MUNICIPALITY OF EL SALTO, JALISCO, MEXICO

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Background and Aims: The municipality of El Salto is part of Guadalajara's Metropolitan Area. The city has grown in a disorderly manner and without tending to the welfare of new residents, who are thus exposed to various risks. The objective of this study was to identify such risks.
Methods: The methodology indicated in the environmental land-use planning of the INE-MEX was used, as were the risk and exposure assessment of NRC-USA and the development of environmental health indicators established by Corvalán-WHO.
Results: In El Salto, the factors generating risks are population growth—which has doubled three times in the last 20 years—and the presence of industrial activity.
The strains these forces have brought about are a change in land use in already fragile areas, the alteration of watersheds and pollution of surface waters which have resulted in 29 kilometers of dead rivers with a presence of heavy metals (Al,Zn,Hg,Cd,Cr), to which 56,000 persons are exposed along with cattle herds used for meat and milk, and migratory birds.
Diseases which have shown a rate of increase are tumors (stomach, bronchus and lungs, mammary and cervical) and respiratory diseases (pneumonia, chronic obstructive pulmonary disease) which together account for the death of 47 persons each year, 64% of these being considered premature deaths.
The greatest number of deaths due to tumors was registered from 2007 to 2009, the majority being women 40-64 years of age. With respect to respiratory disease, the greatest number of deaths occurred in 2005 and 2009 with most of those affected being men over 64 years of age (68%), children under 5 years of age (14%).
Conclusions: The accelerated population growth and ensuing urban sprawl along with the presence of hazardous industries, have polluted the water far beyond Nature's self-purifying capacities and this means an environmental risks.
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EXPOSURE TO MANGANESE IN HIGH VEHICLE TRAFFIC AREAS WITHIN GUADALAJARA, MEXICO

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Background and Aims: The main source of PM_{10} in Guadalajara's metropolitan area is its vehicle fleet which has increased at rates even higher than those of population growth. In 2010, research on high-traffic areas began in order to establish the facts concerning the presence of heavy metals due to this source.
Methods: Sampling of particulate matter was undertaken in May, 2010, at roadways with over 50,000 vehicles per day, using a portable sampler for particles under 10 microns MicroVol – 1100 low Flow-rate Air Sampler. Analysis of particulate matter was conducted using an X-ray fluorescence spectrometer, S4 Explorer.
Results: Traffic flow varied from 3,078 to 5,664 vehicles per hour. The analyses conducted on the PM10 were: Al, Cd, Cu, Cr, Fe, Mn, Mo, Ni, Pb and Zn.
Aluminum and Manganese were the metals which showed the highest results, over 10 ppm and 46 ppm respectively. The main source of Aluminum was determined not to be the vehicle fleet but rather cement factories and soil erosion, while the source of manganese did prove to be gasoline burned by motor vehicles. The amounts of aluminum varied significantly depending on the wind and proximity to the sources. This variation is much lower for manganese which registered similar quantities for samples taken at the edge of roadways and those taken 100 meters away.
Conclusions: The main manner in which Mn enters the human body is through inhalation or ingestion. Although it has not been found to have carcinogenic effects, it can affect brain development in children, bringing about changes in behavior and a decrease in the capacity to learn and remember; thus it is important to implement monitoring systems.
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TEMPERATURE AND HEALTH IN GUADALAJARA, MEXICO

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Background and Aims: The city of Guadalajara, like many other cities throughout the world, experiences a heat-island condition which has resulted in increased temperatures; thus, it is highly relevant to identify the temperature associated to higher morbidity rates among its inhabitants.
Methods: The criteria to define excessive temperature levels are based on determining maximum temperature thresholds at a 95 percentile, of the series of maximum daily temperatures. That is, the temperature threshold is established based on merely statistical considerations, without necessarily taking into account at and above what temperature the effects on health begin to emerge.
The study proposed to determine whether this is the temperature at which the highest association to heart and vascular diseases –coronary heart disease, cerebrovascular disease, peripheral artery or atherosclerotic disease, rheumatic heart disease, congenital heart defects, deep vein thrombosis and pulmonary embolisms as registered by the Public Health Department—can be established..
Results: The temperature representing the 95 percentile for the period of study, from 1996-2005, was 35.4° C.
The greatest number of days with temperatures above 35.4 occurred in 1998 and 2002. Upon determining the correlation between the number of days with temperatures between 29.4 and 35.4 °C and percentage of the city of Guadalajara population suffering cardiovascular diseases, the results showed that at 29.4°C there is a 0.76 correlation, with diseases increasing upon exposure to such temperatures for more than 150 days per year; 0.79 at 32.4°C with diseases increasing upon exposure for more than 15 days per year, and 0.53 at 35.4°C with diseases increasing upon exposures of 1 day per year.
Based on the foregoing, it is established that a temperature of 32.4°C results in a higher association to cardiovascular morbidity rates.
Conclusions: The rise in cardiovascular diseases is determined at 62% due to increased exposure regarding the number of days with temperatures above 32.4 °C.

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SOURCE APPORTIONMENT OF AMBIENT PM10 NEAR A MAJOR HIGHWAY IN A SWISS ALPINE VALLEY

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Background and Aims: Although trans-Alpine highway traffic exhaust is the major source of air pollution along the Alpine highway valleys, little is known about its contribution to residential exposure and impact on respiratory health. This pediatric asthma panel study aims at (1) developing spatial land-use regression models for residential outdoor exposures, (2) estimating the contribution of different sources of PM_{10} using receptor modelling methods, and (3) examining the relationship between spatially refined exposure estimates and respiratory heath. This paper focuses on source apportionment and the source-specific spatiotemporal distribution of PM_{10} in a Swiss Alpine valley.
Methods: From November 2007 to June 2009 two fixed (background and highway) and four mobile sites were monitored for daily PM_{10}, continuous particle number concentrations and NO_x in an alpine community in Switzerland. At the mobile locations measurements were taken for one month in each of the four seasons. PM filters were analyzed for elemental (EC) and organic carbon (OC) and 48 trace elements. Positive Matrix Factorization (PMF) was used to quantify contributions of different local and regional sources.
Results: In a preliminary PMF analysis with 7, 8 or 9 factors about 29% of PM_{10} were explained by secondary pollutants, 23% by biomass burning, 13% by traffic exhaust, 8% by railway and 2% by road salt. The contribution of these factors stayed about constant over all approaches with different factor numbers. The remaining 25% of PM_{10} were split into soil, road dust, break wear and an unknown factor depending on the predefined number of factors. Further analysis will be done using fractionated EC, OC data and an attempt will be made to split the traffic exhaust factor into diesel and gasoline exhaust factors.
Conclusions: These first results indicate significant contribution of highway traffic and local biomass burning on the PM exposure in the community.

PUBLIC TRANSPORT AS INDICATOR OF NOISE EXPOSURE IN URBAN AREAS

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Background and Aims: Public transport has never been used as an indicator of noise exposure in studies on noise and health, contrary to noise levels and traffic density. The aim of this study was to investigate the relationship between public transport, noise levels and traffic density in urban areas.

Methods: A cross-sectional study was performed in an urban municipality in Belgrade, Serbia. Noise levels were measured in the middle of all investigated streets in two daily intervals, in one evening interval, and in two night intervals. Simultaneously, traffic density was registered as the number of light vehicles (motorbikes, motors and cars) and heavy vehicles (vans, trucks, lorries, buses, trams, trolleybuses) in all streets. The presence and the type of public transport (bus, tram and trolleybus) were assessed by matching the streets with official public transport maps for Belgrade.

Results: Public transport was running in 65 (23%) streets of the investigated urban area; 218 (77%) of the investigated streets were free of public transport. In streets where public transport was running, noise levels and traffic density were significantly higher during the daytime (by 12 dBA and by 200 to 400 heavy vehicles per hour) and during the nighttime (by 10-13 dBA and by 30 heavy vehicles per hour), compared to streets where no public transport was present. The highest noise levels were measured in streets where public transport included both buses and trams (68.0±2.9 dBA), followed by streets with buses and trolleybuses (66.8±2.7 dBA), streets with busses only (67.7±2.2 dBA); the lowest noise level at daytime was reported in streets where trams were the only mean of transport (62.0±4.6 dBA).

Conclusions: Public transport is strongly related to noise levels and traffic density in urban areas. We propose public transport to be used as an indicator of noise exposure.

CHALLENGES AFFECTING THE INTERPRETATION OF BIOMONITORING DATA IN EPIDEMIOLOGIC STUDIES

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Background and Aims: Biomonitoring (i.e., measurement of chemicals or their metabolites at trace levels in biological tissues) is useful for investigating background exposures to environmental chemicals and has gained importance in environmental epidemiology. However, limitations in biomonitoring measures do exist. For example, although adequate sampling and processing methods are critical for evaluating biomonitoring data, these methods, especially for ubiquitous non-persistent organic chemicals, have not received as much attention as the analytical techniques. Also, the relevance of toxicokinetics on the selection of both biomarkers of exposure and biomonitoring matrices may have been undervalued.
Methods: We use several case studies including phthalates and bisphenol A, among other chemicals, to illustrate the importance of collection, processing and storage strategies for understanding biomonitoring results and their application in etiologic research.
Results: We discuss the relevance of the following aspects: selection of biomarkers of exposure based on toxicokinetics data (e.g., distribution among body compartments, metabolism), selection of the biological matrix, choice of analytical method, collection protocol—including location and timing of specimen collection, and type of specimen (e.g., first morning vs 24-h urine void)—, variability of the biomarker measures over time, storage and transport protocols, and use of quality control materials, including field and laboratory blanks.
Conclusions: Analytical chemistry advances permit measuring multiple environmental chemicals (e.g., analytes) concurrently at trace levels with the specificity and sensitivity required for biomonitoring. However, not all analytes are optimal exposure biomarkers. In addition to state-of-the-art analytical methods, highly trained laboratory personnel, and strict quality control/quality assurance laboratory practices, other often underappreciated factors (e.g., sampling, storage) must be considered to guarantee the valid interpretation of biomonitoring data and their use for environmental epidemiology. Nonetheless, despite its limitations, particularly for non-persistent chemicals which display considerable variability over time, biomonitoring data strengthens the exposure assessment in environmental epidemiology.

THE IMPACT OF STRESS ON SEMEN QUALITY

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Background: Stress is one the most important health and social problems. Psychological stress has long been suspected as having important impact on infertility. Studies on the effects of psychological stress on male fertility, especially semen quality have so far yielded equivocal findings.
Methods: The study population consists of 179 men register to infertility clinic in purpose of diagnosis with normal fertility (semen total concentration 15-300 mln/ml) or with little oligozoospermia (semen total concentration 10 do 15 mln/ml).
The semen samples was analysed in one laboratory according to the WHO manual for basic semen analysis. The main semen parameters were assessed: volume, motility, % atypical, % of progressive spermatozoa.
To asses the occupational stress the General Health Questionnaire 28 (GHQ-28) was used. As a results of this questionnaire we used sum of the points obtain by man taking part in the study and the number of stressful events at work (if the stressful events or situation appeared) announced by studied subjects.
Results: The level of stress measured by General Health Questionnaire 28 (GHQ-28) taking into account the number of stressful events, such situations affect semen volume and % of progressive spermatozoa after controlling factor that can have impact on semen quality like: time of couple infertility, abstinence and diseases in the past that can affect fertility.
Conclusions: The study confirms that the occupational stress can affect male semen quality, but as there is little studies in those directions the results need to be confirmed. This cohort being assembled will form a basis for further longitudinal observations.

PRENATAL AND CHILDHOOD EXPOSURE TO PESTICIDES AND NEUROBEHAVIORAL DEVELOPMENT: REVIEW OF EPIDEMIOLOGICAL STUDIES

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Background: Conventional pesticides comprise a diverse group of substances intended to destroy, repel or control organisms identified as pests. Compared to studies of lead, mercury and PCBs few epidemiological studies have assessed the developmental neurotoxicity of pesticides.
Methods: Epidemiological studies focused on the neurobehavioural development of children exposed to pesticides were identified by a search of the PUBMED, MEDLINE, EBSCO, AGRICOLA and TOXNET literature bases.
Results: The results from the presented studies suggest that children exposure to pesticides may impaired development. Exposure to organophosporus pesticides (OP) in children can caused difficulties with tasks involving short-term memory, incrased reaction time, mental development and pervasive development problems. In neonates increased number of abnormal reflexes and mental and emotional symptoms in adolesecents. The results of the studies investigated the association between exposure to organochlorine pesticides and neurodevelopmental problems display inconsistent results. Whereas some studies found reduction in mental and psychomotor function the other studies did not confirmed that.
Conclusions: Information derived from epidemiological studies so far indicate the need to increase awareness among people and children exposed to pesticides about the association between use of pesticides and neurodevelopmental impairment. We should simply apply the principle of prudence, just in case.

EXPOSURE TO PHENOXYACETIC ACID HERBICIDES AND ITS' PREDICTORS OF EXPOSURE AMONG SPOUSES OF FARMERS

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Background: The application of pesticides often takes place close to private dwellings and may contribute to environmental exposure to pesticides of their inhabitants. The purpose of the study was to measure the environmental exposure to two commonly used pesticides 2-methyl-4-chlorophenoxyacetic acid (MCPA) and 2,4-dichlorophenoxyacetic acid (2,4-D) among spouses of farmers, not directly involved in the process of spraying.
Methods: During the spring, exposure to 63 sprayings in the household of 24 women were assessed. Women were asked to collect three urine samples: in the morning before spraying (sample A), in the evening after spraying (sample B) and on the next day (sample C).
Results: The number of samples were the level of pesticides were above limit of detection increase from samples taken before spraying to samples taken after spraying in case of the level of both active ingredients: MCPA and 2,4-D. In the A samples the level of pesticides > LOD was found in about 30% of samples whereas in B and C samples in about 45% of samples. The average levels of herbicides in examined urine samples increased from sample A collected in the morning before spraying (2.8 ng/g creatinine) to sample B collected after spraying(6.0 ng/g creatinine). Mean value from the sample C (4,0 ng/g creatinine) taken on the next day after spraying were lower than B and higher than A. In similar direction were results when the average was calculated for all measurements' (including those below LOD). Only women's outdoor activity during spraying was statistically significant (p=0,023) predict the level of exposure.
Conclusions: The presented study have confirmed that farmers' spouses are exposed to pesticides after spraying which indicates that there is transfer of pesticides from the field to the home environment. But further research is required to be able to predict those individuals who are exposed.

ASSOCIATION BETWEEN THE INCIDENCE OF LYME DISEASE AND TEMPERATURE IN HUNGARY, 1998-2010

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Background and Aims: The increase of Lyme disease (LD) can be expected due to climate change, however the association hasn't been studied yet in Hungary. Distribution of the disease depends on the annual activity of ticks and on temperature changes. Our aim was to assess the temperature dependence of the disease.
Methods: The weekly LD data and the site of infection on county level for 1998-2010 were gained from the National Epidemiologic and Surveillance System. The temperature data were retrieved from the National Meteorological Service. Regional differences in the weekly incidence were studied in two north-eastern and 3 south-western counties. Descriptive statistics and linear regression models were applied.
Results: For 100 000 inhabitants the incidence was 11.597 in 1998-2003 resp. 15.268 in 2004-2010. The spring mean temperature showed an increase by a 0,052^{o}C/ year during 1998-2010. LD incidence increased more steadily in spring than in summer. The first day with mean temperature of 10^{o}C followed by days with mean temperature >8^{o}C was chosen as start of spring. Based on this criterium spring started by 1.5-2 weeks earlier during the period. Similar shift of 2-3 weeks was observed in the detection of 10 cases/week from week 16 to 14-13. 80% of the increase of incidence was reported in weeks 18-28 with a maximum in weeks 23-24. The season was longer by 1-2 weeks in warmer years. Heatwaves decreased the incidence during summer months. Regional climatic conditions resulted 2-3 weeks difference in the onset and peak of the incidence.
Conclusions: Based on the climatic dependence of LD we can predict the future changes in the annual distribution and increase of the incidence.
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PARTICULATE AIR POLLUTION AND INFLAMMATORY MARKERS

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Background and Aims: The inflammatory effect of fine particulate matter ($PM_{2.5}$) is one of the potential mechanisms linking PM pollution and cardiopulmonary outcomes. We examined the association between individual level 24-hour $PM_{2.5}$ concentration and blood inflammatory markers in a community dwelling sample.
Methods: We used a Personal DataRam (pDR) to measure 24-hour individual-level real-time $PM_{2.5}$ exposures in 105 middle-aged nonsmokers. Two blood samples were collected from each participant, one immediately before and one immediately after the 24-hour study period. Concentrations of several inflammation markers were assessed and averaged. Linear regression models were used to assess the association between mean 24-hour $PM_{2.5}$ exposure and the mean inflammation markers. Age, race, gender, relative humidity, temperature, and participant's chronic disease status were adjusted for in the regression models.
Results: The participants (mean [SD] age: 56 [8] years) tended to be female (60%) and white (74%). The 24-hour mean (SD) personal $PM_{2.5}$ concentration was 14.33 (14.60) $\mu g/m^3$. We did not observe significant associations between 24-hour mean $PM_{2.5}$ exposure and mean inflammation markers. The regression coefficients (SE) per 10 $\mu g/m^3$ increases in $PM_{2.5}$ were: -0.02 (0.02) g/dL for albumin, 81 (217) ng/mL for C-reactive protein (CRP), -0.56 (0.13) pg/mL for interleukin-1 α (IL-1 α), -0.28 (0.30) pg/mL for interleukin-1 β (IL-1 β), -19 (56) pg/mL for macrophage migration inhibitory factor (MIF), -1.66 (5.37) pg/mL for tumor necrosis factor-α (TNFα), 100 (73) pg/mL for tumor necrosis factor soluble receptor I (TNFsRI),and 0.02 (0.09) x $10^3/mm^3$ for white blood cell count (WBC), respectively (all p-values > 0.05).
Conclusion: Currently low levels of 24-hour mean $PM_{2.5}$ exposure are not associated with blood inflammation markers. More studies on the chronic exposure and inflammatory responses are needed to elucidate the sub-acute and chronic effects of PM on systemic inflammation as a mechanistic link between PM and cardiopulmonary disease.

PARTICULATE AIR POLLUTION, BLOOD COAGULATION AND FIBRINOLYTIC FACTORS

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Background and Aims: Whether fine particulate matter ($PM_{2.5}$) affects clinical thrombosis remains controversial, whereas an association between $PM_{2.5}$ and coronary heart disease (CHD) has been reported more consistently. We therefore investigated the cross-sectional association between individual-level short-term $PM_{2.5}$ exposure and blood hemostatic factors--blood markers of coagulation and thrombosis potential.
Methods: We used a Personal DataRam (pDR) to measure 24-hour individual-level real-time $PM_{2.5}$ exposures in 105 middle-aged nonsmokers. Two blood samples were collected from each participant, one immediately before and one immediately after the 24-hour study period. Concentrations of several hemostatic factors were assessed and averaged. Linear regression models were used to assess the association between mean 24-hour $PM_{2.5}$ exposure and the mean hemostatic factors. Age, race, gender, relative humidity, temperature, and participant's chronic disease status were adjusted for in the regression models.
Results: The participants (mean [SD] age: 56 [8] years) tended to be female (60%) and white (74%). The 24-hour mean (SD) personal $PM_{2.5}$ concentration was 14.33 (14.60) $\mu g/m^3$. We did not observe significant associations between 24-hour mean $PM_{2.5}$ exposure and mean hemostatic factor levels. The regression coefficients (SE) per 10 $\mu g/m^3$ increase in $PM_{2.5}$ were: -0.13 (0.78) % for antithrombin III, 1.95 (2.97) % for factor VIII, -2.79 (3.88) mg/dL for fibrinogen, 0.56 (0.54) IU/mL for plasminogen activator inhibitor, 0.06 (0.19) ng/mL for tissue plasminogen activator, and -0.13 (0.15) µg/mL for D-Dimer (all p-values > 0.05).
Conclusion: Low levels of 24-hour mean levels of $PM_{2.5}$ exposure were not associated with blood hemostatic factors. More studies on chronic PM exposure and hemostatic factors are needed to elucidate their role in the pathophysiologic effects of air pollution on deep vein thrombosis and CHD.

ARSENIC EXPOSURE AND PREVALENT DIABETES IN THE STRONG HEART STUDY

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Background and Aims: High-chronic exposure to inorganic arsenic has been associated with diabetes. At low-moderate levels, however, the epidemiologic evidence is inconsistent. In the Western US States, exposure to inorganic arsenic in drinking water is a concern for many populations who live in small communities. Our objective was to evaluate the association of arsenic exposure, as measured in urine, with diabetes prevalence in American Indians from rural communities in Arizona, Oklahoma and the Dakotas who participated in the Strong Heart Study in 1989-1991.
Methods: We studied 2,356 men and women 45 to 74 years of age with available urine arsenic measures. Total urine arsenic and urine arsenic species were measured using inductively coupled plasma-mass spectometry (ICPMS) and high performance liquid chromatography (HPLC)-ICPMS, respectively. Diabetes was defined as fasting glucose • 126 mg/dL, 2-h glucose • 200 mg/dL, hemoglobin A1c • 6.5% or diabetes treatment. Multi-adjusted prevalence ratios were estimated using robust Poisson models.
Results: The median (interquartile range) urine concentrations were 14.7 (7.9, 25.3) µg/L for total arsenic and 10.8 (6.1, 19.1) µg/L for the sum of inorganic and methylated arsenic species. The prevalence of diabetes was 51.1%. After adjustment for demographics, body mass index, smoking, alcohol, hypertension medication, region and urine creatinine, the prevalence ratios (95% confidence interval) of diabetes for a 2-fold increase in total arsenic and the sum of inorganic and methylated arsenic species were 1.07 (1.03, 1.11) and 1.10 (1.05, 1.15), respectively. Without adjustment for urine creatinine the corresponding prevalence ratios were 1.04 (1.00, 1.07) and 1.05 (1.01, 1.08). The associations were consistent by region, although stronger in the Dakotas.
Conclusions: Exposure to inorganic arsenic, as measured in urine, was associated with the prevalence of diabetes in American Indian communities. Prospective evidence is needed to evaluate the temporality of the association between urine arsenic and diabetes development.

CHALLENGES IN THE IMPLEMENTACION OF THE ECOHEALTH APPROACH FOR THE CONTROL OF A NATIVE VECTOR OF CHAGAS DISEASE IN GUATEMALA.

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Background and Aims: The natural habitats of triatomine bugs, the vectors of Chagas disease, include caves, animal burrows and nests, rock piles, and palm and trees cavities. In Central America, rural mud-bricked houses have similar conditions as caves or mud nests and are colonized by triatomines. The bugs probably arrive in human houses during annual migrations. Control of native vectors is not feasible with traditional insecticide application, new ECOHEALTH approach is experienced
Methods: The risk factors that sustain the presence and reproduction of bugs inside houses were addressed by developing community base interventions. The deterioration of wall plasters was addressed with a new mixture of local materials that could be applied with bare hands by women. Dirt floors were improved by applying a mixture of volcanic ashes heated with lime and compacted. The presence of domestic animals inside the house was reduced with the construction of wire corrals.
Results: Wall improvements reduced the number of bugs collected inside houses. Floor improvements reduced the presence of bug's eggs, and also decrease the prevalence of worm parasites in children. The removal of animals from inside the house improved not only the house sanitary conditions, but also the animals' living conditions leading to healthier poultry and pets. Over time the tendency of triatomine´s blood sources is to reduce human blood consumption and switch to other domestic animal as poultry.
CONCLUTION: ECOHEALTH approach is an alternative for the control of native vector of Chagas disease in Guatemala reducing the risks factors that favor the presence of the vector inside human houses, the approach faced some challenges as: capacity building in rural communities and other stakeholders from health and environment institutions, development of a holistic perception of a disease problem, prevention-action approach rather than disease treatment, inter-institutional coordination, and sustainability of community participation among others.

TEMPERATURE, NITROGEN DIOXIDE, CIRCULATING RESPIRATORY VIRUSES AND ACUTE UPPER RESPIRATORY INFECTIONS AMONG CHILDREN IN TAIPEI, TAIWAN: A POPULATION-BASED STUDY

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Background and Aims: This study investigated whether outpatient visits of acute upper respiratory infections (AURIs) for children aged less than 15 years are associated with temperature, air pollutants and circulating respiratory viruses in Taipei, Taiwan.
Methods: Outpatient visits records for AURIs (ICD9 CM codes: 460, 462, 463,464, 465.9 and 487) from a randomly selected sample (n= 39,766 children in 2005) was used to estimate the cumulative relative risks (RR) associated with per-standard deviation (SD) increases of virus-specific positive isolation rate lasting for 8 days (lag0-lag7 days), air pollutants (NO_2, O_3 and $PM_{2.5}$) lasting for 5 days (lag0-lag4 days), and average temperature lasting for 8 days (lag0-lag7 days) by distributed lag models, 2003-2007.
Results: After controlling for day of week, holiday effects and long term time, per-SD increase of virus specific isolation rate for influenza type A (SD = 13.2%), type B (SD = 8.76%), and adenoviruses (SD = 5.25%) revealed statistical significance for overall 8-day RRs of 1.03 [95% confidence interval (CI): 1.02, 1.03), 1.10 (95% CI: 1.09, 1.10) and 1.06 (95% CI: 1.04, 1.07), respectively, in cold seasons. Overall 5-day RR = 1.05 (95% CI: 1.03, 1.06) for per SD (SD = 7.78 ppb) increase of NO_2 in warm seasons (May-October) and 1.13 (95% CI: 1.12, 1.15) in cold seasons (November- April) were found. The most elevated risk of average temperature per SD (SD = 5.34°C) decrease was identified with an inverse association to AURIs of an RR = 1.17 (95% CI: 1.15, 1.19) in cold seasons.
Conclusions: Current study suggested a positive association between outpatient visits of AURIs and ambient environment factors, including average temperature, air pollutants, and circulating respiratory viruses.

EFFECTS OF HOT AND COLD SPELLS ON CARDIOVASCULAR MORTALITY IN INDIVIDUAL POPULATION GROUPS

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Background and Aims: The study compares impacts of hot and cold spells on cardiovascular mortality in the population of the Czech Republic (Central Europe) over 1986-2006, and examines differences between individual population groups.
Methods: We use analogous definitions for hot and cold spells that are based on quantiles of anomalies of daily average temperature and do not incorporate location-specific thresholds. Epidemics of influenza/acute respiratory infections have been identified and corresponding periods excluded from the analysis in order not to confound results.
Results: We find that both hot and cold spells are associated with significant excess cardiovascular mortality, but there are considerable differences: the effects of hot spells are more direct (unlagged) and typically concentrated on a few days of a hot spell, while cold spells are associated with indirect (lagged) mortality impacts that persist after the end of a cold spell. Although the mortality peak is less pronounced for cold spells, the cumulative magnitude of the excess mortality is larger for cold than hot spells. Differences between mortality impacts in males and females consist mainly in much larger excess mortality of females than males in hot spells, while more lagged effects in females than males in association with cold spells.
Conclusions: The comparison suggests that the relative importance of warm and cold temperature extremes depends on the population group (age and gender), and cold extremes are relatively more harmful in the middle-aged population while warm extremes in the elderly. For both hot and cold temperature extremes, preventive measures implemented by means of warning systems and biometeorological forecast alerts should take the varied effects in individual population groups into account. In the context of climate change, it is probable that reductions in cold-related mortality will be more important than possible increases in heat-related mortality, at least in developed countries that have capacities for reducing the negative effects of hot weather conditions.

COMPARISON OF PERFLUORINATED COMPOUNDS CONCENTRATIONS IN MATERNAL SERUM AND AMNIOTIC FLUID

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Background and Aims: Some perfluorinated compounds (PFCs) are ubiquitous, environmental pollutants used to manufacture non-stick cookware and waterproof fabrics. PFCs are found in maternal and umbilical cord blood and breast milk. The extent to which PFCs are detectable in amniotic fluid is unknown. Using paired samples, we compared the concentration of perfluorooctanoate (PFOA), perfluorononanoate (PFNA), perfluorooctane sulfonate (PFOS), and perfluorohexane sulfonate (PFHxS) measured in maternal serum, the standard medium for assessing human exposure to PFCs, and amniotic fluid.
Methods: The Study of Advanced Reproductive Age and Environmental Health prospectively enrolled a cohort of pregnant women receiving amniocentesis for low-risk screening. We used paired samples from 28 women to examine the relationship between PFOA, PFNA PFOS, and PFHxS concentrations measured in maternal serum and amniotic fluid using the Spearman correlation coefficient and graphical techniques.
Results: These four PFCs were detected in all serum samples. The number of amniotic samples with detectable concentrations differed by PFC (PFOA n=24; PFNA n=10; PFOS n=9; PFHxS n=4). The Spearman correlation coefficient, a measure of rank order, varied considerably by PFC (PFOA ρ=0.64, $p<0.001$; PFNA ρ=0.05, p=0.9; PFOS ρ=0.76, p=0.01; PFHxS ρ=0.80, p=0.2). Using graphical techniques, it appears that PFOA is commonly detected in amniotic fluid once the serum concentration reaches approximately 2 ng/mL, whereas PFOS is not commonly detected in amniotic fluid until the serum concentration reaches approximately 8 ng/mL.
Conclusions: PFCs are detectable in amniotic fluid at maternal serum concentrations below the national average. The ability to pass from maternal serum to amniotic fluid appears to differ by PFCs, independent of serum concentration. This disparate ability may be related to the chemical properties conferred by the charged functional moiety, such as the carboxylate in PFOA and PFNA as compared to the sulfonate in PFOS and PFHxS.

VARIABILITY IN ASSOCIATIONS BETWEEN MATERNAL PRENATAL URINARY PHTHALATE METABOLITE CONCENTRATIONS AND CHILD MENTAL, MOTOR AND BEHAVIORAL DEVELOPMENT BY CHILD SEX

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Background and Aims: Epidemiologic evidence suggests that effects of prenatal phthalate exposure on child executive function and behavior are sexually dimorphic. We reported (ISEE 2010) adverse associations between prenatal phthalate concentrations and child age 3 mental, motor and behavioral development. Here we evaluate whether the associations varied by child sex.
Methods: 168 girls and 151 boys from inner-city communities in New York City were followed from pregnancy. Mono-*n*-butyl phthalate (MnBP), mono-benzyl phthalate (MBzP), and mono-isobutyl phthalate (MiBP) concentrations were measured in spot urine collected from the mothers during the 3rd trimester. At child age 3 years, mental and motor development were assessed using the Bayley Scales of Infant Development II and behavior problems was assessed by maternal report on the Child Behavior Checklist (1 ½ - 5).
Results: Controlling for specific gravity and potential confounders, $\log_e$MnBP concentrations were significantly associated with motor development among boys only (adjusted estimated B= -3.1 [95% CI -5.8, -0.3]) and with mental development among girls only (B=-2.6 [95%CI -4.6, -0.6]). The child sex-by-MnBP interaction on risk of mental delay was significant (p=0.04). Among boys only, $\log_e$MnBP concentrations were associated with significant increases in emotionally reactive behavior (p=0.005), somatic complaints (p=0.007), withdrawn behavior (p=0.02) and internalizing behaviors (p=0.006). Child sex-by-MnBP interaction on emotionally reactive behavior was significant (p=0.03) and on somatic complaints was of borderline significance (p=0.059). Among girls only, $\log_e$MBzP concentrations were associated with significant increases in anxious/depressed behavior (p=0.004), somatic complaints (p=0.01), withdrawn behavior (p=0.0003) and internalizing behaviors (p=0.0001). Child sex-by-MBzP interaction on withdrawn behavior was of borderline significance (p=0.054).
C**onclusions:** Associations between prenatal exposure to these phthalates and child mental, motor and behavioral development appear to vary by child sex.
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HEALTH IMPACT OF PM_{10} IN PO-VENETIAN PLAIN

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Background and Aims: Adverse health effects of air pollution from particulate matter are known. Health impact of PM10 has already been studied in the 13 major Italian cities in 2006. A total of 8220 deaths could be avoided if average concentration decreased to 20 micrograms. The aim of the study is to provide an estimate of deaths attributable to PM10 in the Po-venetian valley, where concentrations are known to be high.
Methods: Standard methods were applied for the calculation of attributable deaths. A population over 30 years of 30 cities of the plain and of the whole province of Milan (around 6 million inhabitants) was considered. Long-term mortality for non accidental causes, lung cancer and infarction were studied. Relative risks (Pope et al 2002, and Pope et al, 2004) of, respectively, 1.06, 1.08 and 1.18 per 10$\mu g/m^3$ PM10 and an Italian average mortality rate were applied to the population. A scenario with a yearly average concentration of 50 micrograms was considered and the health impact was calculated for abatement to 20 (WHO guidelines).

Results: All cause mortality: a total of 8695 deaths are attributable to PM10 concentration over the WHO guideline value. Samecalculations done for lung cancer and infarction provide, respectively, 669 and 2644 excess cases.
Conclusions:A substantial number of lives could be saved decreasing the yearly average concentration of particulate matter. Concentrations are high, although slightly decreasing, and integrated and permanent policies are required. These are particularly needed in the Po-Venetian valley, where air stagnation, dense industrial activity and intense traffic still contribute to high level of pollution and therefore to a considerable burden in term of health impact and social costs.
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DIETARY PREDICTORS OF *HELICOBACTER PYLORI* SEROPREVALENCE IN MEXICAN ADULT POPULATION

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Background and Aims: H. pylori (Hp) infection is the main etiological factor for gastritis and peptic ulcer. Prevalence of infection is one of highest around the world, and it varies in different societies and geographical locations. This variability is attributed to factors such as socioeconomic status, life style, family density and other factors such as eating habits. However, factors influencing the risk of acquisition of Hp infection are not well established. The objective of this study was to identify the dietary predictors of Hp seroprevalence in adult Mexican population.
Methods*:* From January 2002 to December 2004 a cross-sectional study was carried out in Mexico City. A total of 349 ambulatory patients were recruited from 7 tertiary hospitals. From each participant, who had not received any previous anti-Hp treatment, Hp strains were isolated from an antral and corpus biopsy. Food and nutrients intake was estimated by a food frequency questionnaire.
Results: A significant reduction in Hp seroprevalence was observed among those who reported high vs low consumption of milk (OR=0.52, 95%CI:0.31-0.89), Oaxaca cheese (OR=0.44, 95%CI:0.26-0.76), and olive oil (OR=0.49, 95%CI:0.28-0.83), adjusted respectively by age, gender and crowding during childhood. Moreover, we can observed a significant protective effect between high vs low intake of calcium (OR=0.49, 95%CI:0.29-0.85) and fatty acids including butyric acid (OR=0.48, 95%CI:0.25-0.93), caproic acid (OR=0.55, 95%CI:0.32-0.94), capric acid (OR=0.57, 95%CI:0.33-0.98), and lauric acid (OR=0.49, 95%CI:0.29-0.85). Inversely, a significant increase in Hp seroprevalence was observed between high vs low consumption of pork stew (OR=1.72, 95%CI:1.01-2.93), cauliflower (OR=1.83, 95%CI:1.07-2.93), broccoli (OR=1.73, 95%CI:1.01-2.95) and Tomato salsa (OR=1.86, 95%CI:1.09-3.18)
Conclusions*:* This study suggests that consumption of fatty acids and dairy products may have a protective effect against H pylori infection. Additional analytical studies are needed to determine whether consumption of fatty acids and dairy food products can prevent H pylori infection.

PROSPECTIVE ASSOCIATION OF CADMIUM EXPOSURE WITH FATAL AND NON-FATAL CARDIOVASCULAR DISEASE: THE STRONG HEART STUDY

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Background and Aims: Cadmium, a widespread toxic metal, is related to increased cardiovascular mortality in the US population. Prospective evidence evaluating the association of cadmium exposure with cardiovascular events other than mortality is lacking. Our goal was to evaluate the prospective association of urine cadmium concentrations with cardiovascular disease incidence in cardiovascular disease-free American Indians from Arizona, Oklahoma and the Dakotas who participated in the Strong Heart Study (SHS) in 1989-91 and were followed through December 30th, 2007.
Methods: We included 2,078 adults 45 to 74 years old who had complete information on urine cadmium concentrations, potential confounders and fatal and non-fatal cardiovascular end-points (total cardiovascular disease, coronary heart disease, stroke and heart failure). Urine cadmium was measured using inductively coupled plasma mass spectrometry (ICPMS). Multi-adjusted hazard ratios (HR) were computed using Cox-proportional hazards models.
Results: The geometric means of urine cadmium concentrations were 1.26, 0.97 and 0.96 • g/g creatinine in participants from the Dakotas, Oklahoma and Arizona, respectively. A total of 661 cardiovascular events were identified during the follow-up. After adjustment for cardiovascular disease risk factors including smoking status and pack-years, the hazard ratio for total cardiovascular disease incidence comparing the highest to the lowest quartile of urine cadmium concentrations was 1.41 (95% CI 1.08, 1.82). The corresponding hazard ratios for the incidence of coronary heart disease, stroke and heart failure were 1.11 (95% CI 0.82, 1.52), 2.17 (95% CI 1.19, 3.96) and 1.82 (95% CI 1.08, 3.06), respectively. The corresponding hazard ratio for cardiovascular mortality was 2.03 (95% CI 1.30, 3.18).
Conclusions: Urine cadmium, a biomarker of long-term cadmium exposure, was prospectively associated with increased risk of cardiovascular disease, in particular stroke and heart failure. These findings further suggest that cadmium exposure is a cardiovascular disease risk factor. Efforts to reduce cadmium exposure in the population are needed.

APPLICATION OF DISTRIBUTED LAG MODELS TO INVESTIGATE THE TIME COURSE OF FINE PARTICULATE MATTER ON CARDIAC ELECTROPHYSIOLOGY

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Background and Aims: Environmental variables and health outcomes collected for epidemiological studies may give rise to intensive longitudinal data, where the number of repeated measures exceeds the values typical in clinical studies. Well-established methods exist for the analysis of repeated measures; however, methods typically employed for clinical studies with a small number of time points may be difficult to apply or inadequate, as they frequently assume instantaneous effects. We describe methods for handling intensive longitudinal data using the Air Pollution and Cardiac Risk and its Time Course (APACR) study for illustration. The APACR study collected individual-level, real-time $PM_{2.5}$ data and cardiac electrophysiology outcomes over a 24-hour period, with $PM_{2.5}$ and outcome summaries recorded every 30 minutes, producing 48 repeated measures.
Methods: We constructed polynomial distributed lag models, which include models that assume instantaneous effects and moving average models as special cases. For continuous outcomes (e.g., heart rate-corrected QT intervals) we used a linear mixed-effects models framework. For binary (e.g., any ectopic beat) or count (e.g., PVC count, total ectopy count) data we used a generalized estimating equations (GEE) framework. Model selection included examination of competing covariance structures.
Results: Distributed lag models fit to describe QTI% showed lag 0-1 and lag 6-7 $PM_{2.5}$ effects were significantly associated with QTI%, while the middle lags (2-5) were not. The distributed lag models fit to describe PVC count and total ectopy count found only lag 0-1 $PM_{2.5}$ effects to be significantly associated with the counts. These patterns may have been missed by examining only the cumulative effects of the lags or using moving average models, which implicitly assume equal weighting of lags. **Conclusions:** By allowing examination of individual and cumulative lag effects, and not assuming equal weighting of lags, distributed lag models enable us to identify the time course of air pollution effects.

SECONDHAND TOBACCO SMOKE EXPOSURE IN BARS AND NIGHTCLUBS IMPACTS NON-SMOKING AND SMOKING EMPLOYEES

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Background and Aims: In the absence of comprehensive smoking bans in public places, bars and nightclubs have the highest concentrations of secondhand tobacco smoke, posing a serious health risk for workers in these venues. The objective of this study was to assess exposures of bar and nightclub employees to secondhand smoke, including non-smoking and smoking employees.
Methods: Between 2007 and 2009, we recruited around 10 venues per city and up to 5 employees per venue in 24 cities in the Americas, Eastern Europe, Asia and Africa. Air nicotine concentrations were measured for 7 days in 238 venues. To evaluate personal exposure to secondhand smoke, hair nicotine concentrations were measured for 625 non-smoking and 311 smoking employees. The relationship between hair nicotine and air nicotine concentrations was estimated using mixed-effect models with country specific intercepts.
Results: Median (interquartile range) air nicotine concentrations were 3.5 (1.5, 8.5) $\mu g/m^3$ and 0.2 (0.1, 0.7) $\mu g/m^3$ in smoking and smoke-free venues, respectively. Median (interquartile range) hair nicotine concentrations were 1.7 (0.5, 5.5) ng/mg and 6.0 (1.6, 16.0) ng/mg in non-smoking and smoking employees, respectively. After adjustment for age, sex, education, living with a smoker, hair treatment and region, a 2-fold increase in air nicotine concentrations was associated with a 29% (95% confidence interval 22%, 37%) increase in hair nicotine concentrations in non-smoking employees and with a 10% (2%, 19%) increase in smoking employees.
Conclusions: Exposure to secondhand smoke in the workplace, assessed by air nicotine, resulted in elevated concentrations of hair nicotine among both smoking and non-smoking bar and nightclub employees. Legislation measures that ensure complete protection from secondhand smoke exposure in indoor public places are urgently needed.

REGIONAL RURAL DIFFERENCES IN THE EPIDEMIOLOGICAL CHARACTERISTICS OF THE MENSTRUAL CYCLE (MC), ACCORDING TO AGROCHEMICAL (AC) USE, IN A COUNTRY OF LATIN AMERICA.

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Background and Aims: To describe for first time, the characteristic of menstrual cycle (MC) in a Colombian group of rural fertile women and evaluate if there are differences according rural geographic regions with different use of agrochemicals.
Methods: An ecological study of menstrual cycle characteristics (menarche, cycle length, bleeding length and variability) according physical and sociodemographic characteristics in 1603 Colombian rural fertile women from five rural regions with different use of agrochemicals, was performed.
Results: Age mean was 22.4 (SD 4.4) years, minimal 15 and maxim 54. Mean of cycle length was 31.3 (SD11.4) with a range between 12 to 180 days, bleeding length had a mean of 4.7 (SD 2.0), range 1-47 days, and menarche installation had a mean of 13.0 (SD1.4), range 8-18 years. Distribution of cycle length in different regions doesn't offer great differences but proportion of women with variability was 11.7% and was highest in the region with most intensive use of agrochemicals products cause of illicit crops (21.6%). Regional differences in the menarche age were founded.
Conclusion: It is the first time that a community population based study is performed in order to know general characteristics of MC in a country with special use of agrochemicals. Regional differences were strong but it is impossible conclude that them have been caused only for use of AC products, but this study sheds light to geographical areas where is necessary to make other kind of complementary studies and present a basic information for subsequent studies related with MC.

COMPARISON OF SELF-REPORT VS. CARPET DUST SAMPLING TO ASSESS EXPOSURE TO PESTICIDES IN THE NORTHERN CALIFORNIA CHILDHOOD LEUKEMIA STUDY

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Background and Aims: Epidemiologic studies of childhood cancer typically rely on parents' reports of pesticide use to assess the child's exposure to home/garden pesticides. This approach is subject to recall bias. The Northern California Childhood Leukemia Study (NCCLS) is one of the few studies of this cancer to collect dust samples from participants' homes. Here, we examine the consistency between these two methods overall and by case/control status.
Methods: Carpet dust samples were collected from the homes of 296 cases and 333 population-based controls, and parents were queried about the use of pesticides to treat each of several types of pests during the previous year. We used Tobit regression to compare self-reported pest treatments with concentrations of 15 pesticide active ingredients in the dust, adjusting for other pest treatments.
Results: Associations between self-reported pest treatment and pesticide levels in the dust did not differ significantly between cases and controls. We found the strongest associations for professionally-applied insecticides. If insecticides were applied outdoors, cyfluthrin levels were six times higher (95% confidence level [CI]: 2.6-13.8), and cypermethrin levels were 2.5 times higher (95% CI: 1.1-5.4), than in homes without such treatment. For professional treatment indoors, cyfluthrin concentrations were 3.3 times higher (95% CI: 1.3, 8.6) than in homes without professional indoor treatment. Significant positive associations were observed for householder-applied pesticides (ants/cockroaches and cypermethrin; flying insects and cypermethrin, permethrin; fleas/ticks in the home and permethrin, piperonyl butoxide (synergist); fleas/ticks on pets and piperonyl butoxide; lawn/garden insects and cyfluthrin, chlorpyrifos; and lawn/garden weeds and dicamba, 2,4-D, MCPP). These associations are consistent with known uses of pesticide products.
Conclusions: Self-reported pesticide use was generally consistent with concentrations of expected pesticide active ingredients in dust samples, lending credibility to both methods. Further, the consistency of the associations among cases and controls provides evidence against reporting bias.

EXPOSURE TO METALWORKING FLUIDS AND RISK OF BLADDER CANCER

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Background and Aims: Many studies have observed an excess bladder cancer risk among metalworkers that is thought to be due to metalworking fluid (MWF) exposure. We used data from a large population-based case-control study in New England to examine the association between MWF exposure and bladder cancer risk.
Methods: Lifetime occupational histories were obtained from 1,158 patients (895 men, 263 women) newly diagnosed with bladder cancer in 2001-2004 in Maine, New Hampshire, and Vermont, and from 1,402 population controls (1,031 men, 371 women). Participants who reported jobs titles or tasks suggesting metalworking activities were administered detailed questionnaires. An industrial hygienist blinded to case/control status used this information to assess the probabilities of exposure (certain [probability=1], probable [>0.5-<1.0], possible [>0-<0.5]) to straight, soluble, and synthetic MWFs. Unconditional logistic regression was used to calculate odds ratios (ORs) and 95% confidence intervals (CIs), adjusted for demographic factors, smoking, and employment in other high-risk occupations.
Results: Compared to men never exposed to MWF, those with certain exposure to MWF (67 cases, 52 controls) had a significantly increased bladder cancer risk (OR=1.7, CI=1.1-2.6). The OR decreased to 1.3 (CI=0.9-2.0) if the exposure was probable (55 cases, 59 controls), and to 1.1 (CI=0.8-1.6) for possible exposure (108 cases, 125 controls). Men with certain exposure to straight MWF had a significant two-fold risk compared to men with no MWF exposure (CI=1.3-3.3); the OR decreased to 1.3 (OR=0.6-2.9) for probable exposure and 1.2 (CI=0.9-1.5) for possible exposure. For soluble MWF, the ORs were 1.5 (CI=0.9-2.4), 1.5 (CI=0.98-2.3), and 1.1 (CI=0.8-1.5) for certain, probable, and possible exposure, respectively.
Conclusions: Use of MWF, particularly straight MWF, was associated with a significantly increased risk of bladder cancer among men. Ongoing assessments of the probability, intensity, frequency, and duration of exposure to straight, soluble, and synthetic MWF will further inform this analysis.

HEAT-SUSCEPTIBILITY IN OLDER PERSONS AND BARRIERS TO ADAPTATION: A QUALITATIVE STUDY

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Background and Aims: Extreme heat is a well documented threat to health, and for reasons which are not fully understood, older persons are known to be most at risk. With heatwaves being a common occurrence during Australian summers, behavioural adaptation is important for heat-health, and factors limiting adaptive capacity in vulnerable subpopulations need to be identified. The aim of this study was to investigate stakeholders' perceptions and experiences of heat-susceptibility in older persons, and to identify risk factors and barriers to adaptation during extreme heat.
Methods: The study was undertaken in Adelaide, South Australia where a record-breaking heatwave occurred in the summer of 2009. Interviews and focus groups were conducted with 41 respondents including older persons (n=6); and key stakeholders involved in health and aged care, community services, government sectors, emergency services and policymaking (n=35). Topics for discussion included experiences of recent heatwaves, links between age and vulnerability to extreme heat, and obstacles to effective adaptation. Proceedings were digitally recorded, transcribed verbatim into text, and analysed using thematic analysis.
Results: The narratives of respondents revealed multiple issues accounting for heat-susceptibility in older persons. Findings showed that adaptive capacity may be influenced by physiological, psychological, socioeconomic and behavioural factors. These included an age-related decline in health with associated comorbidities and the use of certain medications, low fitness, limited fluid intake, diminished awareness, isolation, and financial concerns about power costs. Persons with undiagnosed dementia were noted to be particularly vulnerable. Other issues raised included the design features of some newer cooling devices not being conducive to use by older persons, heat-associated anxieties, and specific issues facing the elderly in rural areas.
Conclusions: Improving heat-health knowledge and addressing the social and economic concerns of older persons may assist in minimising heat-related morbidity and mortality in today's ageing population facing a warming climate.

ARSENICALS, WATER TREATMENT, AND WATER QUALITY: CAN WE LEAVE OUT ONE?

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Background and aims: Metals are considered very important and highly toxic pollutants in the various environmental departments. Arsenic-associated human health complications are reported worldwide. Although inorganic arsenic has long been known to be toxic to humans, little is known about its metabolite, dimethylarsinic acid, and its toxicity. The risk of outbreaks of waterborne diseases increases where standards of water, sanitation and personal hygiene are low. Water may be contaminated with naturally occurring inorganic elements such as arsenic and cause disease. The risk for developing a human disease derived from environmental exposure is not based solely on the environmental exposure, but is modified by mitigating conditions, such as other environmental or genetic factors. Therefore, we investigated the hepatic toxicity of dimethylarsinic acid and its interaction with iron and lipopolysaccharide in drinking water.
Methods: Rats were given drinking water with dimethylarsinic acid with or without iron for 3 weeks. A single dose of lipopolysaccharide was given with dimethylarsinic acid-plus-iron treatment.
Results: Dimethylarsinic acid alone, iron alone, and dimethylarsinic acid-plus-iron treatment did not cause hepatic damage. A single dose of lipopolysaccharide increased hepatic damage in dimethylarsinic acid-plus-iron-treated rats.
Conclusions: Our study indicates an important ecological and environmental related public health issue: the arsenic removal system may cause liver damage via arsenic metabolites as well as poor water quality. We conclude that exposure to lipopolysaccharide increases hepatic damage in dimethylarsinic-acid-plus-iron-treated rats.

BEHAVIOURAL ADAPTATION OF OLDER PERSONS DURING EXTREME HEAT IN TWO AUSTRALIAN STATES

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Background and Aims: Heatwaves regularly occur during summers in southern Australia, and the health impacts are often more marked in the older population. With established physiological links between age and heat-susceptibility, it is important that barriers to behavioural adaptation be identified so that evidenced-based prevention strategies can be formulated accordingly. The aim of this study was to investigate factors affecting the heat-adaptive behaviours of older persons in two Australian states.
Methods: Computer assisted telephone interviews were conducted late in the 2010-2011 summer with a total of 500 older persons in each of two Australian states, South Australia and Victoria. The study population consisted of persons aged 65 years and over residing in the community, and calls were made to listed residential telephone numbers until a person of the target age was found. The survey instrument was informed by a literature review and a prior qualitative study. Questions covered issues such as air conditioner usage, fluid consumption, resilience, risk perception, behaviour change, and knowledge of heat-health messages. Spatial and quantitative analyses of data were performed using logistic regression in multivariate models.
Results: Whilst an unprecedented heatwave occurred in southern Australia in 2009 claiming hundreds of lives, this study was undertaken during a mild summer in which only one short but intense heatwave occurred, and other natural weather disasters (i.e. floods and cyclones) captured the attention of Australians. Nevertheless, the findings have provided valuable insight into the adaptive behaviours and risk perceptions of older persons during extreme heat in two major Australian cities (Adelaide, SA and Melbourne, Vic) and rural areas in the respective states.
Conclusions: This comprehensive study of the heat-adaptive capacity of older persons may provide an evidence base for interventions and influence the formulation of future age-appropriate health promotion and risk communication strategies for heatwave warnings.

ASSESSING HIGH RISK CLUSTERS OF MALARIA MORTALITY ALONG BORDER AREAS IN SOUTH CHINA

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Background and Aims: Malaria is a major public health problem along border areas in south China, where there are more malaria deaths than any other regions of China. This study aims to assess spatial and space-time distribution patterns of malaria deaths and identify high risk areas of malaria deaths in Yunnan Province, China.
Methods: The annual malaria deaths at a county level were calculated during 1991 - 2006. Poisson models for purely spatial and space-time analyses were performed to identify high risk clusters in 128 counties over 16 years using SaTScan software. Disease mapping was conducted using ArcGIS software.
Results: The high risk clusters were identified in west and south parts of Yunnan along border areas with the most likely cluster (RR=39.03) and secondary cluster (RR=2.49). The most likely cluster (RR=126.5) occurred during 2003-06 while secondary cluster (RR=7.83) occurred during 2003-05.
Conclusions: The identification of high risk locations and periods in Yunnan may provide useful information for health authorities to target high risk hotspot areas. Further research should be carried out to address the determinants of high risk clusters for malaria transmission in this endemic region.

POPULATION-BASED STUDY ON RISK OF STROKE ASSOCIATED WITH TEMPERATURE CHANGE

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Background and Aims: Most of climate related studies on stroke investigated mortality instead of morbidity. This study used insurance claims data to investigate incidences of stroke associated with the temperature change for population in a subtropical island area, Taiwan.

Methods: We used the sample with claims data of one million insured population obtained from the National Health Insurance program of Taiwan to measure the risk of stroke by temperature variations in 1996-2009. Sex- and age-specific risks were also measured. The meteorological and population data were obtained from the Central Weather Bureau and the Ministry of the Interior, respectively.

Results: With the lowest mean temperature of 16.2 Ž during the 13-year period, the mean monthly incidence rate of stroke was at a peak of 19.7 per 100,000 person-days in January. The mean incidence decreased by month to the 1owest of 17.1 per 100,000 person-days in July, the hottest month, and climbed again in August and the rest of months ranging from 17.8-18.9 per 100,000 person-days. Further analyses showed that the incidence had a strong v-shape association with the minimum daily temperature. The incidence rate decreased from 0.67 per 100,000 person-days at < 10 Ž to 0.56 per 100,000 person-days at 20-24 Ž, then climbed to 0.64 per 100,000 person-days as it was $\geq$ 25 Ž. W e also found the risk of stroke was 2.45-fold greater as the daily temperature range was at 18 Ž than was between 1-3 Ž (1.37 vs 0.56 per 100,000 person-days).

Conclusions: The relative risk of stroke is associated with decreasing and increasing rises starting at the ambient temperature of 20-24 Ž. Severe change in temperature enhances the immediate risk further..

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THE GEOGRAPHIC DISTRIBUTION OF DENGUE FEVER AND THE POTENTIAL INFLUENCE OF GLOBAL CLIMATE CHANGE

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Background and Aims: We aimed to describe the geographic distribution of dengue transmission (current and historical) and to estimate possible impacts on transmission from climate change.
Methods: We searched PubMed, digital books and archives for literature describing geographically defined outbreaks of dengue. We also searched PubMed and Scopus for studies modelling the potential effects of climate change on dengue transmission.
Results: One hundred and one articles met the eligibility criteria for the first review; there were some contradictions and ambiguities in the data. Current global distribution of dengue is generally less extensive than historical limits of dengue-like illness. In recent years, several countries have reported local transmission of dengue for the first time, but it is unclear whether this represents true geographic spread, rather than increased awareness and reporting. Six papers met the inclusion criteria for the second review. The findings of theoretical and statistical models of dengue and climate are broadly consistent: the transmission of dengue is highly sensitive to climate. Relatively small increases in temperature (around 1°C) can lead to substantial increases in transmission potential
Conclusions: The geographic distribution of dengue has generally contracted, despite increases in global average temperature in the past century. Theoretically, however, temperature trends have increased the risk of dengue in some areas. The independent effect of climate change on historical patterns of dengue transmission cannot be quantified based on current evidence, as existing models of disease transmission provide limited, incomplete, projections of disease risk. The geographic limits of dengue result from a complex interaction between physical, ecological and social factors which have not been included in current climate change models. Keeping this limitation in mind, models estimating changes to geographic boundaries of transmission suggest an increase in the future population at risk of dengue.
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THE STUDY ON THE RELATIONSHIP BETWEEN PERSONAL HYGIENE AND INTESTINAL INFECTIOUS DISEASES OF RURAL RESIDENTS

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Backgrounds and Aims: Epidemiological studies have demonstrated a link between unhealthy hygienic habits and morbidity of the intestinal infectious diseases of the city dwellers, rather than rural residents. Here, we use case-control design to explore the relationship between the personal hygiene and intestinal infectious diseases in rural residents of China.

Methods: About 20,000 persons were recruited for the survey by stratified random sampling. The subjects were interviewed with the questionnaire designed by our research team to collect the information of personal hygiene, e.g. drinking unboiled water, hand-washing before meals, hand-washing after toileting, tableware-washing timely(within an hour after eating), and tableware-washing with detergent, as well as cases of intestinal infectious diseases including infectious diarrhea, abdominal typhus, dysentery and acute gastritis of the subjects. The case and control group were divided according to case report of themselves. The Multivariate Logistic Regression was used for the data analysis.

Results: There were 692 and 19210 subjects in case group and control group respectively. After adjusting the related confounders, drinking unboiled water increased statistical significantly the possibility of suffering from the infectious diseases (*OR*=1.47, 95%CI=1.18~1.83, *P*<0.01)in the exposed population, the cases of intestinal infectious diseases of subjects were negatively correlated with hand-washing after toileting(*OR*=0.44, 95%CI=0.33~0.58, *P*<0.01), tableware-washing timely(*OR*=0.61, 95%CI=0.49~0.77, *P*<0.01) and tableware-washing with detergent(*OR*=0.72, 95%CI=0.56~0.91, *P*<0.01) respectively. While hand-washing before a meal has not significantly associated with the intestinal infectious diseases.

Conclusion: The better habit if personal hygiene could decreases the possibility of intestinal infectious diseases in rural residents. The approach of health education and promotion about personal hygiene is necessary for reducing the chance of being infected by intestinal infectious diseases.

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CLIMATE CHANGE AND HEAT-RELATED MORTALITY IN BUDAPEST - COMPARATIVE METHODS OF IMPACT ESTIMATION OF TEMPERATURE CHANGE

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Background and Aims: Regional climate models (RCM) allow to assess health impacts. The authors studied how climate-change modify heat-related mortality by different validation methods.
Methods: We assessed 1961-1990 and 2021-2050 heat-related mortality impacts in Budapest by applying temperature projections from 20 RCMs (ENSEMBLES project) and for validation the Budapest station data of the Hungarian Meteorological Service. Based on a previous study, daily mortality increases by 1.03(1.02-1.05) cases/1^{o}C increase resp. by 1.06(1.04-1.07) in the age groups of <75 resp. ≥75-year old population on days with mean temperature above 95% percentile.
Four computation methods were used: only reference and scenario of climate models; observed data compared to scenarios; assuming that excess mortality occurred on equal number of days, resp. assuming the same number of excess deaths occurrred in the observed and reference datasets.
Results: In three models 95% percentile daily mean temperature of the reference period was higher than the maximum values of observed data; in two models the maximum temperature of predicted future was less than the observed maximum. The number of hot days above threshold temperature (23.9^{o}C - 548 days) in observed data fell between 49-1787 days in the reference data. Increase of excess mortality due to climate change was between 16-780%, 7-680% , 21-314%, 21-320% in the computation models. In the last model the yearly heat-related excess mortality was 87(58-145) resp. 174(116-203) in the younger vs. older age group in 1961-1990. The yearly excess mortality predicted by the models will be between 106-366 resp. 212-733 for the younger resp. older age groups between 2021-2050.
Conclusions: When the effect of heat can be modelled for the real past period, the validation should be based on it to produce more reliable prediction.
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A STRATEGY TO ADJUST FOR CONFOUNDING USING MULTIFACTOR STATISTICAL MODELS IN EPIDEMIOLOGICAL RESEARCH

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Background and Aims: There are two main methods to adjust for confounding at the stage of data analysis in epidemiology: standardization (stratification) and multifactor statistical modeling. Comparison of results obtained with the help of these methods is, therefore, of interest to us. The mathematical equivalence of these methods to adjust for confounding has not been fully investigated in scientific papers. Besides, it is customary to assume that the results of both methods coincide when they are applied to the same primary dataset.
Methods: We have considered different statistical methods to adjust for confounding, such as simple and logistic regression, and analysis of variance and covariance. Strict mathematical methods have been used to compare the results obtained by standardization and by including a confounding variable into the multifactor statistical model. We have used our datasets for performing calculations. These datasets include 1577 adults and 1350 children living in the Middle Urals (Russia). For each of the individuals, we gathered data concerning health status, environmental pollution and information about individual risk factors.
Results: It is shown that the multifactor variance model represents the standardization procedure in the best way. The covariance model could allow us to make the same adjustment for confounding as a standardization procedure if we took into account some special conditions. Multiple regression models (both simple and logistic) give results which are different from those obtained with the standardization procedure.
Conclusions: Formal application of regression models (both simple and logistic) to adjust for confounding may lead to incorrect results. Admittedly, the only reasonable method to adjust for confounding is variance models, and occasionally, covariate models. It has to be admitted that a reasonable method to adjust for confounding is variance models only, and covariate models on some occasions.

BIPHASIC DECLINE OF SERUM PERFLUOROOCTANOIC ACID (PFOA) CONCENTRATIONS AMONG MID-OHIO VALLEY RESIDENTS

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Background and Aims: Two PFOA-contaminated water systems, Little Hocking Water Association and Lubeck Public Service District, have used granular activated carbon filtration since 2007 in order to remove the contaminant. The study aim is to characterize the subsequent rate of decline of serum PFOA concentrations among exposed residents.
Methods: Up to 7 blood samples were collected from each of 200 study participants from 2007 to 2009; serum samples were analyzed for PFOA content. Rates of decline and apparent half-lives are calculated separately in year 1 and year 2, with adjustment for a presumed background serum concentration of 4 ng/mL.
Results: The mean background-adjusted decline in serum PFOA concentrations was 27% during year 1 and 11% percent during year 2. Background-adjusted individual rates of decline differed significantly between year 1 and year 2 (paired t test; $p < 0.001$). Corresponding half-life estimates are 2.1 years during year 1 and 5.0 years during year 2.
Conclusions: PFOA was eliminated from human serum more slowly during the second year after an exposure intervention than it was during the first year, suggesting complex pharmacokinetics and/or ongoing local exposures.

THE ANALYSIS OF PUBLIC HEALTH USING THE URBAN AUDIT DATA

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Background and aims: The aim of the paper is to analyse selected public health indicators based on the Urban Audit database. The Urban Audit contains statistics for 258 cities across 27 European countries. There are almost 300 statistical indicators on demography, society, the economy, the environment, transport, the information society, public health, and leisure. In this paper, we analyse the following public health indicators: mortality rates under 65 and mortality rates under 65 from heart diseases and respiratory illness for both sexes. We are interested in the effect of the environment (air pollution) and active travel (the shares of walkers and bikers) on the above mentioned health indicators.
Methods: We employ statistical bayesian techniques to analyse the impact of observed cities characteristics and unobserved random effects on the public health indicators. The bayesian techniques prove useful to deal with missing data and outliers, which is a real issue when working with the Urban Audit.
Results and conclusions: The statistical results suggest that the share of active transport is significantly associated with the decrease in all investigated mortality rates. The elasticity is stronger for the share of bikers. There is also a non-linear interactions between environmental and transport indicators. We plan to check these results using a set of more advanced techniques.

PLOTTING ISOBOLE WITH LOGISTIC REGRESSION

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Background and Aims: Studies concerning interactions between different toxicants are of fundamental interest and practical importance in toxicology. However, there is still no consensus of opinion with regard to the assessment of interaction between agents. We, therefore, should be careful about using the terms additivity, synergism and antagonism, especially where nothing is known about the mechanisms underlying the toxic action. The Loewe additivity model and its extension in the form of isobolographic method are mostly used for assessing the type of combined action in co-exposure experiments. Moreover, practical plotting of an isobole is a non-trivial task.
Methods: We propose to plot an isobole using a logistic regression equation for primary data. In many cases, the outcome of interest is binary (i.e. taking 0, 1 values), and toxicants are continuous (e.g. air pollutant concentrations). By standard calculation, we can get a logistic regression equation $w = f(x, y)$, reflecting the impact of toxicants on objects. The co-exposure of toxicants may manifest itself in a variety of ways, e.g. additive effects, synergism or antagonism. Each of these cases produces some kind of isobole. We can design this plot in 2 steps. Firstly, we calculate disease prevalence w_0 from primary data. Secondly, we find the corresponding isobole solving the implicit equation $w_0 = f(x,y)$.
Results: We have tested this method on various real and simulated data sets, and have come to the conclusion that it is easier and more correct than others. This method of isobole construction may help, with a certain degree of approximation, find isoeffective doses of toxicants (points of intersection of this isobole with the axes).
Conclusions: The isobole plotting method proposed in this report may have some advantages compared to other methods. It has significant stability to outlets, and may be applied to various data sets with minimal preparation.

Epidemiologic research during the past 10-20 years has confirmed the adverse effects of air pollution on public health, and subsequent cost-benefit analysis has become critical in policy decision-making. Since air quality models are among the main tools available to evaluate the impacts of changes in emissions, either due to growth or resulting from the implementation of source-control strategies, these approaches play a vital role in air accountability studies. In this study we present an air-quality system, AQM.cat, to quantify the impact of air pollution on public health. This modelling system is based on coupling different Eulerian models: a meteorological model, WRF or MM5; an emission model MNEQA; and the photochemical model CMAQ. In this contribution we consider two ways to characterize health effects using AQM.cat: (i) using it to obtain the statistical parameters needed by the exposure models to estimate the temporal and spatial variability of different pollutants; and (ii) linking AQM.cat to concentration-response functions derived from relationships between ambient concentrations and health effects. In the first case, one year of simulation is considered to evaluate statistical parameters such as the mean, median and 90^{th} percentile for the eight 3-hourly time diurnal time intervals, illustrating the temporal variability of several pollutants: ozone, PM10 and nitrogen dioxide. In the second case, we link AQM.cat with concentration-response functions and with spatially disaggregated population data. Changes in health effects due to changes in the emission of each pollutant have been quantified by comparing the baseline case with different scenarios corresponding to different reductions of emissions. Both methods have been applied to north-eastern Spain (Catalonia), showing the capacity of an integrated air quality modelling and assessment system to evaluate damage caused by pollutants, and emission control strategies.

MATERNAL CADMIUM EXPOSURE IN PREGNANCY AFFECTS SIZE AT BIRTH

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Background and aim: The toxic metal cadmium (Cd), commonly occurring in various foods, is embryotoxic and teratogenic in a variety of animal species, indicating that the prenatal period is a critical window of Cd exposure; however, data in humans is limited. The aim of the present study was to assess the effects of maternal Cd exposure in pregnancy on size at birth.
Methods: This prospective cohort study was nested into a population-based supplementation trial in pregnancy, conducted in rural Bangladesh. We selected all women that were recruited in early pregnancy (Gestational Week (GW) 8) from February 2002-January 2003, and who had singleton births with measurements of birth size (weight, length, head- and chest circumference; n=1616). Urinary Cd (GW 8), a marker of long-term exposure, was measured with ICPMS and adjusted by specific gravity. All women were non-smokers.
Results: Multivariable–adjusted linear regression analyses, controlled for potential confounders including sex, showed that maternal urinary Cd (median: 0.63 µg/L) was negatively associated with birth weight and head circumference. Stratifying by sex showed that the negative association of maternal urinary Cd on size at birth was only apparent amongst girls; birth weight (B=0.45; p=0.020), head- (B=-0.26; p=0.0031), and chest circumference (B=-0.24; p=0.025). We found no significant associations amongst boys. In girls, an increment of 1 µg/L Cd in maternal urine was associated with a decrease in head- and chest circumference by 0.26 and 0.24 cm, respectively and in birth weight by 45g. Multivariable-adjusted quantile regression analyses using the 25th, 50th, and 75th percentiles of size at birth indicated that Cd similarly affected girls of smaller and larger size.
Conclusions: We found a remarkable sex-specific association between maternal Cd exposure and birth size, which was only apparent in girls. Clearly, this has public health relevance and further emphasizes the importance to reduce Cd pollution.

THE RELATIONSHIP OF RESIDENCE DISTANCE FROM PUBLIC GREEN PARKS IN KAUNAS TO PRETERM BIRTH RISK

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Background and Aims There is some evidence that access to urban green spaces is associated with an increased physical activity, decreased stress level, and improved people's life quality and reduced health problems. We examined the associations between residence distance from green space (parks) and preterm birth.
Methods: We conducted a prospective pregnant women cohort study in Kaunas (Lithuania) and estimated 3,341 maternal residence distance from green space classified as a Formal park. Women's home locations were mapped using the ArcGIS 9.2 Geographical Information System (GIS) and combined with a comprehensive GIS database of neighbourhood and green space characteristics. Preterm birth was defined as infant's whose gestational age was less than 37 weeks. According to the distance from the residents' homes of each respondent to the nearest park, we determined three women groups: residing within 300 m (referent group), 300-1000 m and more than 1000 m. The associations between distance from parks and singleton preterm birth were analyzed by logistic regression models with and without adjustment for maternal education, family status, renal diseases, diabetes, cardiovascular disease, stress, body mass index, smoking, alcohol consumption, parity, previous preterm birth, infant birth year, and NO_2 exposure.
Results: We found positive associations between women home distance to the nearest park and preterm birth. The adjusted risk ratio of delivering a preterm birth infant among women residing within a 300-1000 m from park was 0.90, 95% CI 0.61-1.31 and among women residing above 1000 m from park it was 1.58, 95% CI 1.00-2.51 to compare to the referent women group. Similar results were found when from the model was excluded NO_2 exposure effect.
Conclusion: The findings suggest that there is an association between home location within 1000 m to green spaces classified as a Formal park in urban areas and preterm birth risk.

ROAD TRAFFIC INJURIES IN SOUTH INDIA

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Background and Aims: Road traffic injuries (RTIs) contribute 18% of total deaths in India and the number of RTI-related fatalities has been increasing by 8% annually. This study provides a detailed profile of RTIs on the National, State Highways (NH, SH) and local roads in Vellore district and identifies hotspots of RTIs using GIS methodology.
Methods: 3262 RTI records were abstracted from the police filed First Information Reports (FIRs) between January, 2005 and May, 2007. Each record contained information on accident's location, time, vehicle and injury characteristics. The NH vehicular density and RTIs were mapped. Highway junctions at risk for fatal RTIs and segments with high RTI rates were identified. Poisson regression analysis was used to compare RTIs across road categories and event time.
Results: The highest proportion of RTIs was observed on NH (52%) with 3.77 injuries/day, compared to SH (30%) and local roads (18%), which had 50% pedestrian involvement, in contrast to NH and SH (34% & 40%). Over the study period, the number of fatal RTIs on NH had increased by 57%. A significant 5 and 7-fold increase respectively were observed in all RTIs and fatal RTIs on the local roads. NH RTI rate (8.8/100,000 vehicles/day) varied from 5.8/100,000 (weekends midnight-to-6am) to 13.2/100,000 (weekdays 6pm-to-midnight). RTIs involving heavy motor vehicles (HMV) were more on weekends compared to weekdays (39.4% vs. 32.6%, $p<0.05$).Majority of RTIs on the NH had occurred at five major junctions, two of which had the highest fatality rates (17%). One NH segment exhibited the highest rate for fatal RTIs (1.2/100,000).
Conclusions: Despite the limited specificity of the police reports, this study has demonstrated the patterns and growing trends of RTIs in India. This study also demonstrates the value of GIS for policy makers in the design, maintenance of highways and in implementing preventive strategies.
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EXPOSURE TO DI (2- ETHYLHEXY) PHTHALATE AMONG PREMATURE NEONATES AND ITS RELATION TO PVC MEDICAL PROCEDURES IN NEONATAL INTENSIVE CARE UNIT IN TAIWAN

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Background and Aims: Neonates are exposed to high levels of di-(2-ethylhexyl) phthalate (DEHP) through numerous medical procedures in the neonatal intensive care unit (NICU). Our aim is to assess the contribution of specific medical devices to the DEHP exposure.

Methods: We recruited 32 premature neonates, 20 with very low-birth weight (VLBW, <1500 g) and 12 with low-birth weight (LBW, <2500 g), and 31 controls at a neonatal intensive care unit (NICU) from a medical center in central Taiwan. We recorded the medical procedures including endotracheal tube (ETT), orogastralic tube (OGT), nasogastric tube (NGT) of each subject and collected their urine samples for determination of three metabolites of di-(2-ethylhexyl) phthalate (DEHP) using reversed-phase high-performance liquid chromatography-atmospheric pressure chemical ionization-tandem mass spectrometry.

Results and Discussions: The median level of DEHP metabolites in premature neonates treated with ETT and OGT or NGT were significantly 2-fold higher than those treated without ETT, OGT or NGT. The median level of DEHP metabolites in premature neonates treated with intravenous (IV) injection was significantly ≥2 fold higher than healthy controls who received IV injections. Median levels of three DEHP metabolites were similar in VLBW and LBW. These data suggest that PVC-containing devices are the major defining factor in DEHP exposure levels in neonates in the NICU. We urge the use of PVC-free or alternative materials in medical devices, especially for ETT, OGT, NGT and IV tubing in the NICU. The health effects of high DEHP exposure on premature neonates in the NICU is worthy of further investigation.

TRIHALOMETHANES INTERNAL DOSE AND MATERNAL GSTT1 AND GSTM1 GENES POLYMORPHISM CONTRIBUTION TO THE RISK OF PRETERM BIRTH

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Background and Aims: There is some evidence that prenatal exposure to drinking water trihalomethanes (THM) has a detrimental effect on birth outcome. Both environmental factors and genes involved in metabolic detoxification process may be associated with preterm birth. The relationship between THM exposure and preterm birth in genetically susceptible subjects is not clear. The objective of this study is to investigate whether the polymorphisms of metabolic genes GSTT1 and GSTM1 affect the association of maternal exposure to THM with preterm birth.
Methods: We conducted a nested case-control study of 682 pregnant women in Kaunas (Lithuania) using individual information on water drinking, showering and bathing habits during pregnancy, and uptake factors of THMs in blood, estimated as internal dose of THM. We used logistic regression to evaluate the relationship between internal THM dose, preterm births and individual and the joint (modifying) effects of the metabolic gene polymorphisms controlling for family status, maternal smoking, body mass index, alcohol consumption, education, and infant birth year.
Results: The estimated individual total uptake of THMs ranged between 0.0025 and 2.40 μg/d. The findings suggest that carriers of the GSTM1–0 genotype and exposed to THM, chloroform and bromodichloromethane had an increased risk for preterm birth compared to carriers of the GSTM1–1 genotype: the ORs during the second trimester among woman GSTM1–1 genotype carriers were 1.0–1.11, while among GSTM1–0 genotype carriers ORs were 1.66–2.07. Exposure to dibromochloromethane during the first trimester among carriers of the GSTM1–1 genotype was associated with an OR of 7.35, 95% CI 2.62–20.6, and among carriers of the GSTM1–0 genotype produced an OR of 2.81, 95% CI 1.21–6.52.
Conclusions: These data suggest that THM internal dose may affect preterm birth and that maternal GSTM1 and GSTT1 genotypes modify the THM exposure effects on preterm birth.

CHERNOBYL – 25 YEARS AFTER: IS THERE A SIGNAL IN AUSTRIAN HEALTH DATA?

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Background and Aims: Austria was among the areas outside the former Soviet Union hardest hit by the fall-out following the nuclear accident at Chernobyl in April 1986. In the aftermath of this event several claims were made about measurable health effects in Western European countries. No consistent study has so far been conducted in Austria.
Methods: If the findings in other Western European countries were causally related to the accident also an effect should be visible in Austria provided the data were available with sufficient quality. Although a statistically significant effect on cancer incidence is not likely this endpoint was considered because of its high emotional impact. In addition data on chromosomal aberrations were reviewed and effects of the nuclear accident on the birth weight and the sex ratio at birth were investigated.
Results: No significant effect on cancer incidence was observed, but the spatial distribution of adolescent thyroid cancer in the years 1990-2004 was consistent with a small additional effect of the fall-out in the expected magnitude. An even less clear tendency was seen for leukaemia.
Claims of an increase in trisomy 21 in other European countries do not seem very consistent. Austrian data do not indicate an increase in trisomy 21 but surprisingly an increase in other aneuploidies was observed in 1987. There was no influence on the sex ratio at birth. When the first trimenon coincided with the 4 months after the nuclear accident there was a small but significant reduction in birth weight although there was no clear pattern in the spatial distribution of the effect.
Conclusions: None of the findings is proof for a causal impact of the nuclear accident. On theoretical basis some minor effects are to be expected and findings are on the whole consistent with this expectation.

MYOCARDIAL INFARCTION INCIDENCE AND ROAD TRAFFIC NOISE EXPOSURE,PISA (ITALY),2002-2006

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Background and Aims: Evidence is growing on association between exposure to road traffic noise and health effects, in particular cardiovascular and myocardial infarction (MI). The ongoing study aims to evaluate the association between MI incidence and residential exposure to road traffic noise by a case control (CC) study, on current data.

Methods: Mortality and hospitalization data (1998-2006) have been used to obtain cases of first MI incidence in 2002-2006 through a validated algorithm. Five controls will be matched to each case by gender, age and a deprivation index (DI), based on 2001 census. Residential address, residence length and geographical coordinates come from Municipality archives. Road traffic noise exposure have been estimated at the buildings façades from Pisa noise map built by Environmental Protection Agency of Tuscany Region according to new acoustic indicators and interim methods issued by European Directive 2009/49/CE.

Results: The CC study is ongoing. 823 MI cases (age 35+ years) have been identified in 2002-2006 with the aim to analyze also the last- residence noise exposure length.

Preliminary analyses of MI cases on residents, living in the same building (769 different buildings) on the same year, estimated incidence rates, direcly standardized by age and DI, computed by sex and night noise levels (<50dB; 50-54dB; 55+ dB). The rate ratios vs the lowest noise level were 1.14 at 50-54dB, 1.33 at 55+ dB among men while were respectively 1.12 and 1.06 among women.

Conclusions: Preliminary results confirm, in men, the presence of an association between first MI occurrence and high leves of nocturnal traffic noise exposure at residence place. The ongoing CC study will consider the residence length and will try to evaluate the confoundig effect of air pollution exposure by means of traffic characterization (veichles number, pedestrian area, vicinity to airport,railway etc) in the road of residence.

ASSOCIATION BETWEEN POP EXPOSURE AND TYPE 2 DIABETES IN THE HELSINKI BIRTH COHORT STUDY

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Background and Aims: The prevalence of type 2 diabetes is increasing alarmingly in both developed and developing countries. Lately, exposure to persistent organic pollutants (POPs) has been associated with its increasing incidence. The purpose of this study is to examine the association between type 2 diabetes and POP exposure in the Helsinki Birth Cohort Study. The participants were born between the global POP emission peak, and have mainly been exposed during adulthood. This offers an interesting opportunity to study the association when limited exposure during fetal period has occurred.
Methods: The cohort consists of 8760 people born in Helsinki, Finland, during 1934–44. In 2003, a baseline clinical examination was performed, including blood sampling for laboratory analyses of serum lipids and six POPs. Complete data from the baseline examination was available for 1988 participants. A repeat sampling was performed in 2006, but data from this was not yet available for the present study. The concentrations of each POP were categorized into four groups based on percentile intervals and logistic regression was performed across the POP categories, adjusting for sex, age, waist circumference, and mean arterial pressure, and using the lowest category as the reference group.
Results: Among the participants with the highest exposure to oxychlordane, *trans*-nonachlor, *p,p'*-DDE, and PCB 153, the risk of type 2 diabetes was 1.64–2.24 times higher than among those with the lowest exposure (plin=0.003–0.050). In the BMI-stratified analysis, the associations between type 2 diabetes and oxychlordane and trans-nonachlor remained significant, and were strongest among the overweight participants. Exposure to BDE 47 and BDE 153 was not associated with type 2 diabetes.
Conclusions: Type 2 diabetes was associated with high adult-only exposure to organochlorine pesticides in a general urban population.
References:

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INDIVIDUAL EXPOSURES TO DRINKING WATER TRIHALOMETHANES AND THE RISK OF PRETERM BIRTH

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Background and Aims: Evidence for an association between exposure during pregnancy to trihalomethanes (THMs) in drinking water and preterm birth is still inconsistent and inconclusive, in particular, for various exposure routes. The aim of our study was to examine association between of internal dose of THMs and preterm birth in singleton newborns.
Methods: We conducted a prospective cohort study of pregnant women in Kaunas city, Lithuania. Preterm birth was defined as infant's whose gestational age was less than 37 weeks. In total 4.161 women were interviewed to collect personal data on various characteristics and water consumption habits. We used tap water THMs concentrations, geocoded maternal address at birth, individual information on drinking water ingestion, showering and bathing, and uptake factors of THMs in blood, to estimate an internal dose of individual THM. We examined the relation of THM internal dose to preterm birth with a multiple linear-regression models, adjusting for maternal education, family status, renal diseases, diabetes, cardiovascular disease, stress, body mass index, smoking, alcohol consumption, parity, previous preterm birth, and infant birth year.
Results: The estimated individual total uptake of THMs ranged between 0.0025 and 2.40 μg/d. THMs dose was associated with a slightly increased risk across three pregnancy trimesters. We found dose – response relationships for the entire pregnancy and trimester-specific brominated THMs internal dose and preterm birth. For a second trimester bromodichloromethane adjusted RR for second tertile was 1.79, 95% CI 1.03-3.13 and for third tertile it was 1.84, 95% CI 1.04-3.26. The risk increased by 21% per every 0.01 • g/d increase in bromodichloromethane internal dose (OR 1.21, 95% CI 1.01–1.45).
Conclusions: There is some evidence for an association of THMs internal dose during pregnancy on preterm birth. Increased bromodichloromethane dose may affect preterm birth.

LOW-LEVEL NITROGEN DIOXIDE EXPOSURE AND SMALL FOR GESTATIONAL AGE NEWBORNS IN A KAUNAS COHORT STUDY

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Background/Aims: Evidence for an association between exposure during pregnancy to traffic-related air pollution and impaired fetal growth is still inconsistent and inconclusive. We examined the relationship of individual exposures to nitrogen dioxide (NO2) during pregnancy on small for gestational age (SGA) risk in singleton births.
Methods: We conducted a prospective cohort study of 4,161 pregnant women in Kaunas (Lithuania). We gathered individual information on social and demographic characteristics, residence history, health behaviour, pregnancy history, and pregnancy outcomes. Infants were considered SGA if they were in the lowest 10th centile of BW for each gestational week stratified by infant gender and maternal ethnic group. Gender-specific and ethnic group-specific deciles were determined from the 2004 data set of all births in Lithuania. We estimated maternal exposure during pregnancy to NO_2 by AIRVIRO dispersion model for 3,341 singleton births at the geocoded residential address. Associations between NO2 concentrations and SGA were analyzed by logistic regression models with and without adjustment for estimated potential confounding variables, such as maternal age, education, family status, ethnic group, body mass index, smoking, parity, previous preterm birth, and infant gender.
Results: The mean levels of NO_2 to which the women were exposed throughout their pregnancies ranged from 5.3 to 53.2 $\mu g/m^3$. We found positive, statistically non-significant associations between exposure to NO_2 during entire pregnancy and SGA. Adjusted odds ratio for SGA of exposed to second tertile NO_2 was 1.00; 95% CI 0.70-1.40 and exposed to third tertile NO_2 was 1.17; 95% CI 0.83-1.65 to compare to the first tertile exposure.
Conclusion: The present study suggests that there was a tendency towards an increased risk of SGA with increasing air pollution exposure, but statistical power was low.

JOINT EFFECTS OF ENVIRONMENTAL EXPOSURE TO GEOMAGNETIC ACTIVITY AND DRINKING WATER TRIHALOMETHANES ON CONGENITAL HEART ANOMALIES RISK IN A KAUNAS COHORT STUDY

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Background and Aims: There is growing evidence for an adverse effect of maternal exposure to environmental factors on pregnancy outcomes. Recent epidemiological studies suggested that trihalomethanes (THM) exposures during pregnancy might impair the fetal growth and that exposure to high geomagnetic activity may increase the risk of congenital anomalies. We investigated whether geomagnetic activity might modify the association between THM exposure and risk of congenital heart anomalies (CHA).
Methods: We conducted a case-control study on CHA (ICD-10 codes Q20 – Q28) in Kaunas (Lithuania), using individual information on social and demographic characteristics, residence history, health behaviour, and pregnancy history. We used tap water THM concentrations, geocoded maternal address at birth, and individual information on drinking water ingestion, showering and bathing, and uptake factors of THMs in blood, to estimate an internal dose of THM. As a measure of the geomagnetic activity level we used the average of daily Ap indexes during first trimester of pregnancy. We classified monthly geomagnetic activity exposure into two groups: above median and below median and examined the associations between THM dose, geomagnetic activity and the risk of CHA by multiple logistic regression. All data were adjusted for maternal age, education, stress, body mass index, multiple birth, preterm birth, and miscarriage in previous pregnancy.
Results: The estimated individual total uptake of THMs ranged between 0.0025 and 2.40 μg/d (median 0.1733μg/d). Geomagnetic activity median was 7.33. The adjusted odds ratio for THM dose above median vs. below median and geomagnetic activity below median was 1.39, 95% CI 0.69-2.81 for CHA, while exposure to geomagnetic activity above median and THM dose above median was associated with OR 2.25, 95% CI 1.19-4.25.
Conclusions: These data suggest that THM internal dose may affect CHA and that increased geomagnetic activity strengthen the THM exposure effects on CHA.

EFFECTS OF TRANSPORTATION NOISE ON MYOCARDIAL INFARCTION

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Background and Aims: Both, traffic-related air pollution and noise exposure were found to increase the risk for myocardial infarction (MI). The effect of traffic noise exposure on MI was evaluated in a cohort study that also considered indicators for air pollution exposure.
Methods: In the Swiss National Cohort 4.6 million persons were followed from 2000 to 2005. Exposure to aircraft noise, background PM10 and distance to a major road was calculated (Huss, Epidemiology 2010). Results were compared with a population-based case-control study that was conducted in Stockholm County between 1992 and 1994 considering exposure to road traffic noise and NO2 in 3666 participants (Selander, Epidemiology 2009) as well as the Dutch Cohort Study on Diet and Cancer where road traffic noise, background black smoke and traffic intensity was measured for 121,000 subjects (Beelen, OEM 2009).
Results: In the Swiss study MI mortality was increased by 28% (95% CI: -5 to 73%) in the highest aircraft noise exposure category (>60dB). Close to major roads (<100 m) MI mortality was significantly increased by 10%. In the Swedish study the OR for MI was 1.12 (0.95–1.33) for long-term road traffic noise exposure (• 50 dB). The OR increased to 1.38 (1.11–1.71) in a subsample without hearing loss or exposure to noise from other sources. In the Dutch study ischemic heart disease mortality was increased by 15% (-14 to 53%) in the highest noise exposure category (>65dB). Interestingly no strong effect modification from air pollution was observed in the Swedish and the Swiss study whereas in the Dutch study the risk estimate dropped to unity when concurrently considering air pollution indicators in the model.
Conclusions: Epidemiological studies link traffic noise exposure to increased MI risk; although there is considerable uncertainty about the mutual effects of road traffic generated air pollution and noise exposure.

MATERNAL EXPOSURE TO AIR POLLUTION AND THE RISK OF THE CHILD DEVELOPING TYP1 DIABETES

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Background and aims: The aetiology of type 1 diabetes [T1D] is not fully understood but it is widely accepted that genetic and non-genetic factors act together to initiate and accelerate the development of T1D. However, this could not explain the raid increase for T1D. One suggested environmental risk factor contributing to the development of T1D is air pollutants.
The aim of this birth cohort study was to investigate if maternal exposure low-level of air pollution was associated with the risk of the child to develop T1D.
Methods: High quality registry information on 81 110 births with individually modelled exposure data at residence for nitrogen oxides NO_x and proximity to roads with differing traffic density were linked to data for each child born after 1999 who had developed T1D prior to august 2010 and date of diagnosis where obtained from the Diabetes Centre in Malmö. The data were analyzed using logistic regression on the dichotomous variable T1D or not and survival analyses based on time of diagnosis.
Results: No extended risks of developing T1D if the child had been exposed prenatally for elevated levels of air pollutions were shown.
Conclusions: We saw no effect on the risk of the child developing T1D if the mother had lived in areas of higher levels of air pollution during pregnancy. Although in this study area the air pollution levels generally are well below the threshold levels set by World Health Organisation.

OCCUPATIONAL EXPOSURE TO DISINFECTANTS AND ADULT-ONSET ASTHMA IN U.S. NURSES – PRELIMINARY RESULTS

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Background and Aims: Recent studies suggest a deleterious role of cleaning and disinfecting products on asthma in healthcare workers. Our aim was to examine the association between current occupational exposure to disinfectants and adult-onset asthma in nurses.
Methods: Out of 57,259 women from the Nurses' Health Study II who responded to the 2009 questionnaire and for whom data were already available (at 01/2011), we investigated the association between current job type and current exposure to disinfectants with adult-onset asthma, in 47,391 nurses without asthma at baseline (in 2007) and without missing values for exposures or job. The current use of disinfectants for instruments or surfaces (never(ref), <1day/week, 1-3days/week, 4-7days/week), and current job type: nursing in hospital units (education or administration(ref), ER or ICU, operating room, other inpatient nurse, outpatient, other hospital nursing), nursing outside hospital, non-nursing employment, retired or homemaker, were recorded in the 2009 questionnaire. Data analyses used multivariable logistic regressions, with adjustment for age, smoking status, and body mass index.
Results: New cases of adult-onset asthma was reported by 756 participants (two-year cumulative incidence, 1.6%), women had an average age of 55years, 63% were never smokers, and 43% had a BMI<25kg/m^2. Approximately 31% of nurses reported weekly exposure to disinfectants (12% reported exposure 4-7days/week), varying from 11% (3%, 4-7days/week) for nursing administrative to 70% (40%, 4-7days/week) for operating room nurses. We found significant positive association between occupational exposure to instrument or surface disinfectants and adult-onset asthma (OR [95%CI] for a use 4-7 days/week vs. never: 1.26 [1.01-1.57]). By contrast, no association was found between current job and adult-onset asthma.
Conclusions: Preliminary results from this large cohort study support the hypothesis that regular exposure to disinfecting tasks among nurses is an important risk factor for adult-onset asthma. Exposure to disinfectants may represent an important health issue among healthcare workers.

RELATIONSHIPS BETWEEN CHILD AND MOTHER PFC SERUM CONCENTRATIONS IN A POPULATION WITH PFOA EXPOSURE FROM DRINKING WATER

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Background and Aims: There are few and small population studies on the level of exposure of newborns and children to perflurocarbons (PFCs), in particular perfluorooctanoate (PFOA) and perfluorooctane sulfonate (PFOS). Unlike adult exposure which is from food and water, important routes of exposure to infants and children are transplacental and breast-feeding. Transfer of PFCs from mothers to newborns has been demonstrated by their detection in maternal, cord, infant blood and breast milk. The aim of the present study was to describe the relationship between PFCs in serum in child-mother pairs in a population with high PFOA exposure from drinking water.

Methods: In the C8 Science Panel Community Health Study population, children aged < 20 years at the survey were matched to their mothers using identifiers such as name, date of birth and address. For the successfully matched pairs the relationship was investigated between child and mother PFC serum concentrations and possible modifiers - age of child, whether or not they still lived in a contaminated area after birth, level of mother's exposure and mother's breast-feeding practice-.

Results: The mothers and children in this study population could be matched up with a high degree of confidence for 5,589 children under 20, i.e.63% of the total sample, rising to 73% for those up to 5 years of age. The PFOA (mean 31.20 ng/mL) and PFOS (mean 19.15 ng/mL) serum concentrations in children were highly correlated (especially PFOA) and higher than the mother's serum concentrations (mean PFOA and PFOS: 26.97 and 13.34 ng/mL; rho=0.81 and 0.27, respectively). The child/mother PFOA ratio was higher from in utero and lactation exposure compared to infant exposure.

Conclusion: The relationship between mother's and children's PFC levels can provide insight into the relative importance of pre- and post-natal exposure for infants via the mother and the child's environment.

DETERMINANTS OF VALIDITY OF SELF-REPORTED BMI IN AUSTRIAN ADULTS

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Background and aim: Self-reported data on body weight and height are conflicting in adults. Therefore the aim of this study was to evaluate the validity of self-reported weight and height and to examine associated socio-demographic determinants.
Methods: Data of 473 Austrian adults (> 18 years) were collected standardised in a public outpatient in a city in southern Austria. We compared self-reported and anthropometric data on weight and height by different socio-demographic characteristics.
Results: Based on self-reported data on BMI the prevalence of overweight (BMI: 25 – 29.9 kg/m²) was overestimated, while those for obesity (BMI: > 30 kg/m²) was underestimated ($p < 0,001$). Anthropometric measurements revealed an overweight prevalence of 37,2% and an obesity prevalence of 12,5%. A multiple linear regression analysis was performed and demonstrated that age was the only significant predictor that was associated with the difference between measured and reported BMI ($p < 0.001$). The difference in the two oldest age groups increased significantly (age group 46 – 55 years: B = -0.39 kg/m², $p = 0.026$; age group 56 years and older: B = -0.70 kg/m², $p < 0.001$). Bland-Altmann plots also showed that the agreement between reported and measured BMI was lower in older study participants (mean difference: -0.60 kg/m², 95 % CI -2.64 kg/m² - 1.44 kg/m²).
Conclusions: Data on self-reported weight and height are a valid method for BMI estimates of overweight and obesity in epidemiological studies for younger adults. But they are limited for adults aged 46 years and older. Analyses based on self-reported data should therefore be adjusted for the age-dependency of the validity.

URINARY MARKERS OF FETAL EXPOSURES TO PHTHALATES AND PHENOLS AND RISK OF MALE GENITAL ANOMALIES, IN EDEN AND PELAGIE MOTHER-CHILD COHORTS

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Background and Aims: Exposure during pregnancy to chemicals suspected to disrupt hormonal signalling may alter male reproductive organogenesis, which is controlled by sex hormones. Our aim was to assess the association between risk of hypospadias and undescended testis at birth and fetal exposure to phthalates and phenols.
Methods: We conducted a case-control study nested in two French mother-child cohorts (EDEN, PELAGIE) that enrolled pregnant women between 2002 and 2006. Cases were all boys members of the cohorts with hypospadias (n=21) or undescended testis (n=50) at birth. Three matched controls per case were selected among male singleton livebirths. Eleven phthalate metabolites and 9 phenols (EDEN cohort only) concentrations were measured in the pregnant mothers' urine collected between the 3rd and the 28th gestational week. Conditional logistic analyses adjusted for maternal age, parity, educational level, gestational duration and urinary creatinine were carried out.
Results: Prevalence ranged from 0.3% to 1.1% for hypospadias and from 0.7% to 5.1% for undescended testis according to residence area. Decreased risk of hypospadias, but not statistically significant, was observed with urinary concentrations of both low- and high-molecular-weight phthalate metabolites (p_trend, 0.13 and 0.10, respectively). No evidence of association (p_trend>0.10) with urinary concentrations of phthalates metabolites was observed for undescended testis risk. Risk of undescended testis increased with urinary concentrations of ethylparaben (OR_1st_tertile=reference; OR_2nd_tertile=1.5, 0.4-5.3; OR_3rd_tertile=2.9, 0.9-9.9; p_trend=0.08). Excluding preterm births led to similar conclusions.
Conclusions: Our study did not support an impact of fetal exposure to phthalates or bisphenol A on male genital tract development. It however pointed out a possible role of ethylparaben on testicular descent which needs to be replicated by further studies since it is not supported by animal data. Our study was limited by a modest sample size but provided prenatal exposure assessment (that covers the gestational window of male reproductive organogenesis).

PUBLIC HEALTH BURDEN OF TRIHALOMETHANES IN SELECTED EUROPEAN CITIES

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Background and Aims: The selection of water treatment methods may have considerable implications for the microbial and chemical quality and furthermore the safety of tap water consumed by over 500 million people in Europe alone. Disinfection by-products (DBPs), which are formed during disinfection treatment of drinking water, may cause serious adverse health effects when exposed to the them. Therefore there is a public health concern on the DBPs in drinking water.
Methods: Disability adjusted life years (DALYs) were calculated for six European cities: Barcelona (Spain), Modena (Italy), Heraklion (Greece), Bradford (United Kingdom), and Kaunas (Lithuania). To estimate the risks of trihalomethas (THMs) due to tap water consumption via drinking, the risk was calculated for five different exposure scenarios including water filtering and different chlorination doses. Bladder cancer and small for gestational age (SGA) were selected to represent the adverse health outcomes of THMs in drinking water. The exposures from drinking water were calculated with Monte Carlo based modelling software Analytica by using Impact Calculation Tool, which was applied the population structure and growth estimates for each city.
Results: Risk estimates show that highest DALYs of bladder cancer and SGA are in Barcelona and Bradford, where the exposure is also highest. Intermediate exposure with lower DALYs is found in Heraklion and Kaunas, and low exposure with low DALYs in Modena. Filtration of drinking water reduces the exposure and DALY estimates significantly. DALY estimates are strongly dependent on the water treatment type such as chlorine dose during disinfection in water treatment.
Conclusions:
Health risks associated with DBPs in drinking water can be significant public health burden when the exposure levels are high. Even EU's regulatory reference concentration 100 µg/L can result in alarmingly high morbidity and mortality rates, especially when using current THM levels exposure is underestimate of life-time exposures.

THE RELATIONSHIP BETWEEN PAH/AROMATIC DNA ADDUCTS IN CORD BLOOD AND CHILD BEHAVIOR

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Background. Airborne polycyclic aromatic hydrocarbons (PAH) are widespread urban pollutants from fossil fuel burning and other combustion sources that can bind to DNA to form PAH-DNA adducts. Prenatal PAH exposure measured by personal monitoring has been linked to cognitive deficits in childhood in a prospective study conducted by the Columbia Center for Children's Environmental Health (CCCEH).
Aims. We measured PAH-DNA and other bulky aromatic adducts in umbilical cord white blood cells using the ^{32}P-postlabeling assay to determine the association between this molecular dosimeter and behavioral/attention problems in childhood.
Methods. Children born to nonsmoking African-American and Dominican women residing in New York City (NYC) were followed from *in utero* to 7-8 years of age. At two time points prior to age 8 (mean ages 4.8 years and 7 years), child behavior was assessed using the Child Behavior Checklist (CBCL). To estimate and test the association between adducts and behavioral outcomes, both CBCL continuous raw scores and dichotomized T-scores were analyzed. Potential confounders were included as covariates in the models.
Results. Higher cord adducts were associated with higher symptom scores of Anxious/Depressed at 4.8 years and Attention Problems at 4.8 and 7 years, and with *Diagnostic and Statistical Manual of Mental Disorders (DSM*) oriented Anxiety Problems at 4.8 years.
Conclusions. These results are generally consistent with those using prenatally monitored levels of airborne PAH and suggest that PAH exposure, measured by DNA adducts, may adversely affect child behavior, potentially affecting school performance.
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METHODS TO ASSESS SELENIUM EXPOSURE: EVALUATION OF DIETARY INTAKE AND BIOMARKERS IN MELANOMA PATIENTS AND POPULATION CONTROLS

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Background and Aims: Selenium is a metalloid of strong nutritional and toxicological importance, whose relation with risk of chronic diseases, including cancer, is still uncertain and currently under active investigation. Different methods to estimate selenium exposure in the human have been suggested, but their strengths and limitations are still controversial. We assessed selenium status in a group of melanoma and cancer patients, by evaluating their average dietary intake of the metalloid and its concentrations in plasma and toenails.
Methods: We investigated selenium status of 54 patients with newly-diagnosed cutaneous melanoma and 56 controls, originally enrolled in a population-based case-control study of environmental and life-style risk factors of cutaneous melanoma in Modena, northern Italy. We sampled subjects' blood and toenails and we administered a food frequency questionnaire including 248 questions on frequency and quantity of consumption of 188 food items, developed within the EPIC (European Prospective Investigation on Cancer and Nutrition) project in northern Italy. Plasma and toenail selenium concentrations were determined by atomic absorption spectrometry.
Results: In the overall study population, plasma selenium levels correlated with toenail concentrations (Spearman rank correlation coefficient (ρ) = 0.22, p=0.02), but these biomarkers were not associated with dietary intake of the metalloid. In subgroup analysis according to disease status, plasma selenium levels were associated with dietary intake only among cases (ρ=0.25, p=0.07), while plasma and toenail concentrations correlated both in cases and in controls.
Conclusions: Study results may be explained by intake of different selenium species in cases compared with controls, or more likely by differences in absorption and metabolism of selenium compounds between the two study groups. These findings suggest that the validity of methods assessing selenium exposure may vary according to disease status.

EXPOSURE MEASUREMENT ERROR DUE TO RESIDENTIAL MOBILITY DURING PREGNANCY

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Background and Aims: Pregnant women are a highly mobile group, yet recent studies suggest exposure error due to migration in pregnancy is minimal. However, the spatial and temporal variability of the exposure of interest, and the scale at which it is measured, are likely to influence the extent of error introduced. We aimed to investigate the impact of maternal residential moves on measurement error for exposures differing in their spatial and temporal variability.
Methods: Deliveries recorded by the Northern Congenital Abnormality Survey (NorCAS) during 2000-2008 were linked to the UK's National Strategic Tracing Service (NSTS) to provide address at conception. Data on continuous and discontinuous urban fabric were obtained at 100m resolution, and the proportion of each land class within a 500m buffer assigned to each postcode (conception and delivery). Total road length within each buffer was also calculated. We contrasted exposure to these variables based on conception versus delivery address.
Results: NorCAS registered 7428 deliveries during 2000-2008. Of these, 7227 (97.3%) were linked to the NSTS data, and postcode at conception and delivery geocoded for 6970 (93.8%). 1609/6970 women (23%) moved during pregnancy with a median moving distance of 1.7km. Amongst movers, 84% and 38% were 'exposed' to the same proportion (+/- 0-10%) of continuous and discontinuous urban fabric respectively, and 36% were exposed to the same length of road (+/- 0-250m) at conception and delivery.
Conclusions: Exposure does not differ between conception and delivery when assessed overall; increases in exposure in some are offset by decreases in others. Nonetheless, for exposures that show substantial spatial variation, a high proportion of pregnancies would have included measurement error if exposure was assigned at delivery rather than conception. For exposures with both spatial and temporal variability, such as air pollution, the probability of exposure error is likely to be higher.

INCREASED RISK OF CHILDHOOD LEUKEMIA IN COMMUNITIES IMPACTED BY HYDRAULIC FRACTURING IN THE MARCELLUS SHALE

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Background and Aims: Hydraulic fracturing (HF) is a process by which water, chemical additives, and proppants are injected into geologic formations to facilitate oil and natural gas production from unconventional reservoirs such as shales and coalbeds. The US EPA recently issued a draft plan to examine the potential impacts of HF on drinking water resources, which includes the identification of areas with a high density of existing wells, evidence of impaired water quality, and human populations located in proximity to contaminated water. While the chemical composition of fracturing fluid is proprietary, and is currently unknown to the scientific community, typical fracturing solutions contain known leukemogens such as benzene. Our aim was to perform an exploratory analysis of potential health impacts in areas affected by HF, with a particular focus on risk of childhood leukemia.
Methods: We performed a standardized incidence ratio (SIR) analysis examining the incidence of childhood leukemia in four Pennsylvania counties overlying the Marcellus Shale and meeting the EPA criteria for HF-impacted areas. Expected rates were calculated based on age- and sex-adjusted data from the Surveillance, Epidemiology, and End Results (SEER) Program.
Results: From 1998-2007, a total of 40 leukemia cases were diagnosed in children aged 19 years or younger, which was more than four times higher than expected compared to national rates (SIR=4.08, 95% CI: 2.91-5.55). Individual county SIRs ranged from 2.64-4.91, with all CIs exclusive of 1.0. Subtype analyses revealed the majority of leukemias to be of lymphocytic origin.
Conclusions: Our analysis demonstrates highly increased risks of childhood leukemia in counties with a high density of HF wells and evidence of water contamination due to HF. These data suggest that EPA's recent concerns regarding HF are well-founded, and that children may be particularly susceptible to the adverse effects of HF on water quality.

CHILD NEURODEVELOPMENT IN A BOLIVIAN MINING CITY

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Background and Aims: This study evaluates the neurodevelopment of children living near highly contaminated mining industries during their first year of life.

Methods: Participants from the city of Oruro (Bolivia) were prospectively recruited during pregnancy and followed-up between May 2007 and November 2009. Questionnaires were used to obtain information regarding the pregnant women's socioeconomic status, as well as anamnesis. Neurodevelopment was tested on 246 children using the Bayley Scales of Infant Development (BSID) at 10.5 to 12.5 months of age. Trace elements (Pb, As, Cd, Sb, Cs, Zn, Fe, Cu, Se, Rb, Sr) exposure during prenatal life was evaluated by testing maternal blood concentrations before delivery.

Results: The blood lead concentration of pregnant women was low, considering the contaminated environmental context. The geometric mean was 1.85µg/dL (95% IC: 1.71; 2.00), a level almost comparable with those observed in non contaminated areas. The only element found to be relatively elevated was antimony, with 1.03µg/dL (95% IC: 0.94; 1.13). The Bayley Scales of Infant Development (BSID) did not reveal mental or psychomotor abnormalities associated to blood levels of trace metals during pregnancy. Almost all levels were lower than the control limits.

Conclusion: Our results suggest that women from this mining area were poorly exposed.

MODELING OF CRITICAL EPISODES OF AIR POLLUTION FOR PM10 IN SANTIAGO DE CHILE. COMPARISON OF THE PREDICTIVE EFFICIENCY OF PARAMETRIC AND NON-PARAMETRIC STATISTICAL MODELS

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Backgrounds and aims: To evaluate the predictive efficiency of two statistical models (one parametric and a non-parametric one) to predict critical episodes of air pollution levels by PM10 the after day above national standard. A suitable prediction of such episodes allows the authority to apply restrictive measures that diminish the gravity of the episode with the objective to protect to the health of the community.
Methods: We used PM10 concentrations registered by Net of Air Quality Monitoring during 2001 to 2004, and meteorological information collected during this period considering 14 variables and 152 observations. We fitted a parametric Gamma using STATA v10 software and a non-parametric MARS models using a demo version of Salford-Systems for the construction of predictive models.
Results: In general, both models presented a high correlation between observed and predicted values. However, Gamma model predict in a better way values < 240 ($\mu g/m^3$) of PM10 better than MARS. The last one was more efficient to predict values above 240 ($\mu g/m^3$) of PM10 during the period studied.
Conclusion: MARS model are more efficient to predict extreme values and therefore it would be considered by the sanitary authority to take a more precise decision in a preventive way to avoid critical episodic conditions of air pollution by PM10 in short time and consequently the probable effects on health status. This would be explained because MARS corrects the changes of the series throughout the time fitting the best to the curve associated with the concentration of PM10.

MEASUREMENTS OF INDOOR MAGNETIC FIELDS IN APARTMENT BUILDINGS WITH IN-BUILT TRANSFORMER ROOMS

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Background and Aims Transformers in apartment buildings might represent an important source of magnetic field exposure for inhabitants. Previous research has indicated that classification of apartments into those directly on top or further away from the transformer room might provide a simple approach for classification into "high" and "low" exposure categories for use in epidemiological studies, as proposed for the international epidemiologic investigation of childhood leukaemia (TransExpo). However, transformer room and building layouts may differ across regions /countries and these results do not necessarily apply everywhere. We aimed at assessing magnetic flux density in buildings with in-built transformers in The Netherlands.
Methods: We performed measurements in 35 apartments in 14 buildings. We took spot measurements of the magnetic flux density in the apartments; 0.5m above the floor, 1.4m from corners and in the middle of each room.
Results: Spot measurements of magnetic flux density yielded a median of 0.17μT (IQR 0.06-0.45) in the apartments (n=7) located directly on top of transformer rooms, 0.09μT (IQR 0.05-0.15) in apartments on the second floor (n=5) and 0.06μT (IQR 0.04-0.10) in apartments located further away (n=23). Apartments placed adjacent to a transformer room had a median of 0.09μT (IQR 0.06-0.38). Maximum magnetic flux densities were encountered in an apartment on top and in an apartment adjacent to a transformer room with 5.7 and 18.8 μT, respectively.
Conclusions: Placement of an apartment relative to the transformer room provided a maximum two-fold contrast in median exposure. Higher, very localized exposures were observed in apartments on top or adjacent to transformer rooms.
Whether or not magnetic field exposure from a transformer room adds considerable to an individual's exposure would therefore depend highly on where most time is spent in the apartment.

MERCURY, THYROTROPIN, AND THYROID AUTOANTIBODIES IN U.S. WOMEN, USNHANES 2007-2008

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Background and Aims: Mercury accumulates in the thyroid gland, and mercury exposure has been associated with cellular autoimmunity. Elevated thyrotropin coincident with positive thyroid autoantibodies has strong predictive value for hypothyroidism, a disorder more prevalent among women and most commonly caused by autoimmune thyroiditis. The association between thyrotropin, thyroid autoantibodies, and mercury has not been evaluated in epidemiologic studies.
Methods: Data on mercury, thyrotropin, thyroglobulin autoantibodies (TgAb), thyroid peroxidase autoantibodies (TPOAb), and urine iodine (UI) were obtained from the 2007-2008 US National Health and Nutrition Examination Survey files for adult women (n=31,874). We used multiple logistic regression to evaluate the association between mercury and elevated thyrotropin coincident with thyroid antibody positivity in younger (20-59 years) and older (60+ years) women, adjusted for demographic factors, nutrient intake, UI, and stratified by World Health Organization thresholds for iodine deficiency and excess.
Results: Among younger women, relative to women in the lowest Hg quintile (<0.46 µg/L), women with Hg >2.06 µg/L (upper quintile) showed 2.37 (95% CI=1.28, 4.40) greater odds for elevated thyrotropin (>4.0 • IU/mL) coincident with thyroid antibody positivity. Among women with iodine deficiency, those with Hg >2.06 µg/L showed 4.97 (95% CI=1.23, 20.06) greater odds for thyroid antibody positivity coincident with thyrotropin >4.0 • IU/mL. Unlike thyrotropin or TPOAb, TgAB positivity alone was consistently associated with mercury, with an odds ratio above 2.00 for the upper quintile of mercury in overall sample and all sub-groupings of women.
Conclusions: We report a novel association between mercury and elevated thyrotropin coincident with positive thyroid autoantibodies, a strong predictor for hypothyroidism (positive predictive value=86%). Strongest associations were observed among women aged 20-59 and among women with iodine deficiency, and appeared to be driven by TgAB positivity. Further research into mercury, hypothyroidism and autoimmunity is warranted.

MOVING OUT OF CARS AND ONTO BIKES: IMPACT ON HEALTH, AIR POLLUTION AND GREENHOUSE GAS EMISSIONS IN THE NEW ZEALAND URBAN SETTING

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Background and Aims: To estimate the effects on health, air pollution and greenhouse gas emissions if short trips (• 7 km) by adults in the New Zealand (NZ) urban setting were undertaken by bicycle rather than motor car.

Methods: Existing data sources and a number of modelling tools were used to estimate the effects of shifting varying proportions (1-30%) of vehicle kilometres travelled light motor vehicle to bicycles. Modelling tools included the WHO Health Economic Assessment Tool for Cycling to estimate mortality benefits from increased physical activity and Jacobsen's 'Safety in numbers' factor for effects on injury.

Results : A 5% shift of vehicle kilometres to bicycles would return cycling to the levels seen in NZ in the 1980s, reduce vehicle travel by approximately 223 million kilometres each year, save about 22 million litres of fuel and reduce transport-related greenhouse gas emissions by 0.4%. The health effects would include about 116 deaths avoided annually as a result of increased physical activity, six fewer deaths due to local air pollution from vehicle emissions, and potentially an additional five cyclist fatalities from road crashes. In economic terms, including only fatalities and using the NZ Ministry of Transport Value of a Statistical Life, the health effects of a 5% shift represent net savings of about NZ$200 million per year. In addition, a 5% shift would expend about 19 billion kilojoules of energy over baseline resting metabolic rate.

Conclusions: The health benefits of moving from cars to bikes heavily outweigh the costs of injury. For fatalities, the benefit:cost ratio is 3:1 for 1% substitution and over 40:1 when 30% of vehicle trips are substituted.

USING HEALTH IMPACT ASSESSMENT TO TRANSLATE EPIDEMIOLOGICAL EVIDENCE INTO POLICY RECOMMENDATIONS: HEALTH IMPACTS OF A CAP-AND-TRADE PROGRAM IN CALIFORNIA

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Background and Aims: A cap-and-trade program was initiated in California to reduce greenhouse gas emissions to 1990 levels by the year 2020. Legislation also maximize that public health co-benefits be maximized to ensure that vulnerable communities are not disproportionately impacted. The California Department of Public Health performed a health impact assessment and suggested mitigations to minimize health risks while improving health benefits
Methods: The HIA stakeholder process included the 5 stages of screening, scoping, assessment, recommendations, and reporting. Stakeholder-identified health determinants included changes in employment, changes in energy costs, environmental health impacts from emission offset projects, and benefits from the distribution of program revenue. Air-related health impacts were assessed separately as part of the regulatory process. Economic modelling results were used as the basis for qualitatively assessing potential health impacts from a cap-and-trade program in California.
Results: Overall, the potential health effects from a cap-and-trade program in California are expected to be negligible to minor. Health co-benefits can be improved by limiting the use of emission offsets, maximizing the auction of emission allowances, and directing community investments to vulnerable communities. Environmental health monitoring needs to be enhanced to ensure that no population bears a disproportionate health impact from a cap-and-trade program. Due to data limitations, it is difficult to quantify community-level health impacts from a cap-and-trade program, though local impacts are expected to vary.
Conclusions: The health impacts of a cap-and-trade program are largely neutral, though low-income populations may have the least ability to adapt to changes in air emissions, labor shifts, and rising energy costs to the extent that they occur. Mitigation efforts should focus on risk reduction and health promotion, especially among vulnerable populations. HIA proved a useful tool in translating epidemiological evidence into policy recommendations in a highly political regulatory process.

COLD SPELLS AND HOSPITALIZATIONS DUE TO HYPOTHERMIA: UNRECOGNIZED THREATS FOR ELDERLY WITH DIABETES

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Background and Aims: Climate variability has the potential to substantially increase the number and intensity of extreme weather events worldwide. Extreme cold spells are causing hypothermia, a relatively common but preventable condition, resulting in significant morbidity. This presents an important socio-economic problem for vulnerable populations. We describe functional relations with meteorological conditions and spatial-temporal patterns of hospitalizations due to hypothermia in the older adults residing in the USA.
Methods: 10,522 hospitalization records due to hypothermia (95%) and frostbites (ICD-9M:991,E9583,E9883,E901) in patients aged 65+y.o. were abstracted from MEDPAR files maintained by the Center of Medical Services for 2005-2006. Each record includes patient's age, sex, race, residence, 10 diagnostic codes, and total hospitalization charges. Daily meteorological parameters were abstracted from 1,979 stations nationwide and windchill indexes were estimated. Age- and zipcode-specific rates of hospitalizations were calculated for 3 age groups (65-74, 75-84, and ≥85y.o.), 5 racial groups, and 7 climatic areas based on the modified Köppen classification system. Relative risks (RR) associated with low temperature and windchill indexes were estimated using non-linear regression models, considering effect modification by age, race, and climatic conditions.
Results: The rate of hypothermia was increasing with age from 4.09 [95%CI: 3.08,5.44] to 8.48 [95%CI: 7.03,10.23] and 24.78 [95%CI: 22.12,27.75] in older adults. Patients with diabetes, Black and Native American males, residents of polar tundra and areas with wet winters have the highest rates. Irrespective of age, RR of hypothermia associated with 5℃ was 1.22 [95%CI:1.26;1.15]. Median cost of a hospitalization event was $13,260 [IQR:$7,240,$25,276].
Conclusions: Patient's age, race, place of residence, and co-morbidity (most notable the diabetes) have substantial impacts on frequency, duration, and costs associated with treating hypothermia. Preventive efforts targeted at vulnerable populations and regions are needed to reduce hypothermia hospitalizations. Allocation of resources to a growing segment of elderly with diabetes is warranted.

SURVEILLANCE OF AGRICULTURAL PESTICIDE USE AND POTENTIAL ENVIRONMENTAL EXPOSURE

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Background and Aims: Limited information exists on pesticide exposure in Canada, and some of the most prevalently used pesticides are classified as "possible" carcinogens by the International Agency for Research on Cancer (IARC). The objective is to characterize environmental exposure to "possibly" carcinogenic IARC pesticides used for agriculture in Canada.
Methods: Region-specific annual agriculture use (AAU) estimates for selected pesticides are derived by multiplying crop production areas (hectares) obtained from the Interpolated Census of Agriculture (2006) by crop-specific intensity use weights (grams/hectare per year) developed using national and provincial pesticide use information. Total AAU (tonnes) is derived for each pesticide as the sum of active ingredient used on all crop types within a sub-provincial region. Regional estimates are mapped using a Geographic Information System (GIS). Population estimates corresponding to sub-provincial AAU estimates are determined using Census of Population (2006) data. These estimates represent the number of persons at risk of environmental exposure to "possibly" carcinogenic pesticides, by exposure potential (i.e. AAU estimate).
Results: AAU estimates were derived for chlorothalonil in Western provinces: British Columbia (BC), Alberta (AB), Saskatchewan (SK). Regions that use chlorothalonil were classified into four 'usage groups' based on AAU (tonnes) quartile distribution: Low (>0-21), Low-Medium (>21-82), Medium-High (>82-273), High (>273-1597). The percent of the total provincial population living in 'High' chlorothalonil use regions are approximately: 16% (n=595,353) for BC; 24% (n=790,014) for AB; and 62% (n=594,712) for SK. When mapped, the regions in which these populations reside are identified. Regions with no chlorothalonil use were classified as 'no use' (0 tonnes); corresponding populations were considered to not be at risk (62% of BC population; 54% of AB population; 5.6% of SK population).
Conclusions: Surveillance of IARC "possible" carcinogenic pesticides provides knowledge on environmental exposure potential, in terms of geographic variation and extent (population counts) across Canada.

SURVEILLANCE OF POTENTIAL ENVIRONMENTAL EXPOSURE TO GOLF TURF PESTICIDES

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Background and Aims: In Canada, golf courses are often permitted continued use of pesticides banned for cosmetic purposes, including those classified as "possible" carcinogens by the International Agency for Research on Cancer (IARC). As part of a National Carcinogen Surveillance Project (CAREX Canada), we geographically estimate environmental exposure potential for "possibly" carcinogenic pesticides applied to golf turf in Canadian watersheds.
Methods: Pesticide type, application frequency, and course size were obtained from Canadian Golf Superintendents' Association surveys (2004, 2008). Estimated annual use (kilograms active ingredient) were calculated using product label application rates from the Pest Management Regulatory Agency. A Canadian golf course database was compiled in a geographic information system (GIS) from national landuse, business directories and online sources. GoogleEarth was used to verify locations and rank courses by relative surrounding housing density (n): Low 0-2; Low-Medium 2-10; Medium-High 10-20; High >20. A method to develop an average course perimeter polygon for estimating adjacent populations is being developed.
Results: Data sources of course locations were frequently inadequate. Locations were corrected to more accurately assess adjacent housing density. We identified three IARC "possible" carcinogens being used: 2,4-D, MCPP and chlorothalonil. Average annual use was calculated for a typical course and multiplied by number of courses in each watershed. For example, an average course applies 158 kg chlorothalonil annually. We identify hotspot watersheds, such as that in Western Canada using up to 19,586 kg (lower Fraser Valley). Percentage of courses with highest surrounding housing density varies by province: 11.8% British Columbia, 8.6% Alberta, and 1.4% Saskatchewan. Exposure surveillance information is disseminated in map format for comparison within and across provinces.
Conclusions: We geographically assess golf course pesticide use across Canada at the watershed level to identify areas with greatest potential for environmental exposures. Ongoing research will provide more detailed population estimates that account for residential proximity to golf courses.

ESCAPE LUR DEVELOPMENT AT TWO DIFFERENT SCALES: CATALUNYA AND BARCELONA AREAS

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Background/Aims: The objective of the study was to develop land use regression (LUR) models at two different scale levels (Catalunya and Barcelona) within the framework of ESCAPE project for assessment of long-term population exposure to air pollution.
Methods: Following the ESCAPE protocol we selected 80 locations spread over Barcelona (40), Sabadell (16) and Girona area (24) and collected NOx/NO_2 levels using passive samplers (Ogawa). We took 14-days measurements in 3 different seasons during 2009 in order to calculate the annual average. We also sampled NO_2 continuously during the year on a fixed station in each area for time adjustment.
We gathered geographical information and created predictor variables at each site using ArcGis 9.2. Using multiple linear regressions, we constructed models for the Catalunya and Barcelona areas separately.
Results: The Barcelona model (40 sites) explained 72% of the intraurban NO2 variability using four variables: high density residential area within 300 m, inverse distance to the nearest major road, inverse distance to the nearest street plus traffic intensity on that street and total length of road within 1000m. The Catalunya model explained 70% of the NO2 variability using three variables: roadlenght1000, traffic intensity within 25m and natural area within 5000m. Results for NOx were similar.
Conclusion: As part of the Europe wide ESCAPE project we have LUR models for Barcelona and Catalunya that can be linked to epidemiological studies in the study areas. Further work will include the comparison of these models with other LUR and dispersion models in the areas.

IMPACT OF AIR POLLUTION AND TRANSPORTATION NOISE ON BLOOD PRESSURE IN THE SWISS STUDY ON AIR POLLUTION AND LUNG AND HEART DISEASES (SAPALDIA)

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Background and Aims: Air pollution has been associated with cardiovascular endpoints previously, however, the impact on blood pressure remains controversial. Positive associations have been found in studies on short-term ambient and personal measures, while studies using long term ambient air pollution largely fail to show an association. We aimed at investigating the association between long-term ambient air pollution and blood pressure and potential confounding or interaction by transportation noise.
Methods: Blood pressure was measured in 6450 SAPALDIA participants, age 29-73. Annual average ambient air pollution exposure (µg/m3) of the year prior to exam was predicted by dispersion (PM10, source specific PM10, PM2.5) and a hybrid land-use regression model (NO2). Multivariable linear regression was run, adjusting for potential confounders and predictors of hypertension. Interaction between transportation noise and air pollution is to be tested.
Results: We found borderline significant negative associations for each of the PM estimates, with exception of railway specific PM10. For SBP the largest negative estimate was found for traffic specific PM10 (β= -0.40, 95%CI -0.85;0.05), then PM2.5 (SBP β= -0.19, 95%CI. -0.39;0.01) and the least by PM10 (SBP β= -0.11, 95%CI -0.25;0.02). Effects estimated for DBP are at -0.02 with varying CI for all exposures variables. Railway specific PM10 was positively associated with blood pressure and highly collinear with railway noise. Railway noise was a significant covariate positively associated with SBP and DBP.
Conclusion: The first preliminary analyses yielded consistent negative associations with blood pressure for all traffic related air pollution indicators. The air pollution effect was not confounded by noise. Further analyses, testing additional potential confounders and a vulnerable population approach are underway trying to explain the observed inverse associations. Different exposure time windows will be tested next to capture the actual long-term effect and potential interaction between PM and transportation noise will be investigated.

ELABORATION AND APPLICATION OF A NEW HIERARCHICAL CLASSIFICATION ALGORITHM IN EPIDEMIOLOGICAL RESEARCH

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Background and Aims: Most noninfectious diseases are caused by a potential influence of a range of risk factors (RF) (100 factors and more) on health. However, only a few those (3 to 5) have a significant influence. The identification of a main RF set is solved by means of multivariate statistical analysis. These methods work well in case of statistically independent RF and when their joint effect is amenable to a clear interpretation. The condition of RF independence is often violated in observation studies where it is impossible to vary experimental conditions.
Methods: In this report, new algorithm to look for main RF set is presented. The algorithm is based on a hierarchical classification method and allows:

- finding small RF sets that produce maximal influence on population health;
- creating decision rules for describing a "generalized image" of the sick and the healthy that would be clear to physicians;
- finding ways to compensate the negative influence of significant RF.

To carry out calculations, an epidemiological database gathered during 2002-2010 for Ekaterinburg preschool children (1300 children) is used. Basic diseases are determined at medical inspection for every child. Levels of atmospheric pollution are measured; data on 50 family-based RFs of health impairment are obtained using parent's questionnaire.
Results: We have identified sets of 3-4 RFs having a maximal negative influence on the prevalence of respiratory, cardiovascular, and musculoskeletal diseases and behavior disorders in children. These factors are: atmospheric pollution, gas-stove in apartment, parent smoking, low-quality drinking water, child's insufficient physical activity, mother's low educational attainment.
Conclusions: The suggested variant of stepwise hierarchical algorithm allows obtaining effective and evident decision rules for classifying children into low and high pathology prevalence categories using 3-4 RF. The algorithm allows one to find factors reducing the adverse impact of environmental contamination on population health.

THE EFFECT OF RELEVANT GENOTYPES ON HEMOGLOBIN ADDUCTS OF ACRYLAMIDE AND GLYCIDAMIDE IN WORKERS EXPOSDE TO ACRYLAMIDE

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Background and Aims: Acrylamide (AA) is an industrial chemical widely used in industries and also an environmental chemical found in tobacco smoke and food. It is classified as a probable human carcinogen (Group 2A) by the IARC. AA undergoes metabolism to glycidamide (GA). Both AA and GA react with hemoglobin (Hb) to form adducts (AA-Hb and GA-Hb), and these adducts are considered as biomarkers for long-term AA exposures. This study elucidates associations between AA- and GA-Hb adducts as well as their ratio with genetic polymorphisms *CYP2E1*, *mEH* (in exon 3 and exon 4), *GSTT1*, and *GSTM1*, involved in the activation and detoxification of AA-associated adducts.

Methods: Fifty-one AA-exposed workers and 34 controls were recruited and provided a post-shift blood sample for this study. Personal air sampling was performed for the exposed workers. AA- and GA-Hb were determined simultaneously using isotope-dilution liquid chromatography-electronspray ionization/tandem mass spectrometry (LC-ESI-MS/MS). *CYP2E1*, *mEH* (in exon 3 and exon 4), *GSTT1*, and *GSTM1* were analyzed using polymerase chain reaction.

Results: Our results reveal that AA personal exposures ranged from 4.37×10^{-3} to 113.61 μg/m^3 with a mean at 15.36 μg/m^3. The AA- and GA-Hb levels in the exposed group significantly exceed those in controls. The ratio of GA-Hb/AA-Hb, potentially reflecting the proportion of AA metabolized to GA, was calculated with a mean of 0.27 and in the range of 0.13-0.45. Multivariate regression analysis demonstrate that *GSTM1* genotypes significantly modify the formation of GA-Hb and the GA-Hb/AA-Hb ratio, polymorphism of exon 4 of *mEH* were all significantly associated with AA-Hb, GA-Hb levels and the GA-Hb/AA-Hb ratio after adjustment for AA exposures.

Conclusions: These results suggest that *GSTM1* and/or *mEH* associated with the formation of blood AA-Hb and GA-Hb. Further studies may be needed to cast light on the roles of both enzymes in AA metabolism.

PRENATAL EXPOSURE TO PCBS AND RISK OF WHEEZING IN CHILDREN: A RELATIONSHIP MODIFIED BY DIET DURING PREGNANCY?

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Background and aims: Prenatal exposure to organochlorine compounds (OCs) has been related to immune function and adverse effects on respiratory health. For polychlorinated biphenyls (PCB), associations with respiratory outcomes have been heterogeneous. Given the hypothesis that effects of PCBs may be influenced by dietary factors, we aimed to assess whether maternal diet in pregnancy may modify associations between PCBs and infant wheezing.

Methods:657 mother-child pairs participated in the INMA (Environment and Childhood) population-based birth cohort study in Sabadell (Spain). Wheezing was defined based on maternal reports at age 6 and 14 months. First trimester diet, assessed by a validated questionnaire, was used to derive diet patterns using factor analysis. A “healthy” pattern was identified which discriminated mothers with higher fruit/vegetable and fresh fish intakes, and lower intakes of pastries; scores were dichotomized at the median. PCB exposure (∑PCBs) in first trimester maternal serum was calculated as the sum of lipid-adjusted congeners 118, 138, 153 and 180 and log-transformed. Poisson regression was used to estimate relative risks (RRs) for associations between wheezing and PCBs, adjusting for confounders including other OCs.

Results: Wheezing was present in 34% of the children. Overall, no association between ∑PCBs and wheezing was observed. Interaction between ∑PCBs and a healthy diet pattern was significant ($p<0.05$). In women with less healthy diets, ∑PCBs were positively associated with wheezing (RR=1.89, 1.13-3.15). However, in women with high healthy diet scores, ∑PCBs were not significantly associated with wheezing (RR=0.83, 0.52-1.32). No such interaction with individual food groups, including fruits, vegetables and fish, was observed.

Conclusions:

Results suggest prenatal PCB exposure may increase risk of infant wheezing among women with less healthy diets. The absence of interaction by food groups suggest that global dietary patterns, rather than specific food groups, plays a role. Replication should be performed to confirm these findings.

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OUTDOOR AIR POLLUTION AND ITS EFFECTS ON ALLERGIC DISEASES IN AN INDUSTRIAL CITY OF KOREA

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Background and aims: The prevalence of allergic diseases (AD) has significantly increased in recent decades. Outdoor air pollution can be considered as an important environmental risk to the increased prevalence of AD. This study aims to identify the major risk factors for childhood AD by a unique and standard ISAAC questionnaire and investigate relationship between outdoor air pollution and the AD prevalence in an industrial city of Ulsan in Korea.
Methods: Data on the physician-diagnosed prevalence in the past 12 months and potential risk factors of AD (asthma, allergic rhinitis and atopic dermatitis) were collected in 2009 and 2010 from the survey of 4,067 schoolchildren (grades 1-6) living near and far from industrial area. Exposure to outdoor air pollution was estimated by using annual mean concentrations of pollutants (PM_{10}, O_3, NO_2, SO_2 and CO) obtained from monitoring sites near the participant's residence. All data were analyzed with SPSS 18.0 and odds ratio was calculated by logistic regression analysis to estimate the independent effect of each study factor on AD.
Results: Current prevalence of AD was most strongly associated with parental AD history and place of residence. After adjusting for the parental AD history and other significant factors, we observed that the AD prevalence ratio for polluted urban area near the industrial complex as compared with the suburban was 1.39 (95% CI: 1.16–1.67). Statistically significant and robust association between air pollution levels and the prevalence of AD were also found both before and after adjustment by confounders. The adjusted odd ratio for the pollution effects were 1.24 (95% CI: 1.04-1.47) and 1.90 (95% CI: 1.23-2.93) with increase in PM_{10} level of 10 $\mu g/m^3$ and O_3 level of 10 ppb, respectively.
Conclusions: Although there should be other risk factors for AD, these results suggest that living in polluted area and exposure to high levels of air pollutants can contribute to the increased risk of childhood AD.

THE EFFECT OF COARSE PARTICLES, MAINLY ROAD DUST, ON DAILY MORTALITY IN STOCKHOLM

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Background and Aims: Numerous epidemiological studies have been published on health effects associated with PM_{10} and $PM_{2.5}$. Research on the health effects of coarse particles with aerodynamic diameter between 2.5 and 10 µm ($PM_{2.5-10}$) is limited. Our aim was to study the short-term effects of coarse fraction to daily mortality and morbidity in Greater Stockholm area. The concentrations of coarse particles in this region are relatively high in comparison with other cities in Europe. The particles consist largely of crustal materials and the main source during winter and springtime is the wear of road surfaces caused by studded tires.
Methods: Data on daily mortality in Greater Stockholm area (population approx.1.3 mil.) for 2000 - 2008 were collected from the Cause of Death Register at the National Board of Health and Welfare. On average there are 28.4 deaths per day (min=12, max=52). PM_{10} and $PM_{2.5}$ were measured simultaneously at an urban monitoring site in central Stockholm. $PM_{2.5-10}$ was calculated as the difference between PM_{10} and $PM_{2.5}$ and the average concentration was 7.3 µg/m^3 (min=0, max= 61.9 µg/m^3). We used additive Poisson regression models, controlling for trend and seasonality, meteorological variables and influenza episodes. Lag 01 single and multi-pollutant models (with $PM_{2.5}$, O_3 and CO) were considered.
Results: For winter and spring (Nov-May) we found a 0.91% (95% CI: 0.11% to 1.72%) increase in daily mortality per IQR (5.25 µg/m^3) increase in $PM_{2.5-10}$ (lag01) from the single pollutant model. When adjusted for other pollutants, particularly for $PM_{2.5}$, the effect estimate slightly decreased, but was higher than the estimate for $PM_{2.5}$.
Conclusions: Our analysis shows an increased mortality associated with coarse particles, in Stockholm originating mainly from road dust caused by the use of studded tires. Our estimates indicate around 30 premature deaths per year due to coarse particle exposure in Stockholm.

DETERMINANTS OF DENTINE LEAD LEVELS IN CHILDREN LIVING IN NEWCASTLE UPON TYNE

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Background and Aims: Lead is a toxic environmental contaminant, associated with irreversible health effects in children who are susceptible due to their developing physiology and behaviour. Research on the association between lead and cognitive impairment in children suggests that there is no safe level of lead exposure. In the UK, studies have found differences in children's tooth lead levels by social class, but little evidence of determinants of exposure. This study aimed to use dentine lead levels (DLLs) to explore determinants of lead exposure in children living in Newcastle upon Tyne, a historically heavily industrialised city in the UK.
Methods: The Tooth Fairy study cohort consists of 69 children aged 5-8 years who donated teeth and whose parents answered a questionnaire. DLLs were measured in primary dentine using Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS). To identify determinants of early life exposure, associations between lifestyle characteristics and DLLs were assessed.
Results: DLLs ranged from 0.06-0.77ug/g, (Mean±SD=0.25±0.16). In univariate analysis, significant determinants of DLL were methods of cleaning floors in the house; growing fruits/vegetables in the garden; and tap water consumption. Multivariate analysis showed that children living in houses cleaned less than weekly had higher DLLs than those residing in houses where floors were cleaned at least once weekly (mean 0.34 vs 0.18, p=0.047); children who drink up to 1/2 pint tap water daily had higher DLLs than those who reported drinking more than 1/2 pint daily ((mean 0.34 vs 0.22, p=0.035). Socioeconomic status, measured by education of the main wage earner, household income or Index of Multiple Deprivation was not significantly associated with DLL.
Conclusions: Unlike other studies, we did not find an association between socio-economic status and lead exposure. Frequency of cleaning hard floors in house is a possible predictor of elevated DLLs, however, cautious interpretation is required.

THE RELATIONSHIP BETWEEN WATER DISINFECTION BY-PRODUCTS AND EARLY CHILDHOOD NEUROBEHAVIORAL DEVELOPMENT

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Background and Aims: Trihalomethane (THM), the most common DBPs were widely explored the relationship between by-products of disinfection of drinking water and congenital anomalies. However, the impact of THMs exposure on neurobehavioral development in children still remains unclear. The purpose of our study was to investigate the relationship between the TTHM and early childhood neurobehavioral development.

Methods: We conducted a cohort study of 400 mother-infant pairs in 2004-2007 using information from Taiwan birth cohort study (TBCS) and Waterworks Registry. All subjects finished questionnaires and the childhood neurobehavioral development scales when the children were at the ages of 6 months. The exposure periods was grouped into prenatal and postnatal period. We used the proportional hazard model to assess the relationship between different exposure levels and the milestone and controlled for potential confounders including infant sex, birth weight, parity, maternal age, maternal education, breast feeding duration, environmental tobacco smoking exposure, and care style.

Results: The prenatal exposure duration, in the proportional hazard model the hazard ratio of “Smile at the main caregiver spontaneously” (adjusted odds ratio: 0.59, 95% confidence interval: 0.42, 0.82), “Roll over” (0.68, 95% CI: 0.49, 0.95), “Transfer objects from one hand to the other “ (0.58, 95% CI: 0.41, 0.82), and “Creep on belly” (0.39, 95% CI: 0.26, 0.63) were elevated in the high exposure compared to the reference category. And the risk of “Smile at the main caregiver spontaneously”, “Transfer objects from one hand to the other “, and “Creep on belly” showed an exposure-response pattern (test for trend: $p = 0.001$, 0.005, and 0.0001).

Conclusions: The present study suggests that prenatal exposure to disinfection by-products increases the risk of delay motor at 6th months. Our findings indicated that prenatal exposure may influence the children developments significantly than the postnatal.

AIR POLLUTION EFFECTS ON RISK OF ICD-DETECTED ATRIAL AND VENTRICULAR ARRHYTHMIAS: WHO ARE THE MOST VULNERABLE PATIENTS?

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Background and Aims: Implanted cardioverter defibrillators (ICD) monitor and treat arrhythmias and provide electrocardiographic records of the timing of ventricular and atrial arrhythmias. Diabetes, history of myocardial infarction (MI) and other risk factors have been shown to increase vulnerability to cardiac air pollution effects. In this study we explore which patient characteristics modify the associations between fine particulate matter ($PM_{2.5}$) and arrhythmias among a cohort of 200 dual chamber ICD patients prospectively followed at the Tufts Medical Center in Boston.
Methods: Patients were followed November 2006 through June 2010. We analyzed the association between air pollution and the onset of arrhythmias with a case-crossover approach. Cardiac events were matched with control time periods by month and day of the week. $PM_{2.5}$ exposure was included as 24-hour moving averages. Effect modification by patient characteristics was examined by including an interaction term. Risks of arrhythmias associated with air pollution were estimated with conditional logistic regression, adjusted for temperature and relative humidity. Odds ratios (OR) are reported for an interquartile range increase in exposure.
Results: A total of 135 patients with a mean follow-up time of 2.0 years had 3012 episodes (1917 atrial and 1095 ventricular arrhythmias). A 5.0 $\mu g/m^3$ increase in 24-h $PM_{2.5}$ was associated with an increased risk of atrial arrhythmias (OR 1.18, 95% CI 1.05 to 1.34) for diabetic, but not for non-diabetic patients (p-value interaction=0.03) and with an increased risk of ventricular arrhythmias (OR 1.17, 95% CI 1.04 to 1.31) for obese subjects, but not for non-obese (p-value interaction=0.06). We also found associations between $PM_{2.5}$ and increased risk of both atrial and ventricular arrhythmias in subjects with a history of angina or MI.
Conclusions: Diabetic and obese subjects and those with angina or MI may be more vulnerable to particle exposure in this population of patients with ICD devices

ASSOCIATIONS BETWEEN DIFFERENT BIOMARKERS USED FOR CADMIUM EXPOSURE IN THE GENERAL POPULATION

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Background and Aims: Biomarkers are normally used to assess the body burden of cadmium (Cd). Urinary Cd needs to be adjusted for variation in dilution using creatinine concentration (Crea) or specific gravity (SG). The aim of this study was to investigate the associations between Cd measured in urine (24h and overnight), blood and plasma.
Methods: Between 1999 and 2005, 152 healthy kidney donors were recruited to the study. Before transplantation, blood and separate 24h urine (U_{24}) and timed overnight spot urine (U_{ON}) samples were collected. Cadmium in blood (B-Cd), plasma (P-Cd) and urine (U-Cd), together with Crea and SG in urine were analyzed. SG standard 1.015 was used in the SG adjustment calculations. Associations between different biomarkers were assessed using the Pearson correlation coefficient.
Results: The mean levels were; U-Cd/24h: 0.51 µg, U-$Cd_{ON,Crea}$: 0.36 µg/gCrea, U-$Cd_{ON,SG}$: 0.32 µg/L, B-Cd: 0.49 µg/L, and P-Cd: 0.02 µg/l. Adjusted U-Cd and excretion rates (U-Cd/h) in the overnight samples were all associated to the 24h excretion of Cd (r=0.59 for U-$Cd_{ON,Crea}$, r=0.55 for U-$Cd_{ON,SG}$ and r=0.70 for U-Cd/h_{ON}; p<0.001). U-Cd/24h was also associated to B-Cd (r=0.32, p<0.001) but not among never smokers and not to P-Cd. There were stronger associations between B-Cd and U-$Cd_{ON,Crea}$, U-$Cd_{ON,SG}$ and U-Cd/h_{ON} (r=0.48, r=0.42, r=0.45; p<0.001) compared to P-Cd (r=0.22, p=0.007, r=0.27, p=0.001, r=0.15, p=0.09). There was an association between B-Cd and P-Cd (r=0.30, p<0.001).
Conclusions: Adjusted U-Cd and excretion rates in U_{ON} samples were significantly associated to U-Cd/24h, indicating that they are useful as biomarkers for Cd body burden, assuming a close relation between body burden and U-Cd/24h. B-Cd seems to be more closely associated to U-Cd than P-Cd. The latter is, however, more difficult to quantify correctly, due to low levels.

THE ROLE OF NON-ACOUSTICAL FACTORS IN NOISE ANNOYANCE OF URBAN POPULATION

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Background and Aims: Noise annoyance is influenced by acoustical factors, such as type of noise, noise levels and frequency, and non-acoustical factors, including physiological, psychological and social factors. The aim of this study was to assess the role of some non-acoustical factors in noise annoyance of urban population.
Methods: A cross-sectional study was performed on 1311 adults (452 men and 679 women), aged 42±16 years, residing in noisy urban areas in Belgrade for more than one year. Non-acoustical factors, such as socio-economic status (family income, education and employment) and dwelling characteristics (apartment size, floor level, orientation of windows) were estimated using a questionnaire. Noise annoyance was estimated using self-reported 5-graded verbal annoyance scale. Based on their annoyance level, participants were divided into two groups: highly annoyed (high level of noise annoyance) and less annoyed (low to moderate level of annoyance).
Results: Highly annoyed participants were more likely to be females, married with children and to have higher family income. Educational level and employment were similarly distributed among highly annoyed and less annoyed subjects. Highly annoyed participants were more likely to be living on lower floor levels (on the ground floor, basement or first floor), for a longer period of time, to spend more time indoors, and to have windows of their bedrooms facing the street. Orientation of windows toward the street was the most important predictor of noise annoyance (B=2.690, 95% Confidence Interval =1.796-4.029), followed by the living on the groundfloor or first floor (B=1,448, 95% CI =1.134-1.851), independently from age, gender and noise exposure.
Conclusions: Our study identified several non-acoustical factors as indicators of noise annoyance, independent from age, gender and noise exposure, primarily some dwelling characteristics and time spent indoors. Socio-economic status was not related with noise annoyance, when all the relevant parameters were taken into account.

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EFFECTS OF TRANSPORTATION NOISE ON BLOOD PRESSURE

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Background and Aims: Laboratory experiments on humans and animals, occupational noise studies with high noise levels and transportation noise studies with lower noise levels support the evidence that environmental noise is associated with high blood pressure. The biological plausibility is determined by the general stress concept, referring to the activation of the autonomic nervous system and the endocrine system. Most transportation noise studies looked at aircraft noise and road traffic noise. A recent meta-analyses investigating the relationship between aircraft noise and hypertension reported an odds ratio of 1.06 (95% CI: 1.00-1.13) per 5 dB(A) increase of the weighted day-night aircraft noise level Ldn (range 47-67 dB(A)). Despite the fact that during the last decade the number of studies investigating the association between road traffic noise and high blood pressure increased substantially, no reliable exposure-response relationship is as yet available. A meta-analysis was carried out to fill the gap.
Methods: Based on review papers and an electronic data-base search, epidemiological studies investigating the relationship between road traffic noise exposure and measured high blood pressure and/or use of antihypertensive treatment were considered for a meta-analysis. The studies were published between 1970 and 2010.
Results: Eventually 27 studies were evaluated. Preliminary results showed that road traffic noise was positively and significantly associated with the prevalence of hypertension: data-aggregation produced an of OR of 1.03 (95% CI: 1.01-1.06) per 5 dB(A) increase of the 16 hour average road traffic noise level (LAeq,16hr) (range 45-75 dB(A)).
Conclusions: Overall evidence shows that road traffic exposure is associated with high blood pressure. Based on a meta-analysis a quantitative relationship is derived that can be used for health impact assessment. The results of this meta-analysis are consistent with a slight increase of cardiovascular disease risk in populations exposed to transportation noise.

INTERRELATIONS BETWEEN BLOOD SERUM LEVELS OF PERSISTENT ORGANIC POLLUTANTS AND THEIR DETERMINANTS IN INUIT, POLISH AND UKRAINIAN MALES (CLEAR PROJECT)

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Background and Aims: The overall objective of the multi-center CLEAR project is to investigate the possible impact of climate change on human exposure to environmental contaminants and their impact on fertility and child development. CLEAR is a follow-up of the INUENDO project (Bonde et al 2008), comprising parent-child cohorts from Arctic and two local European populations. Numerous environmental contaminants, notably persistent organic pollutants (POPs), are suspected endocrine modulators. As many POPs have common determinants, we anticipate that future epidemiological analyses could suffer from multi-collinearity and multiple testing issues, and thus explored multivariate data analysis approaches.
Methods: Cross-sectional serum blood concentrations of POPs were measured in 602 male partners of pregnant women recruited in 2002-04; 199 Inuit from Greenland, 197 from Warsaw, Poland, and 206 from Kharkiv, Ukraine. Brominated flame retardants, including the polybrominated diphenyl ethers (PBDEs) BDE-28, 47, 99, 100, 153, 154, and 183 and brominated biphenyl BB-153 were measured in a subset of 300 by GC-HR/MS. Six metabolites of di(2-ethylhexyl)phthalate (DEHP) and seven perfluorinated compounds were measured by LC-MS/MS, in addition to dichlorodiphenyldichloroethane (p,p′-DDE) and polychlorinated biphenyl congener (PCB-153) already characterized in the baseline INUENDO study (Jönsson et al 2005). We used bivariate correlation and exploratory factor analysis to explore the relationship between potential determinants and levels of POPs.
Results: Geometric mean concentrations of all compounds differed significantly between the three populations (ANOVA), and highest concentrations were generally measured in Greenland. All compounds showed right skewed distributions, and a high proportion of PBDEs were below the limit of quantification. Several PBDEs and PCB-153 were highly correlated with PFCs ($r>0.7$).
Conclusions: There is a large contrast in body burdens of POPs in the CLEAR cohorts. Multivariate exploratory factor analysis may yield additional insight into common determinants of exposure to POPs in these three populations.

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DNA METHYLATION IN BLOOD LYMPHOCYTES AND RISK OF LUNG CANCER

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Background and Aims: Aberrant DNA methylation is a common event in cancer development, lung cancer included. Aim of our study is to determine whether alterations in global and gene-specific DNA methylation in peripheral blood lymphocytes (PBLs) can precede and thus predict lung cancer development.
Methods: The study subjects were selected from a Danish prospective study and were free-of-cancer at the enrollment (1993-1997). Blood samples and information on life-style (smoking habits, diet) were collected. 276 lung cancer cases were diagnosed (1994-2003) and a sub-cohort of 303 controls was selected and frequency matched on sex and age according to the case-cohort design. Methylation state of *LINE*-1 repetitive elements (global methylation) and of gene-specific promoters of *microRNA124a*, tumor suppressor (*p16, RASSF1A, DAPK*), DNA-repair (*MSH2, MGMT, hMLH1*) and cell-proliferation genes (*CDH1, CDH13, RARβ*) was measured in PBLs by PCR-Pyrosequencing.
Hazard Ratios (HR) for lung cancer were estimated with Cox models, adjusted for age, sex, and smoking status. We created gene-specific dichotomous variables (equal to 0 or 1 if methylation lays below or above the 75th percentile of each gene-specific distribution, respectively) and summed them (excluding *LINE*-1) to calculate methylation indexes for overall methylation (MI), tumor suppressor genes (TSGI), DNA-repair genes (DRGI), and cell-proliferation genes (CPGI).
Results: Gene-specific methylation indexes were significantly positively associated with lung cancer risk for MI, TSGI and DRGI [HR=1.25 (95%CI 1.14-1.36; p<0.001), HR=1.19 (95%CI 1.02-1.38; p=0.030) and HR =1.59 (95%CI 1.35-1.87; p<0.001)] but not for CPGI and microRNA124a [HR=1.09 (95%CI 0.92-1.29; p=0.301) and HR=1.10 (95%CI 0.84-1.44; p=0.502)]. LINE-1 index was inversely correlated with lung cancer risk [HR=0.13 (95%CI 0.07-0.22; p<0.001)].
Conclusions: Specific methylation tumorigenic patterns are found in PBLs (in particular DNA-repair and tumor suppressor gene hypermethylation together with LINE-1 hypomethylation) and precede lung cancer development. Such results suggest how DNA methylation changes could be predictive of lung cancer risk.

WHO IS ANNOYED AND/OR WORRIED BY LIVING CLOSE TO PETROCHEMICAL INDUSTRIES?

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Background and Aims: People living close to industry may be annoyed by smell or noise, and worried about possible adverse health effects or industrial accidents. Not all people are annoyed or worried, however, in spite of the same distance to emission sources. The aim of the present study was to assess which individual factors were associated with annoyance or worry.
Methods: In 1992, 1998, and 2006, postal questionnaires were distributed to stratified samples of residents 18-75 years in residential areas close to the petrochemical industry in Stenungsund, Sweden, and a control area further away. The samples included 6-800 people on each occasion, and 200-1000 people in a control area, and the response rate was 69-74%. Questions were focused on annoyance by smell and noise, and worry about health effects from chemical emissions or accidents. Individual factors evaluated were age, sex, type of residence, type of employment, children at home, and annoyance or worry due to traffic exhausts. Predictors were evaluated using multiple logistic regression analyses.
Results: About 20 % of responders in Stenungsund were annoyed by industrial smell or industrial noise (1-4% in the control area), and 40-50% were at least sometimes worried of health effects or chemical accidents (10-20% in the control area).
Young age and annoyance by road traffic exhaust were associated with annoyance by industrial smell or noise. Young age and female sex were associated with worry of health effects or industrial accidents. Having children at home increased the worry. The association between worry of health effects from industrial emissions and accidents was strong.
Conclusions: Individual factors contribute to the risk of being annoyed or worried when living close to petrochemical industry. Gender, having children at home, and annoyance or worry regarding traffic exhausts were important predictors.

EFFECTS OF AIR POLLUTION ON BLOOD PRESSURE AND LEFT VENTRICULAR FUNCTION: A PANEL STUDY OF CORONARY ARTERY DISEASE PATIENTS IN SOUTHWESTERN PART OF TAIWAN

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Background and Aims: Air pollution (AP) has been associated with elevated blood pressure and heart failure (HF). However, the results were inconsistent. We investigated the effects of AP on blood pressure and left ventricular (LV) function using panel data.

Methods: Resting systolic blood pressure (SBP), diastolic blood pressure (DBP), and echocardiography were repeatedly measured every 3 months for 4 times in 61 patients (aged 61.5±10.4, 78.7% were men) with coronary artery disease (CAD) at one teaching hospital in southwestern part of Taiwan. 2-dimension and M-mode echocardiography were used to measure the deceleration time (DT) of E wave, LV end diastolic volume (LVEDV), and LV end systolic volume (LVESV) by Simpson's rule method. LV ejection fraction (LVEF) was calculated. AP concentrations were obtained from nearby fixed-site monitoring stations. We used mixed models that controlled for individual-specific effects, humidity and temperature to examine relationships between AP and hemodynamics.

Results: Average SBP and DBP were 137.9±20.0 and 77.4±11.3 mmHg. Baseline data of DT, LVEDV, LVESV, and LVEF were 189.6±58.3 msec, 63.3±32.9 ml, 30.1±24.2 ml, and 59.0±13.0%. Average concentrations during study period of SO_2, NO_2 , CO, O_3 , PM_{10} and $PM_{2.5}$ were 4.1±1.7 p.p.b., 16.6±7.6 p.p.b., 0.5±0.2 p.p.m., 29.1±11.3 p.p.b., 79.4±42.5 μg/m^3, and 45.8±24.5 μg/m^3 , repectively. The 1 day moving average of increase in 1 p.p.b. SO_2 , 1 p.p.m CO, and 10-μg/m^3 PM_{10} were associated with increase of 1.4 (95% CI 0.4 to 2.9), 11.4 (95% CI 2.1 to 20.8), and 0.5 mmHg (95% CI 0.03 to 0.9) of DBP. $PM_{2.5}$ and O_3 were associated with DT. $PM_{2.5}$, PM_{10}, SO_2, NO_2, and CO were associated with LVEDV. $PM_{2.5}$, PM_{10}, NO_2, and CO were associated with LVESV. SO_2 was associated with LVEF.

Conclusions: Elevated levels of ambient AP may adversely affect BP and LV function in susceptible population.

EMERGING DISINFECTION BY PRODUCTS (DBPS): CHLORATE IN ITALIAN DRINKING AND SWIMMING POOL WATERS

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Background and Aims: Chlorate is a disinfection by-product (DBP) originating from chlorine dioxide water disinfection, which can be a contaminant of sodium hypochlorite solutions as well. Due to its not yet well investigated genotoxic and carcinogenic potential effects, it is considered, together with other DBPs , an emerging DBP for which further research on occurrence levels and toxicological properties is a prior need.
The aim of this study was to evaluate in some Italian regions the potential exposure to chlorate via drinking water of the general population and of a specific population (swimmers).
Methods: Chlorate levels were investigated in drinking water samples collected form 12 waterworks located in Emilia-Romagna, Friuli Venezia Giulia and Lombardia Regions. To investigate spatial and seasonal variability, different water samples (n.194) were collected at different points along the distribution system and over four seasons. In the same period 20 swimming pools in the Emilia-Romagna Region were investigated for the occurrence of chlorate in water pools. Chlorate analysis was performed by ion chromatography (detection limit: 1 µg/l).
Results: Chlorate occurred in 97% of the drinking water samples, (median:18, range: 2-399µg/l) and resulted always below the provisional WHO guidelines (700µg/l). Nevertheless, significant differences in levels were observed according to disinfection methods, and the highest levels occurred in water disinfected both with chlorine dioxide and ozone (median:163, range:83-399µg/l). No clear spatial or seasonal trends were observed. Swimming pool waters showed much more higher chlorate levels (median:4347, range: 5-19537µg/l) and significant differences according to disinfectant applied were also observed.
Conclusions: In the Italian investigated regions, chlorate appears to be widespread both in drinking and swimming pool waters; in the latter particularly high levels were observed in different settings. Swimmers are therefore a potentially highly exposed population subgroup: to evaluate health implications of this specific exposure pathway, however, further investigation is needed.

CORONARY HEART DISEASE BURDEN AND COSTS OF LOCAL TRAFFIC-RELATED AIR POLLUTION AMONG 10 EUROPEAN CITIES – RESULTS FROM APHEKOM

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Background and aims: Animal studies and a few epidemiological investigations suggest a causal role of local traffic-related air pollution in the development of chronic cardiovascular pathologies such as coronary heart disease (CHD). The number of avoidable CHD cases, should this exposure be reduced, has not been evaluated in traditional air pollution risk assessments, which only consider air pollution as a cause of acute cardiovascular episodes (i.e. hospitalizations). The objective of the study was to estimate the health and cost benefits of avoiding the development of CHD through the reduction of local traffic-related pollution among adults (age >65 yrs) in 10 European cities, assuming a causal role of these pollutants in the development of CHD.
Methods: We obtained population attributable numbers by combining the concentration-response function (CRF) for the association between CHD prevalence and living within 150m of busy roads (OR:1.85 [95%CI:1.21-2.84]; Hoffmann et al, 2006), the proximity distribution of urban populations (i.e. the number of persons living within 150m of roads with more than 10,000 vehicles per day), and the CHD prevalence in these populations. We monetized this burden using direct and indirect medical costs as well as intangible costs.
Results : We estimated that 28% (95%CI: 9%-44%) of CHD cases could be attributable to local traffic-related pollution among the estimated total 132,000 elderly with CHD. Avoiding this burden translated into a total of 249 million Euros saved per year. This monetary estimation is more than 30 times larger than an estimation considering only acute cardiovascular episodes attributable to air pollution levels above the recommended World Health Organization annual guidelines.
Conclusions: If traffic-related pollutants play a causal role in the development of CHD, the reduction or elimination of this exposure could be a very effective primary prevention to reduce a substantial public health burden.

ISCHEMIC STROKE AND FISH CONSUMPTION IN SOUTHERN SWEDEN

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Background and Aims: Fish intake can have both beneficial effects (via omega-3 fatty acids) and adverse effects (via the environmental pollutants methyl mercury and PCB). Quite a few researchers have reported fish intake to reduce stroke risk, but there have also been inconsistencies in results; high fish consumption have for example been observed to increase stroke risk in men from northern Sweden. We aimed at studying lean and fat fish consumption as a risk factor for ischemic stroke in southern Sweden, separately for men and women.
Methods: Data on fish intake and other variables were obtained from an already available population based case-control study, with incident first-time ischemic stroke patients. Complete data on all relevant variables were obtained for 2718 controls and 2455 cases. The data were analyzed with logistic regression analysis.
Results: Stroke risk decreased with fat fish intake (• 1/week versus <1/month) in both men and women; adjusted Odds Ratio (OR) 0.69, 95% Confidence Interval (CI): 0.54-0.89. However, stroke risk for women increased with intake of lean fish; adjusted OR 1.6 (95% CI: 1.2-2.3), whereas there was no association with men's lean fish intake; adjusted OR 0.97(95% CI: 0.73-1.3).
Conclusions: Our results suggest fat fish intake to decrease ischemic stroke risk and lean fish intake to increase women's stroke risk. However, fish intake the year before the stroke occurred was self-reported retrospectively yielding potential recall bias. The findings regarding lean fish would be explained by recall bias if inclination to report fish consumption depended on both disease status and sex. The fact that the association between fat fish intake and stroke was similar in men and women does not support such a differential in recall. Our results stress the inconsistencies in literature regarding fish intake and stroke risk.

PROJECTING HEAT-RELATED MORTALITY UNDER CLIMATE CHANGE SCENARIOS: A SYSTEMATIC REVIEW

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Background and Aims: Heat-related mortality is a matter of great public health concern, especially in the light of climate change. Although many studies have found associations between high temperatures and mortality, more research is needed to project the future impacts of climate change on heat-related mortality. We conducted a systematic review of research and methods for projecting heat-related mortality under climate change scenarios.
Methods: A literature search was conducted in August 2010, using the electronic databases PubMed, Scopus, ScienceDirect, ProQuest, and Web of Science. The search was limited to peer-reviewed journal articles published in English up to 2010.
Results: Most projections showed that climate change would result in a substantial increase in heat-related mortality. Significant differences in projected mortality were found by different emissions scenarios, suggesting that a greenhouse gases mitigation policy is important to reduce the health risks of climate change. However, because different studies used different scenarios, time periods, temperature exposures and assumptions, it is not possible to conduct a meta-analysis to create a combined estimate of the impacts of climate change on heat-related mortality. Projecting heat-related mortality requires an estimation of the historical temperature-mortality relationship, and consideration of the future changes in climate, population and acclimatisation. Further research is needed to provide a stronger theoretical framework for projections, including a better understanding of socio-economic development, adaptation strategies, land-use patterns, air pollution and mortality displacement.
Conclusions: Climate change is projected to increase heat-related mortality. Although the methods used for projections are still in their early stages and have limitations, the need for evidence-based assessments of future health impacts of climate change is urgent. Such research will significantly contribute to assessing and managing the potential impacts of climate change on heat-related mortality.

ANIMAL CONFINEMENT BUILDINGS AS A SOURCE OF AMBIENT PM10 AND ENDOTOXIN PM10

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Background & Aims: While most PM10 exposure studies focus on traffic related sources, PM10 emitted by animal buildings has hardly been studied. It has been suggested that PM10 exposure from animal buildings, especially poultry houses, may impose respiratory health risks. In addition, PM10 dust composition i.e. microbial content may vary. We investigated ambient PM10, endotoxin, *Coxiella burnetii* and methicillin-resistant *Staphylococcus aureus* (MRSA) exposure levels in areas with varying animal farm densities.
Methods: Week-averaged PM10 dust was collected simultaneously at five sampling sites with various animal farm densities and at one urban background location. Density of animal buildings around a sampling point was calculated using a Geographic Information System. Endotoxin content was determined by LAL assay. DNA isolation and qPCR were performed to determine *C. burnetii* and MRSA DNA content. Association between exposure and number of surrounding animal farms was determined by regression analysis.
Results: The number of animal farms within a 1000 meter radius of the sampling location ranged from 3 to 23 (provence licence data) or 5 to 37 (animal registry data). Geometric mean concentration of PM10 and endotoxin ranged from 16.1–22.2 $\mu g.m^{-3}$ and 0.16–0.31 $EU.m^{-3}$, respectively. PM10 levels were increased compared to urban background at sampling points with highest animal densities only, whereas endotoxin levels were increased at all sampling points. Endotoxin levels and to a lesser extent PM10 levels increased with animal farm density (endotoxin Beta 0.017 per farm, standard error (0.009), PM10 Beta 0.007(0.005). The association was more clearly observed with pigs and poultry than cattle. Microbial DNA analysis is ongoing.
Conclusion: Levels of PM10 and endotoxin PM10 were positively associated with the number of surrounding animal farms. Since this was less clearly observed for PM10 dust, the microbial diversity might possess additional information Livestock farming should be considered when modeling PM10 exposures.

ARE PESTICIDES RELATED TO PARKINSON'S DISEASE? SOME CLUES TO HETEROGENEITY IN STUDY RESULTS

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Background and Aims: Previous systematic reviews have indicated that pesticide exposure is possibly associated with Parkinson's disease. However, large heterogeneity has been observed in study results. We aimed at providing an update of the literature published on Parkinson's disease and exposure to pesticides, by performing a systematic review and meta-analysis. In addition, we investigated if methodological differences between studies could explain the heterogeneity in study results.
Methods: Studies were identified through a systematic literature search. Summary risk ratios (sRR) for pesticide exposure and subcategories were calculated using random effects meta-analyses. Potential sources of heterogeneity were investigated by meta-regression and stratified analyses.
Results: Thirty-eight case-control studies, 4 cohort studies and 3 cross-sectional studies were identified. An sRR of 1.65 (1.42-1.92) for pesticide exposure (ever vs. never) was found. This association was also observed for exposure to herbicides and insecticides but not for fungicides. Heterogeneity in individual study results was not related to study design, source of control population, adjustment of results for potential confounders or geographical area of the study. However, heterogeneity was possibly related to differences in the exposure assessment. Pesticide exposure assignment based on job-titles resulted in a higher sRR than studies relying on self-reported exposure with sRR of 2.5 and 1.5, respectively.
Conclusions: This review strengthens the evidence that exposure to herbicides and insecticides can increase the risk of Parkinson's disease. A suggestive effect for method of exposure assessment was found. Future studies should therefore focus on more objective and improved methods of exposure assessment.

HEALTH IMPACT ASSESSMENT: EXPERTS' EXPECTATIONS AND VIEWS IN THE APHEKOM PROJECT

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Background and Aims: At the ISEE 2009 conference in Dublin we launched a questionnaire among participants regarding their views on Health Impact Assessments (HIA) with a special focus on air pollution. Afterwards other epidemiologists and public health experts were also contacted by e-mail and the questionnaire was made available on the internet.
Methods: Respondents were asked about their expectations and needs regarding HIA, what in their opinion were the weakest parts of a HIA, and how HIA could be improved and the results should be communicated to the different stakeholder groups.
In a second questionnaire stakeholders were asked about their perceptions and needs. The responses to both questionnaires will be contrasted.
Results and Conclusions: Twenty-six responses were received from experts. Most of the respondents have already authored a HIA (21 persons) or used it as reviewer or teacher. All are at least acquainted with the principles of HIA because they used HIA in their daily work and have at least read or reviewed examples. Thus, all respondents were scientists with a complete knowledge and understanding of HIA. Most of them have dealt with HIA regarding air pollution.
Answers regarding the weakest part ranged from the underlying model assumptions regarding the exposure-response function and its applicability to the specific setting under discussion, the general lack of appropriately considering lag effects and/or the impact on susceptible subgroups or combined effects and interactions as far as a lack of transparency regarding the assumptions for the economic valuation. Many good proposals were made regarding the presentation of HIA results especially in communicating with the general public.
Among lay stakeholders expectations differ considerably from the experts.

ARE METEOROLOGICAL FACTORS ASSOCIATED WITH SUICIDE?

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Background and Aims The Northern Territory (NT) has the highest suicide mortality among all the states and territories in Australia. However, little has been done in determining how meteorological factors influence suicide in this area, compared with studies in other Australian areas and other countries. This study aims to explore the association between meteorological factors and suicide variation in Darwin, the capital of NT and a tropical city.
Methods Monthly suicide (146 suicides, 128 males and 18 females between 1999 and 2003) and meteorological data (including rainfall, maximum and minimum temperature, humidity at 9:00am and 3:00pm and sunshine hours) of the Darwin Statistical Division (metropolitan area) were collected. Time-series analysis was applied to examining the association between these factors and suicide variation using a generalized linear model with Poisson distribution after adjustment for autocorrelations and over-dispersion.
Results Months with increased sunshine hours were accompanied with less suicides among male population (RR = 0.58, 95% CI: 0.38 – 0.88), as well as 25-44 year group (RR = 0.52, 95% CI: 0.29 – 0.92). When humidity at 9:00am increased, there were more suicides among male population of 24-year and below (RR = 1.24, 95% CI: 1.05 – 1.45). However, there was no significant association between temperature, humidity at 3:00pm, rainfall and suicide. Among female population and population aged 45 and over for both genders, the associations were not significant.
Conclusions Humidity and sunshine hours were associated with suicide in Darwin, especially in all males and groups of 44-year and below. This may be attributed to the influence of sunlight on the human mood. The influence of other factors, such as socioeconomic status, life style and personal issues will be explored in future studies.

RISK OF PARKINSON'S DISEASE AND AGRICULTURAL PESTICIDE EXPOSURE.

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Background and Aims: Several studies have found an association between agricultural pesticide exposure and Parkinson's disease (PD), but uncertainties remain about the characteristics of exposure that are involved. Our objective was to determine agricultural pesticide exposures associated with PD in a French case-control study.
Methods: The study was conducted in 2007 in five French districts in an agricultural population (≤ 80 years). Cases were identified through antiparkinsonian drug claims; PD diagnosis was verified by clinical examination. Two controls per case were matched for age, sex, and district. A comprehensive questionnaire described tasks associated with pesticide use. The cumulative number of pesticide applications and years of exposure, and the average number of applications per year were computed overall, by type of products (herbicides, fungicides, insecticides), and by target (crops, livestock). The Mini Mental State Examination (MMSE) assessed cognitive performances. Analyses were performed using conditional logistic regression and restricted to men whose main occupation was farming.
Results: The study included 192 cases (72% farmers) and 382 controls (72% farmers). After adjustment for confounders (smoking, coffee, MMSE, pesticide use for gardening), PD was not associated with the cumulative number of applications (p-trend=0.070) or years of exposure (p-trend=0.566), but an association was observed with the average number of applications per year (p-trend=0.011). PD was associated with the average number of applications of fungicides per year (p-trend=0.037) but not with insecticides or herbicides. An association was observed with the number of pesticide applications for crops (p-trend=0.046) but not for livestock.
Conclusions: A detailed description of agricultural pesticide exposure is important in order to better understand the association between PD and pesticides. We found a stronger association with the intensity of applications than with the cumulative number of applications or duration of exposure. In addition, fungicides and applications for crops were more particularly associated with PD.

YEARS OF LIFE LOST DUE TO COLD AND HOT TEMPERATURES IN BRISBANE, AUSTRALIA

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Background and Aims: Temperature is an important determinant of population health. Most previous studies were formulated in terms of temperature-related mortality risk, but it is also useful to consider years of life lost. Information on years of life lost is of great concern for policy makers, as evidenced by the issue of mortality displacement. This study aims to estimate the years of life lost associated with changes in season and temperature in Brisbane, Australia.
Methods: We used daily time series data on climate and mortality collected for Brisbane city between 1996 and 2004. The years of life lost were estimated by matching each death by age and sex to Australian life tables for the years 2002–2004. Regression was used to estimate the association between daily total years of life lost and daily maximum temperature, with adjustment for day of week, trend and season. To examine the non-linear and lagged effects of temperature, we used the distributed lag non-linear model.
Results: There was no effect of season on years of life lost. The association between daily maximum temperature and daily total years of life lost was V-shaped with increased years of life lost for cold and hot temperatures. The lowest years of life lost were at 30 °C for men and 27 °C for women. The greater heat-related years of life lost were most associated with a shorter lag (same day exposure), and the largest cold-related years of life lost were most associated with a multiple days lag.
Conclusions: This study provides evidence of increased years of life lost due to cold and hot temperatures. Extreme temperatures are known to cause increases in the number of deaths, our study demonstrates that temperature extremes also cause significant increases in years of life lost.

THE EFFECTS OF HIGH TEMPERATURES ON ELDERLY MORTALITY DIFFERED BY YEAR, CITY AND REGION IN THE UNITED STATES

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Background and aims: Studies examining the impacts of high temperatures on mortality are useful for quantifying their public health burden and establishing warning systems that aim to reduce their health effects. However, most previous studies have only considered the effects during the whole study period, and have ignored the variability in effects in different years. We aimed to examine the variation in the effects of high temperatures on elderly mortality (age • 75 years) for 83 large US cities for the years 1987–2000. We also explored the overall trend of high temperature-related elderly mortality.
Methods: We defined high temperature days as two or more days with temperatures above the 90th percentile for each city during each warm season (May 1 to September 30). We used a time series Poisson regression model and decomposed the mortality risk for high temperatures into: a "main effect" due to high temperatures using a distributed lag non-linear function, and an "added" effect due to consecutive high temperature days. We pooled yearly effects across regions using a random effects meta-analysis. We used a Bayesian hierarchical model to generate an overall high temperature effect at regional and national levels.
Results: The high temperature effects (both main and added effects) on elderly mortality varied greatly by year, city and region in the United States. Some of the variation in the heat effect is a regular fluctuation of "bad" years being followed by relatively "good" years. The elderly mortality due to high temperatures generally declined over the study time.
Conclusion:
High temperature effects on elderly mortality vary greatly from year to year and by city and region. This variability makes it difficult to predict the future effects of heat, and is likely to cause false positives in heat-warning systems.

USING SATELLITE AEROSOL OPTICAL DEPTH DATA TO INVESTIGATE THE ASSOCIATION BETWEEN MORTALITY AND LONG AND SHORT TERM EXPOSURE TO PM $_{2.5}$ IN MASSACHUSETTS

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Background and Aims: A large number of studies have reported associations between ambient particulate matter (PM) exposures and adverse health effects, yet all these studies have focused on the effects of either short-term (acute) or long-term (chronic) PM exposures. In this paper we aim to use a novel PM $_{2.5}$ exposure model based on satellite aerosol optical depth data to investigate both the long and short term effects of PM $_{2.5}$ exposures on mortality in Massachusetts, USA.
Methods: Using our novel predictions model for exposure, we preformed a time series analysis where daily death counts in each geographic grid cell were regressed against the long and short term $PM_{2.5}$ exposure, temperature, socio-economic data, lung cancer rates and a spline of time to control for season and trends.
Results: Our results indicated that for every10-$\mu g/m^3$ increase in short term PM $_{2.5}$ exposure there is a 1.07 percent increase in mortality (CI=0.52 to 1.61), while concurrently for every10-$\mu g/m^3$ increase in long-term PM $_{2.5}$ exposure there is a 44.2 percent increase in mortality (CI=17.7 to 76.8).
Conclusions: We have developed a novel $PM_{2.5}$ exposure model based on remote sensing data to assess both short- and long-term human exposures. Our approach relies upon gaining spatial resolution in the acute effects and allowing an assessment of long term effects in the entire population, rather than a selective sample from urban locations

ESTIMATION OF EXPOSURE TO URBAN AIR POLLUTION IN TWO CITIES USING A GAUSSIAN DISPERSION MODEL: THE EDEN-AIR PROJECT

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Background and Aims: Air pollution exposure models used in epidemiology are often based on the network of air quality monitoring stations (AQMS). The spatial resolution of these models is limited, which is of concern in urban areas, where atmospheric pollutants exhibit strong spatial fluctuations. Dispersion models are expected to increase the spatial resolution. Our aim was to implement such a model in two cities using a harmonized methodology.
Methods: ADMS Urban dispersion model has been implemented in Nancy and Poitiers (France) to estimate the hourly atmospheric concentrations of nitrogen dioxide (NO_2) and particulate matter (PM_{10}). Domain size for each area is about 30km x 30km. The model relied on a spatialized and temporally-resolved emission inventory including data on traffic, industrial sources and heating, as well as on hourly data on meteorological parameters and background air pollution levels from AQMS. Traffic emissions were described with linear sources, while other sources were aggregated on a 1km-resolution grid. Validation of the model has been done by comparing hourly estimated concentrations with permanent stations measures.
Results: Annual concentrations measured by AQMS were 30 µg/m^3 for NO_2 and 22 µg/m^3 for PM_{10} in Nancy, and 20 µg/m^3 and 18 µg/m^3 in Poitiers. Hourly model predictions and measured concentrations at the AQMS locations exhibited a correlation of 0.6 for NO_2 and 0.5 for PM_{10} in Nancy (0.7, and 0.9, respectively, for Poitiers). In each area, the relative error between annual measured averages and model estimates was always below 30% for NO_2 and below 20% for PM_{10} (based on 7 locations in Nancy and 3 in Poitiers).
Conclusions: NO_2 and PM_{10} levels estimated by a dispersion model showed good correlation with measures, and low error in urban background and traffic locations. Implementing dispersion models in different cities in a standardized way appears feasible.
References:

DOES THE PRECISION OF GEOCODING AFFECT ASSOCIATIONS BETWEEN OUTDOOR AIR POLLUTION AND LUNG FUNCTION IN ADULTS?

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Background and aims: Different techniques of geocoding can lead to important differences in distance between the true and the geocoded location. To which extent such differences can impact the estimates of air pollution effects on health outcomes has not been studied. The objective is to assess the differences in health estimates of home outdoor air pollution on lung function using 2 geocoding techniques (spatial interpolation versus parcel matching).

Methods: FEV1% predicted was assessed between 2001-2007 for 393 adults living in Grenoble, France, from the follow-up of the Epidemiological study on the Genetics and Environment on Asthma (EGEA) and the European Community Respiratory Health Survey (ECRHS). Home addresses were geocoded automatically using a map developed with spatial interpolation technique and manually using the cadastral map and geocoding the building's center. Annual concentrations of NO_2 (2004) and PM_{10} (2008) lestimated at the home addresses, using a dispersion model with a $10m^2$ grid, were combined to time-specific measures from the permanent air quality monitoring stations to capture temporal variations in exposure. Linear regressions, adjusted for sex, age, BMI, active smoking, ETS, occupational group, atopy and asthma were conducted.

Results: Medians concentrations ($\mu g/m^3$) were 34 (IQR 31-38) for NO_2 and 31 (29-33) for PM_{10} using the automatic geocodes and 33 (31-36) for NO_2 and 30 (29-32) for PM_{10} using the manual geocodes. The median distance in meters between the two techniques was 29 (IQR 14-59). For a $10\mu g/m^3$ increase in NO_2 and PM_{10}, FEV1% predicted decreased by 2.42 (p=0.06) and 8.96 (p=0.05) using the automatic geocodes, and by 2.71 (p=0.09) and 12.32 (p=0.02) respectively using the manual geocodes.

Conclusion: These first results suggest that a more precise geocoding technique has a minimal impact on the assessment of NO_2 and PM_{10} effects in lung function.

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THE IMPACTS OF EXTREME COLD AND HOT TEMPERATURES ON MORTALITY IN TIANJIN, CHINA: TOWARDS RESPONSE FOR CLIMATE CHANGE

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Background and aims: There has been increasing interest in assessing the impacts of temperature on mortality as global warming continues. However, little evidence is available on the temperature-mortality relationship in China, or what temperature measure is the best predictor of mortality. Also, no study has used the case–crossover design to examine the non-linear and distributed lag effects of temperature on mortality. In this study, we aim to examine the non-linear and distributed lag effects of temperature on mortality in Tianjin, China; to explore which temperature measure is the best predictor of mortality; to apply the distributed lag non-linear model (DLNM) as a part of case• crossover design.
Methods: The DLNM was applied to a case• crossover design to assess the non-linear and delayed relationship between temperatures (maximum, mean and minimum) and deaths (non-external, cardiovascular and respiratory). The Akaike information criterion was used to determine which temperature measure was the best predictor of mortality.
Results: A U-shaped relationship was found for all temperature measures and mortality categories. The lagged effects of cold temperatures lasted longer than hot temperatures. Mean temperature had a better AIC than maximum and minimum temperatures.
Conclusions: In Tianjin there was a relatively large comfortable temperature zone, but extreme cold and hot temperatures increased the risk of mortality. The effects of cold lasted longer than the effects of heat. Mean temperature had the best predictive ability. It is possible to combine the case• crossover design with DLNM to estimate non-linear and delayed effects of temperature whilst controlling for season.

LONG-TERM EXPOSURE TO TRAFFIC RELATED AIR POLLUTION AND HOSPITAL ADMISSION IN THE NETHERLANDS

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Background and aim: Cardiopulmonary effects of long-term exposure to outdoor air pollution have been observed in several cohort studies, but the association between hospital admission and long-term exposure has not received much attention. This study aims to explore this relation focusing on respiratory and cardiovascular hospital admission in the Netherlands.
Methods: This study was based on hospital registration (2001-2004) and general population data for the West of the Netherlands (population 4.04 million). At postcode area level (n=683) the association between the land use regression modeled annual average outdoor NO_2 concentrations and hospital admission for respiratory and cardiovascular causes was evaluated. Analyses were adjusted for differences in composition of the population of the postcode areas (age, sex, income).
Results: Outdoor NO_2 concentration was associated with increased prevalence of hospital admission for asthma, chronic obstructive pulmonary disease (COPD), all cardiovascular causes, ischemic heart disease (IHD) and stroke. For these causes of admission exposure-response relations for the second to fourth quartile of exposure were found, relative to the first quartile of exposure. Adjusted Prevalence Ratios (and 95%-confidence intervals) were 1.87 (1.46-2.40), 2.34 (1.83-3.01) and 2.81 (2.16-3.65) for asthma, 1.44 (1.19-1.74), 1.50 (1.24-1.82) and 1.60 (1.31-1.96) for COPD and 1.07 (0.99-1.15), 1.08 (1.00-1.17), 1.10 (1.01-1.19) for all cardiovascular causes, 1.08 (0.98-1.20), 1.12 (1.01-1.23) and 1.13 (1.02-1.25) for IHD and 1.11 (0.98-1.25), 1.12 (0.99-1.26) and 1.28 (1.13-1.45) for stroke. All respiratory causes showed significantly elevated prevalence ratios with increased exposure, but no exposure-response relation was observed.
Conclusion: Long-term exposure to traffic related air pollution was associated with increased hospital admission for respiratory and cardiovascular causes.

EPIGENETIC EFFECTS OF IN-UTERO ARSENIC EXPOSURE

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ABSTRACT

Background and Aims: There is a growing body of epidemiologic evidence that arsenic exposure in-utero, even at the low levels found in the United States, is associated with adverse reproductive outcomes and may contribute to long-term health effects in exposed individuals. Animal models, in-vitro studies, and human cancer data suggest that arsenic may elicit epigenetic alterations as its mode of toxicity, specifically, by altering the pattern of DNA methylation. This study aims to identify differences in the profiles of DNA methylation in infant cord blood samples associated with low-level chronic arsenic exposure in a U.S. cohort.
Methods: DNA methylation of cord-blood derived DNA from 150 infants involved in a prospective birth cohort in New Hampshire was profiled using the Illumina Infinium Methylation450K array. In-utero arsenic exposure was assessed using urine and toenail samples. Infinium methylation data were analyzed using the semi-supervised recursively partitioned mixture modeling approach.
Results: Ongoing analyses of the DNA methylation array data suggest differences in DNA methylation profiles associated with in-utero arsenic exposure, and the top loci identified in these analyses are being validated for their methylation status using bisulfite pyrosequencing.
Conclusions: This works demonstrates that arsenic may be acting through epigenetic mechanisms to produce its developmental effects. Prospective follow-up of these children will allow for the long-term assessment of the health-related risks associated with these alterations.

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PRENATAL PHTHALATE EXPOSURE AND CHILDHOOD WHEEZING IN A MULTIETHNIC COHORT

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Background and Aims: Experimental studies suggest that phthalates may affect respiratory function by altering immune or inflammatory responses. Associations between asthma and childhood exposure to phthalates detected in building materials or house dust have been reported, but prenatal exposures have not yet been studied. Our objective was to assess the relationship between prenatal phthalate exposure and asthma or wheezing in childhood.
Methods: The Mount Sinai Children's Environmental Health Study enrolled a multiethnic prenatal population in New York City between 1998 and 2002 (n = 404). Third-trimester maternal urines were analyzed for phthalate metabolites and a wheezing questionnaire was administered at the age of 6 or 7 years (n = 165). Adjusted odds ratios (aOR) and 95% confidence intervals (CI) for the association between questionnaire responses and micromolar sums of di(2-ethylhexyl) phthalate (ΣDEHP), low molecular weight (ΣLMW), and high molecular weight (ΣHMW) phthalate metabolites were estimated via logistic regression. Models were adjusted for creatinine, baseline maternal characteristics, race/ethnicity, prenatal smoke exposure, sex, breastfeeding duration, and child's relationship to primary caretaker. Adjustment for childhood overweight status did not alter conclusions.
Results: Prenatal phthalate exposure was positively associated with wheezing or whistling in the chest in the past 12 months; aORs (95% CI) for a unit increase in natural log ΣLMW, ΣHMW, and ΣDEHP metabolites concentrations were 1.19 (0.88, 1.60), 1.29 (0.88, 1.88), and 1.37 (0.94, 1.99), respectively. The aOR for wheezing in the past 12 months comparing the highest to the lowest tertile of ΣDEHP metabolite concentrations was 3.05 (95% CI 1.08, 8.63). Ever wheezing or whistling in the chest and physician-diagnosed asthma were also elevated in the highest ΣDEHP metabolites concentrations tertile, though estimates were imprecise.
Conclusions: These findings support a link between the plasticizer DEHP and development of wheezing in childhood, but confirmatory studies in larger populations are needed..

FOOD FOR THOUGHT: ETHICAL ISSUES IN FOOD AND NUTRIENT RESEARCH

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Heads of governments at the 1996 World Food Summit reaffirmed "the right of everyone to have access to safe and nutritious food, consistent with the right to adequate food and fundamental right of everyone to be free from hunger". In 1999, the UN Committee on Economic, Social and Cultural Rights, clarified the 'right to adequate food' to mean that every human being should have physical and economic access to food that is culturally and nutritionally acceptable. Increasing world population, conflicts and climate change have created global food shortages. Efforts aimed at solving world hunger through mass production of cheap and readily available food have resulted in agricultural practices that harm the environment, workers and public health, as well as food systems that are changing cultural landscapes and lifestyles.

Epidemiologic data have supported the association between dietary patterns and health effects, such as the high intake of vegetables and fruits and the low risk of chronic disease. The importance of nutrition in building disease resistant body and mental capacity, starting from early life, has also been recognized. However, sustainable food production and processing methods at local levels and achieving healthy dietary patterns in socio-economically disadvantaged groups remains challenging.

This session will be a moderated open forum to discuss the ethical dilemma of addressing food shortages, personal dietary intake and nutritional status in the context of resource availability and food affordability, and the need to comply with ethical principles of the individual's right to self-determination, beneficence and non-maleficence. The focus of the discussion will be on identifying the unaddressed issues and emerging priorities that the research community should consider from the papers presented in this session.

URBAN AIR POLLUTION AND EFFECTS ON BIOMARKERS IN BLOOD

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Background and Aims: Exposure to ambient air pollution is associated with cardiovascular diseases and mortality. The mechanistic pathways are still unknown, however one hypothesis is that particulate air pollution induces airway inflammation, causing systemic inflammation leading to cardiovascular events and atherosclerosis. The aim was to study the effects of short term alterations in ambient air pollution on biomarkers of inflammation and coagulation in a panel consisting of healthy volunteers.
Methods: The study group consisted of 16 individuals (8 men and 8 women), all non-smokers and living in Gothenburg, Sweden. Median age was 35 years (range 26-55 years). The subjects were called for blood sampling the morning after either a day with high levels of air pollutants (PM_{10}>30 µ/m^3 as 24-hour mean) or after a day with low levels of air pollutants (PM_{10}<15 µg/m^3 and NO_2<35 µg/m^3). Blood samples were analyzed for biomarkers of inflammation and coagulation (CRP, serum amyloid A (SAA), intercellular adhesion molecule 1 (ICAM-1), fibrinogen and factor VIII). Associations between each biomarker and exposure to air pollution were examined using linear mixed-effects models (SAS, version 9.1).
Results: All together, 12 sampling sessions were performed (six days of high and six of low levels of air pollutants). No significant increase in any of the biomarkers was found after days with high levels of PM_{10} (median: 49 µg/m^3) compared with days with low levels (median: 10 µg/m^3) in preliminary analyses. Similar results were found when the exposure instead was classified by the urban background NO_x concentrations, as a marker of traffic exhausts (median: 95 µg/m^3 and 42 µg/m^3 for high and low pollution events, respectively).
Conclusions: We found no significant increases in biomarkers of inflammation and coagulation after high ambient air pollution events compared with low pollution events when performing repeated investigations in a group of healthy study subjects.

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COMPARISON OF THREE DIFFERENT GEOCODING TECHNIQUES IN FRANCE

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Background and aims: The development of more and more precise techniques to assess environmental exposures, particularly using geographic information systems (GIS), has raised the necessity to geocode the addresses of participants in cohort studies. Our objective is to assess the distance of the geocodes obtained for the same address using different techniques of geocoding in French urban areas.
Methods: Within the context E3N, a French Cohort, we geocoded 1809 addresses in 4 urban areas, with 3 techniques:
A. automatically by a commercial firm that uses NavTEQ® streets network to geocode by spatial interpolation along street axis. Location of the coordinates corresponds to 15m to the left or the right from the street centre (depending on the street number if even or odd)
B. automatically using a free Internet service developed using Google Maps® Internet mapping application programming interface (API) where the returned location of the coordinates corresponds (in theory) to the entrance of the building/parcel on the street
C. manually using the free on-line French cadastral maps and locating the coordinates in the center of the building, these were considered as the "true" ones.
Results: We only kept the 1656 addresses for which the 3 techniques found the complete address without doubt. The median difference in m between A and C was 21 (IQR 12-41), and between B and C was 23 (14-45). Comparing A and C, the distance was between 50 and 75m for 9% of the addresses and above 75m for 11%, comparing B and C the percentages were 10 and 12 respectively.
Conclusion: We did not observe large differences between the different techniques however around 20% of the addresses were geocoded at more than 50m from the "true" location. It will be interesting to assess if this alters the exposure estimates and the health effects.
Funding: ESCAPE(EU-FP7)

SOCIO-ECONOMIC PREDICTORS OF IPM TRAINING PARTICIPATION AND IMPLEMENTATION IN ILLINOIS CHILDCARE CENTERS

Background and Aims

A comprehensive program for childcare providers and supervisors to reduce pesticide use and promote integrated pest management (IPM) in Illinois childcares is analyzed, in order to determine its impact on different populations. Since populations are non-uniform in their perception and response to environmental challenges, researchers are looking for criteria to identify at-risk populations and opportunities for promoting environmental behavior.

Infants and young children are particularly vulnerable to pesticide impacts because of their physiology, metabolism and behavior. Critical neurodevelopment processes are especially at risk from toxins. The majority of childcares report using pesticides, where approximately 53 million US children spend up to ten hours daily.

While regulated school IPM programs have proliferated, childcares are more difficult to influence as they vary in location, size, and government oversight; while socio-economic factors help explain access.

Method

A listing of licensed trained and untrained childcares from the post-survey was analyzed for pest incidences, IPM training participation and implementation and the results compared to census 2000 socio-economic data.

Results

Childcares in underprivileged populations were significantly more likely to participate in training than middle socio-economic populations; and mostly large centers participated. Understanding IPM benefits correlated positively with lower socio-economic and negatively with middle to high status, while IPM actions only coordinated with spending a high percentage of income on rental. Training resulted in selective adoption of IPM practices, especially pest prevention.

Conclusions

The training program raised awareness leading to IPM implementation in large licensed childcare centers in underprivileged, but not higher socio-economic populations; homes or license exempt childcares where children may be at even greater risk. This may reflect the formal organization and resources of government subsidized centers serving weaker populations and the strong motivation of childcare providers to protect children.

SPATIAL METHODS FOR ANALYSIS OF CANCER INCIDENCE AND MORTALITY IN VICINITY OF LARGE INCINERATORS IN ENGLAND 1998-2008

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Background and aims In response to health concerns by residents in the vicinity of large waste incinerators in England, a study of incidence and mortality from selected cancers has been undertaken in collaboration with the Health Protection Agency (HPA).
A particular aim is to develop and apply spatial and temporal statistical methods of risk estimation using a novel matched control-area design.
Methods The study includes five incinerators in England with a capacity > 150,000 tonnes pa of waste, operational $\leq$ 31/12/1998. A *case area* is a circle of radius 10km centred on an incinerator. A *matched control area* is a 10km circle of similar demographic profile to the case area, obtained using matching criteria based on the National Statistics 2001 Area Classification for Local Authorities. Cancer incidence and mortality rates are compared between paired areas, and spatial variation in risk estimated within areas.
Results Spatial and temporal trends in annual health outcome data within each circle are analysed using a Poisson log-linear model including age-standardised expected count as an offset, matched case-control areas, deprivation and a plume model for distance and directional effects. Statistically significant distance and directional effects in case areas but not in control areas are indicative of elevated risk attributable to the incinerator. Disease rates in case areas compared to both national rates and control areas are presented.
Conclusion This study develops and applies statistical methods for analysing spatially-referenced health outcome data in regions with a suggested exposure relative to matched regions with no such exposure. Disease risk can be estimated using a combination of classical case-control methods at whole-area level and spatio-temporal methods within case and control areas.

A CASE-CROSSOVER STUDY OF AMBIENT AIR POLLUTION AND STROKE: AN EVALUATION OF PATIENT FACTORS THAT MODIFY ASSOCIATIONS

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Background: Several studies have demonstrated positive associations between short-term increases in ambient air pollution and the risk of stroke. While these studies have compared risks across different seasons, type of stroke, and age, the influence of individual level patient characteristics has remained unstudied.
Methods: This was a time-stratified case-crossover of 5,945 patients who presented to emergency departments (ED) in Edmonton, Canada between 2003 and 2009 with stroke or a transient ischemic attack (TIA). Chart reviews were conducted to extract information on patient's disease history, medication use and smoking status. Daily concentrations of ambient pollution (NO_2, $PM_{2.5}$, O_3, CO, and SO_2) were obtained from fixed-site monitors. Conditional logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals (CI) in relation to an increase in the interquartile range of each pollutant. Stratified analyses were conducted by season, and across variables that captured patient's disease history, medication use and smoking status.
Results: Consistent with a previous ED study conducted during 1992-2002, we observed positive associations between NO_2, and $PM_{2.5}$ between April to September. Specifically, for ischemic stroke the OR for an increase in the interquartile range of the 3-day average of NO_2 was 1.57 (95% CI: 1.16-2.11). No statistically significant associations were observed with NO_2 or $PM_{2.5}$ for TIAs, or hemorrhagic strokes. SO_2 levels were not associated with any of the stroke types examined. Stratified analysis by patient characteristics for ED visits between April and September revealed stronger associations between NO_2 and ischemic stroke for those with a history of stroke (OR=2.43, 95% CI: 1.44-4.08), or heart disease (OR=2.08, 95% CI: 1.25-3.46), and use of insulin or oral hypoglycaemic drugs (OR=2.19, 95% CI: 1.22-3.95).
Conclusions: Our results support the hypothesis that individuals with pre-existing comorbid health conditions are at greater risk of experiencing a stroke due to their exposure air pollution.

HEALTH IMPACT MODELLING OF ALTERNATIVE ACTIVE TRAVEL VISIONS FOR ENGLAND AND WALES USING A TRANSPORT AND HEALTH INTEGRATED MODELLING TOOL (THIM)

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Background and Aims: Achieving health benefits while reducing greenhouse gas emissions from transport offers a potential policy win-win,however, the magnitude of potential benefits is likely to vary by setting. This study presents a new Transport and Health Integrated Modelling tool (THIM) to evaluate the health and environmental impacts of high walking and cycling transport scenarios for English and Welsh urban areas outside London.
Methods: A series of integrated travel time, distance, and trip based scenarios were generated using THIM as part of the Visions 2030 Walking and Cycling project. Environmental modelling was used to estimate changes to CO_2 emissions. Health impact assessment modelling was used to estimate changes in Disability Adjusted Life Years (DALYs) resulting from changes in exposure to PM 2.5, road traffic injury risk, and physical activity.
For each transport scenario THIM generates age and sex specific weekly active travel time distributions, assuming log-normality. THIM uses these log normal distributions to estimate physical activity exposure under each scenario, and from these it calculates the expected changes to DALYs and age/sex specific population body mass index distributions. THIM allows parameter estimates either to be entered for each scenario, or for default values to be used based on existing data.
Results: This paper will present the findings of the new modelling study and discuss them in the light of previous research. The sensitivity of the findings will be considered with reference to parameter uncertainty including, 'safety in numbers', variation in active travel times by age, and the dose-response relationship between physical activity and risk of health outcomes.
Conclusions: Methods to estimate the health impacts from transport related physical activity and injury risk are in their infancy, but this study has demonstrated an innovative integration of transport and health impact modelling approaches. The findings have implication for transport and health policy, and for future empirical and modelling research.

CLUSTER ANALYSIS OF ENVIRONMENTAL AND ELECTROMAGNETIC FIELD HEALTH RISK PERCEPTION IN TAIWAN

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Background and Aims: We surveyed the health risk perception of the environment and electromagnetic fields (EMF) in Taiwanese adults, and analyzed its response clusters.
Methods: A cross-sectional telephone surveys was conducted by the Center for Survey Research, Academia Sinica in August to September, 2007, with a randomized sample of 1,251 adults aged 18 years and beyond.
Results: There were 77% of Taiwanese adults who considered food safety affected health to a big extent, followed by quality of outdoor air, drinking water, and dumping of waste. There were four clusters in the survey, namely, high risk, low risk, environment, and EMF. Within the high risk group, there were more women, middle-aged, married, and high school educated participants. Further, there were higher percentages of reported hypersensitivity to EMF in the high risk and EMF groups.
Conclusions: Taiwanese adults were highly concerned of the health risks of food. Issues of hypersensitivity to EMF warranted further investigation.

RELATIVE DEPRIVATION BETWEEN NEIGHBOURING WARDS IS PREDICTIVE OF CORONARY HEART DISEASE MORTALITY AFTER ADJUSTMENT FOR ABSOLUTE DEPRIVATION OF WARDS

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Backgrounds and aims: An association between income inequality and health has been widely reported, as has an association between levels of income inequality and poor health. Here we are interested in whether, at a small area level, health is affected by the relative deprivation of a ward compared to its neighbours. We aim to assess whether deprivation inequality at small area level in England is associated with coronary heart disease (CHD) mortality rates, and assess whether this provides evidence of an association between area-level and individual-level risk.
Methods Mortality rates for all wards in England were calculated using all CHD deaths 2001 - 2006. Ward-level deprivation was measured using the Carstairs index. Deprivation inequality within local authorities was measured by the interquartile range of deprivation for wards within the local authority. Relative deprivation for wards was measured as the modulus of the difference between deprivation for the ward and average deprivation for all neighbouring wards.
Results Deprivation inequality within local authorities was positively associated with CHD mortality rates after adjustment for absolute deprivation ($p < 0.001$ for all models).
Relative deprivation for wards was positively associated with CHD mortality rates after adjustment for absolute deprivation ($p < 0.001$ for all models).
Sub-group analyses showed that relative deprivation was independently associated with CHD mortality rates in both affluent and deprived wards.
Conclusions Rich wards surrounded by poor areas have higher CHD mortality rates than rich wards surrounded by rich areas. Poor wards surrounded by rich areas have worse CHD mortality rates than poor wards surrounded by poor areas. Local deprivation inequality has a similar adverse impact on both rich and poor areas, supporting the hypothesis that income inequality of an area has an impact on individual-level health outcomes.

EVALUATION OF BREAST CANCER RISK IN RELATION TO NIGHT SHIFT WORK IN A CASE-CONTROL STUDY IN A SPANISH POPULATION

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Background and Aims: Recent epidemiologic and animal data indicate that night work may increase the risk for breast cancer. We evaluated breast cancer risk in female night shift workers in a population based case-control study in Spain, the Multi Case-Control study (MCC-Spain).
Methods: Incident breast cancer cases (n=795) and randomly selected population controls (n=849) were enrolled in 7 regions of Spain. Lifetime occupational history including questions on shift work and information on reproductive and lifestyle factors were assessed by face-to-face interviews. We estimated the risk of different shift profiles using unconditional logistic regression models adjusting for a wide range of potential confounders.
Results: Among 1644 female subjects, 14 controls and 16 cases had ever worked in permanent night shift and 49 controls and 52 cases in rotating night shift for ≥1 year. Having ever worked in permanent night work was associated with an increased risk for breast cancer (Odds Ratio (OR) 1.36 (95% Confidence Interval (CI) 0.62-2.97), compared to permanent day workers, after adjusting for confounders. The corresponding OR for rotating night workers was 1.17 (95%CI 0.71-1.92). Women who had worked in night work for more than 10 years during lifetime, had an OR=1.43, (95%CI 0.79-2.57). This risk was higher in postmenopausal women (OR=1.67, 95%CI 0.79-3.53) as compared to premenopausal women (OR=1.09, 95%CI 0.41-2.89).
Conclusions: A moderate increased risk for breast cancer was associated with having ever worked in night shift, but results were not statistically significant. Risk estimates tended to increase among permanent night workers, among workers with long-term exposure to night work and in postmenopausal women. These estimates were based on small numbers due to the low prevalence of night shift in this population. The study is ongoing and, at the conference, results will be presented for a much larger population sample.

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ASSOCIATIONS BETWEEN BLOOD LEAD LEVELS OF FRENCH CHILDREN AND ENVIRONMENTAL LEAD CONENTRATIONS: PROPOSITIONS OF RISK BASED ENVIRONMENTAL LEAD CONCENTRATIONS LEVELS FOR POLICY MAKING

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Background and Aims: Reductions of environmental lead concentrations and therefore of Blood Lead Levels (BLLs) have been achieved last decades thanks to public health policies (ban of leaded gasoline and leaded paints …). However, children's lead exposure remains a major public health concern, considering the increasing scientific evidence for adverse effects (including cognitive and neurobehavioral deficit) without apparent threshold. The aim of this study is to propose risk based environmental lead concentrations levels in the residential dust, soil and water for policy making.

Methods: 484 French children were enrolled from the survey of the National Institute of Health surveillance (InVS) in a way to be representative of French children aged from 6 months to 6 years. Lead concentrations in blood and environmental samples (water, soils, home dusts, paints and other unusual sources such as cosmetics and traditional dishes) were measured using an ICP-MS, both for total and bioaccessible lead. Social and individual characteristics were collected in addition to housing data. A predictive multivariate model was built with a priori assumption on the covariates to be introduced. Missing data were replaced using multiple imputation by chained equations; the sampling design and sampling weights were taken into account in the model, and cross-validation based on bootstrapping was used.
Results: The population weighted Geometric mean (GM) for BLLs was 1.4 µg/L. The preliminary analyses yielded to significant positive associations between BLLs and lead concentrations in environmental medias after adjustment on sexe, age, tobacco, child's time activity pattern, hobbies at risk, parents educational attainment and use of cosmetics and traditional dishes. More analyses and adjustments are ongoing in order to validate the model. The final results will display: i) action levels (corresponding to BLL increment) for lead concentrations in water, soils and dusts, ii) the most predictive lead concentration measurement method (total or leachable) of BLLs.
Conclusions: This predictive model intended to be a basis to establish and update regulatory action levels for lead concentrations in the different residential medias of exposure, in the context of Public Health attention paid to lower BLLS of young children.

PRESENCE OF ORGANOCHLORINE PESTICIDES IN BREAST MILK SAMPLES FROM WOMEN OF BOGOTA, COLOMBIA

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Background and aims: The presence of organochlorine pesticides (OCPs) in biological and environmental samples has been widely studied in many countries around the world because of their environmental persistence and potential toxicological effects. Determining the presence of OCPs on human fluids, including breast milk, has been used to understand general population exposures and potential health risks derived from these substances, and for surveillance purposes. Exposure to OCPs has not been studied systematically in Colombia. Thus, there is very limited information about the magnitude of the problem (i.e., current and historically), and the potential health implications for the Colombian population.

Methods: Fifteen pregnant and/or breastfeeding mothers who met the sampling criteria of the World Health Organization Persistent Organic Pollutant Surveillance Program were randomly selected to voluntarily participate on the study. Breast milk samples were analyzed for 10 OCPs (alpha-, beta-, gamma-, delta-HCH, Heptachlor, alpha-, gamma-Chlordane, 4,4 DDT, 4,4 DDE, 4,4 DDD). The participants answered a questionnaire regarding diet and socioeconomic status. Milk samples were analyzed using liquid-liquid extraction, followed by sulfuric acid clean-up, and quantified using GC/• ECD. Results were confirmed by GC/MS. OCPs concentrations were normalized by gravimetrically quantified sample's fat content.

Results: The most common OCPs found on breast milk samples were (range ng of OCP/g of fat) alpha-HCH (5,5–8,8 ng/g), and 4,4 DDE (51,8–143,8 ng/g). For all the OCPs reported the analytical method percent recoveries were above 80%.

Conclusions: The OCPs concentrations observed were similar or below the levels found over the last 5 years on other countries, except for alpha-HCH (i.e., our results were higher). Despite the small sample size, the DDE/DDT ratio suggests that the use of DDT has been drastically reduced in Colombia.

INDOOR AIR POLLUTION (CHLORINATED ORGANIC HYDROCARBONS) IN ELEMENTRY SCHOOL IN ISRAEL

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Background: In 1997, heavy contamination was discovered in groundwater in Tel Aviv with heavy metals and volatile organic compounds (VOC)
These VOC's were also found in soil gases in one of the neighborhoods, especially near industrial areas. As a result, the authorities began monitoring VOC's in the neighborhood elementary school.
We report the results of VOC's measurements made at the school expressing exposure of children aged 6-12 years.
Methods: Samples were taken over the years 2001 - 2011 in various methods and included indoor air samples (24-hour canister sampling, passive and active - active charcoal tubes sampling), shallow drills in the school yard, nearby buildings, and "head space" from different materials found in school.
Results: Trichloroethylene was found in all indoor-school measurements (concentrations up to 30.8mcg/m^3). Carbon Tetra-Chloride (up to 49mcg/m^3), Vinyl Chloride (up to 10.4mcg/m^3), cis1,2 Dichloroethene (up to <3.97mcg/m^3), and 1,2 Dichloroethane (up to 14.4mcg/m^3) were found only on ground and underground floors. Chloroform was found in high concentrations (up to 95mcg/m^3) in all 3 school floors. One test even showed a gradient of lower levels in higher floors.
Head-space testing for VOC's from different products found in the school showed low concentrations of chloroform from detergent (3.35mcg/m^3) and Trichloroethylene from a classroom rug (3.61mcg/m^3).
VOC's were not measured in non-ground level distant buildings (above method threshold).
Recurrent measurements were not consistent. However, this may be due to differences in tests performance (classroom ventilation, sampling location, etc.), different test methods (charcoal tubes, canisters, air flow rates, etc.) and laboratory analysis.
Conclusions: The results demonstrate significant exposure of children to carcinogens.
Assisted ventilation of classrooms and continuing measurements were recommended, as well as avoidance from learning in classrooms on the ground and underground floors. Further tests to identify the source of the pollution (indoor or outdoor) were warranted.

GENOTOXIC DAMAGE IN WORKERS OF THE LEATHER SHOE INDUSTRY, EXPOSED TO NOISE

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Background and Objectives: In functional studies has shown that mice carrying the Ahl gene are more sensitive to noise which makes them more sensitive to noise. Other authors have shown an increased cell migration (comet) in subjects exposed to noise levels above 90 dB.
The purpose of this study was to evaluate hearing loss and genotoxic damage in workers chronically exposed to noise in the leather-footwear industry.
Methods: Through an epidemiological design we evaluated 225 workers and identified 44 workers exposed to chronic noise. Hearing loss was assessed using pure tone audiometry. Genotoxic damage caused by noise was determined by measuring DNA migration (comet assay technique.) The results were controlled for age of workers, the use of tobacco and alcohol, working hours, exposure time, intake of NSAIDs and other drugs.
Results: Of a total of 225 audiological examinations, found that 44 patients showed abnormalities of varying degrees. Hearing curves were below the surface profiles of profound hearing loss, indicating that there are probably following systemic damage: 1) surface to severe losses, 2) moderate loss and moderate to severe. This compared with parameters <20 dB. Blood samples were taken at 44 subjects to determine the existence of comet cells. This study showed that 50% of the worker had DNA migration, which correlated significantly with noise level and exposure time $R = 0.503$, $p < 0.05$
Conclusions: This study showed that there genotoxic damage and hearing damage. The comet assay is an excellent biomarker to assess the level of damage in subjects exposed to chronic environmental factors.
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LONGITUDINAL STUDIES OF NOISE AND MENTAL HEALTH

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Background and Aims: Most studies of environmental noise exposure and mental health have been cross sectional and may be prone to selection bias. Studies of symptoms, clinical disorders and medication use suggest associations between aircraft and road traffic noise and anxiety disorders. There have been few longitudinal studies. This paper examines the results of current longitudinal studies adding further data from the 1958 Birth Cohort.

Methods: The UK 1958 Birth Cohort has followed a cohort of 18,000 born during one week in 1958. At age 45 they were interviewed with the Clinical Interview Schedule to measure common mental disorders. In these analyses occupational noise exposure during adulthood was examined in relation to depressive and anxiety symptoms at 45 years taking potential confounding factors into account.

Results: In the 1958 Birth Cohort occupational noise exposure was weakly prospectively associated with depressive symptoms in men but much of this may be explained by confounding factors. These findings are compared with previous studies including the Caerphilly Study where road traffic noise exposure was associated with a non-linear increase in anxiety symptoms (Stansfeld et al, 1996).

Conclusions: There is weak evidence for environmental noise influencing mental health in longitudinal studies. There is a need for further studies with good measurement of noise exposure, confounding and moderating factors, such as noise sensitivity and a greater reliance on standardised interview measured psychiatric disorders in order to answer the question of whether noise can be implicated in the causation of common mental disorders.

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PREVALENCE OF LIP AND PALATE IN COMMUNITIES BRICK ASSOCIATED POLYCYCLIC AROMATIC GUANAJUATO

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Background and Aims: Exposure to environmental an occupational and inhalation of hazardous substances (polycyclic aromatic), toxins and pregnant before 25 or after age 35 are factors that increase the risk of some congenital malformation (originating during pregnancy), such as lip and palate, neural tube defects, and Down syndrome or Turner.
The aim was to determine the prevalence of cleft lip and palate in brick business communities by environmental and occupational exposure to polycyclic aromatic compounds.
Methodology: The study was descriptive, using a Medical History and Diagnosis environmental community, families with presence of cleft lip and palate infants born during the January 1, 2009 and Oct 31, 2010. Was studied gender, occupational activity during pregnancy, weight, maternal age, number of deeds, origin, malformation and history of alcoholism and smoking positive
Results: Of the neonates with cleft lip and all were born alive, 6 were female (33.33%) and 12 males (66.66%) with a F / M of 0.20. The average birth weight was 2943 grams. The average age was 25.1 years, the 50%, a history of alcoholism on their partners on weekends. This type of malformation in children, 15 (83.33%) with cleft lip and palate type I, 2 girls (11.11%) cleft lip and 1 child (5.55%) cleft palate. With regard to the number of deeds, could be seen that most infants with cleft lip and palate were the product of multiparous mothers (66.66%). The frequency of congenital cleft lip and palate were from communities of brick producers. León 13.5%, 54% of Salamanca, Silao 12%, 11% of capital and Celaya Guanajuato to 6%.
Conclusions: Data obtained from the review of the families engaged in the activity of the brick mothers worked or cooked by burning furnaces throughout the pregnancy.

TIMING OF AND LOCATION AT STROKE ONSET: IMPLICATIONS FOR CHARACTERIZING SHORT TERM EFFECTS FROM AMBIENT AIR POLLUTION

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Background and aims: Time-series and case-crossover studies have found that short-term increases in ambient air pollution are associated with a higher risk of stroke. These studies have typically used the day of presentation to an emergency department to infer the time of stroke. The objective of this study is to improve our understanding of potential sources of bias that could arise from the use of hospital administrative data to estimate the risk of stroke from exposure to ambient air pollution.

Methods: We collected survey data from 336 stroke patients in Edmonton, Canada on the date, time, location and nature of activities at onset of stroke symptoms. The daily mean concentration of ambient NO2 and PM2.5 on the self-reported day of stroke onset was estimated from continuous fixed site monitoring stations.

Results: Among the 241 patients who were able to recall when their stroke started, 72.6% experienced stroke onset the same day they presented to the emergency department; there was no systematic difference in assigned pollution levels for either NO2 or PM2.5. At the time of stroke onset, 90% were inside at the time of stroke onset. On the day of their stroke, most patients (84.5%) reported that for most of the day they were within a 15 minute drive from home.

Conclusions: Our analysis suggests that day of presentation obtained from hospital administrative records can reasonably capture onset of stroke, and that any associated errors are unlikely to be important source of bias when estimating air pollution risks.

THE ROLE OF GENDER IN INORGANIC ARSENIC INDUCED OXIDATIVE STRESS AMONG BANGLADESHI POPULATION EXPOSED TO HIGH ARSENIC THROUGH DRINKING WATER

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Background: Arsenic acts as a carcinogen may be due to oxidative stress induction through the generation of reactive oxygen species (ROS). Gender disparity has been reported in many arsenic-exposure related diseases like cardiovascular diseases, hypertension, liver diseases, as well as skin lesions or cancers. However, no study had been reported about gender disparity in arsenic induced oxidative stress in Bangladeshi arsenic-exposed population.
Objective: The objectives of the study are to examine the levels of urinary 8-OHdG and F2α –isoprostane, two established oxidative stress biomarkers, in relation to the urinary arsenic within Bangladeshi arsenic-exposed men and women.
Methods: Data were obtained from 219 healthy participants, aged 18-45 years, from two communities of southern-west part of Bangladesh in August 2009. One hundred four participants were participated from high arsenic- contaminated area and other 115 participants from arsenic free area.
Results: Urinary arsenic was positively associated with oxidative biomarkers-namely 8-OHdG and F2α-isoprostane ($r=0.59$, $p<0.001$ and $r=0.43$, $p<0.001$, respectively). The exposed group showed higher urinary arsenic (Geometric mean 166 µg/g Cr 95% CI 102.8-230.9) than the non-exposed group (Geometric mean 54 µg/g Cr, 95% CI 38.8-70.9). Higher 8-OHdG level was found in As-exposed group (Geometric mean 8.4 ng/mg Cr, 95% CI 2.5-14.2 vs Geometric mean 6.5 ng/mg Cr, 95% CI 3.9-9.6) than in non-exposed group, but result was different for F2α-isoprostane (Geometric mean 5.5 ng/mg Cr, 95% CI 4.1-6.9 vs Geometric mean 7.0 ng/mg Cr, 95% CI 2.8-11.2). Among arsenic-exposed subjects urinary arsenic and 8-OHdG levels were significantly lower ($p<0.05$) in women than men. In case of F2α-isoprostane, women have higher values than men within the non-exposed group, but no sex difference was found in As-exposed group.
Conclusions: The results suggest that oxidative DNA damage and lipid peroxidation were associated with arsenic exposure, which were sex-dependent to some extent.

ASSOCIATION BETWEEN URINARY 3, 5, 6-TRICHLORO-2-PYRIDINOL, A METABOLITE OF CHLORPYRIFOS AND CHLORPYRIFOS-METHYL, AND SERUM THYROID HORMONES IN NHANES 1999-2002

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Background and Aims: Thyroid hormones (TH) are vital to a host of human physiological functions in both children and adults. Exposures to chemicals, including chlorpyrifos, have been found to modify thyroid signaling at environmentally relevant levels in animal studies. The aim of this study was to examine circulating TH levels in relation to urinary concentrations of 3, 5, 6-trichloro-2-pyridinol (TCPY), a metabolite of the organophosphorus insecticides chlorpyrifos and chlorpyrifos-methyl, using data from individuals 12 years and older from the U.S. National Health and Nutrition Examination Surveys (NHANES).
Methods: NHANES datasets from 1999-2000 and 2001-2002 were combined, and individuals with thyroid disease were excluded (N=4304). Multivariable linear regression models for relationships between log-transformed urinary TCPY and total serum T_4 or log (TSH) were constructed and adjusted for urinary creatinine, age, BMI, race, serum cotinine, income, and thyroid altering medications. Models were stratified by sex and a categorical age variable (<18, 18-40, 40-60, and >60 years).
Results: In male participants, an interquartile range (IQR) increase in urinary TCPY was associated with statistically significant decreases in serum T_4 of 3.7% (95% CI 0.77%-6.8%) among those <18 years of age, and 3.3% (0.03%-6.8%) in the 18-40 year age group, relative to median T4 levels. An IQR increase in TCPY was also associated with decreases in TSH of 9% (1%-17%) among men 18-40 years old and 21% (12%-29%) among men >60 years old. Conversely, urinary TCPY was positively associated with TSH in females >60 years of age.
Conclusion: These results, from a representative sample of the U.S. population, support the limited human and animal data that have reported a relationship between chlorpyrifos, chlorpyrifos-methyl, or TCPY exposure and altered thyroid hormones. Further research to confirm these findings, elucidate mechanisms of action, and explore the clinical and public health significance of such alterations in thyroid hormones is needed.

Con formato: Izquierda, Espacio Después: 0 pto, Interlineado: sencillo

Assessment of Personal Exposure to Manganese in Children Living Near a Ferromanganese Refinery

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Background and Aims: Airborne exposure to manganese (Mn) can result in neurologic effects. Stationary air sampling is the traditional technique to assess Mn exposure for communities, yet may not accurately reflect children's personal exposure. The study aimed to 1) determine personal air Mn exposure in children residing near a ferromanganese refinery, and 2) identify the relationship between personal air Mn, stationary air Mn, and time-weighted distance from the refinery (TWD).
Methods: A subset of children living in non-smoking households ages 7-9 enrolled in the Marietta Community Actively Researching Exposure Study during March – June 2009 and 2010 were invited to participate. Participants wore a $PM_{2.5}$ sampler (Personal Modular Impactor) for 48 hours. TWD was based on time spent at home and school and the distance of each from the refinery. Stationary outdoor air sampling was conducted 8 km from the refinery using a Harvard-type $PM_{2.5}$ impactor. The relationship between personal Mn exposure and TWD was examined by multiple regression controlling for stationary air Mn concentration, wind speed and direction, and average precipitation.
Results: We collected complete personal air sampling data on 38 children. TWD ranged from 4.7 km to 28.5 km with a mean distance of 11.1 (4.7 st.dev) km. Mn concentration in personal air samples ranged from 1.5 ng/m^3 to 54.5 ng/m^3 (mean, 11.7 ng/m^3; st.dev, 12.5 ng/m^3). TWD was the most significant predictor of personal air Mn concentration with an associated decrease of approximately 8% of the natural log of personal air Mn for each km TWD ($p<0.005$, 95% CI -13% to -2%). Wind speed and stationary Mn levels were also significantly associated with personal exposure.
Conclusions: A child's location (home and school) relative to the refinery is a significant predictor of personal Mn exposure. Future analyses will evaluate ambient air Mn exposure on childhood neurobehavioral development.
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A METHOD FOR DETECTION OF RESIDUAL CONFOUNDING IN SPATIAL AND OTHER OBSERVATIONAL STUDIES

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Background and Aims: Detection of residual confounding is a difficult issue in observational studies. We recently described such a method and justified its use primarily for time-series studies (Flanders et al, 2009; Flanders et al 2011). The method depends on an indicator with two key characteristics: it is conditionally independent (given measured exposures and covariates) of the outcome in the absence of confounding, misspecification and measurement errors; second, it is associated with the exposure and, like the exposure, with unmeasured confounders. We proposed using future exposure levels as the indicator to detect residual confounding. This was a seemingly natural choice for time-series studies because future exposure cannot have caused the event yet could be spuriously related to it. A related question of interest – that addressed here - is whether an analogous indicator exists that can be used to identify residual confounding in a study based on spatial, rather than temporal contrasts.
Methods: Using directed acyclic graphs and specific causal relationships, we show that future air pollution levels may have the characteristics appropriate for an indicator of residual confounding in spatial studies of environmental exposures
Results: In simulations based on a spatial study of ambient air pollution levels and birth weight in Atlanta, with ambient air pollution one year after conception as the indicator, we were able to detect residual confounding. For the study size used, the discriminatory ability approached 100% for some factors intentionally omitted from the model, but was very weak for others.
Conclusions: The simulations illustrate that the indicator based on future exposures can have excellent ability to detect residual confounding in spatial studies, although performance varied by situation and study size.

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PRENATAL ENVIRONMENTAL EXPOSURE, SUPPLEMENTATION WITH OMEGA-3 FATTY ACIDS DURING PREGNANCY AND RISK OF ATOPIC DERMATITIS IN MEXICAN INFANTS

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Background and aims: The identification of family and environmental risks factors in early stages of life could help early detection of risk of atopy in children and studies suggest that omega-3 polyunsaturated fatty acids could play a role in preventing allergic diseases. We conducted this study to identify the main prenatal environmental risk factors of the atopic dermatitis in childhood whose mothers participated in a randomized clinical trial of supplementation with omega 3 fatty acids during pregnancy.
Methods: We included 785 children whose Mothers were randomly assigned to receive daily supplement of 400 mg of docosahexaenoic acid or placebo from week 18-22 of pregnancy until childbirth. During pregnancy, we obtained information on sociodemographics characteristics, environmental exposures and perceived stress. Clinical information of signs and symptoms of atopic dermatitis in infants was obtained every three months from birth until 18 months of age based on the classification of objective SCORAD at cutoff $\geq$ a 1. Logistic regression models were used to identify the main prenatal risk factors.
Results: We didn't observe significant differences in SCORAD prevalence for treatment group (25% in placebo vs 24.5% in DHA group). We observed that the higher risk of atopic dermatitis were for the infants that has been born in autumn (OR= 1.99; 95%CI 12.4, 3.19) and winter (OR= 1.85; 95%CI 1.18, 2.90) vs. spring and those born by cesarean (OR= 1.38; 95%IC 1.00, 1.92). Having spiders in the home (OR= 1.29; 95% CI 0.93, 1.79) and maternal history of allergic rhinitis (OR= 1.39; 95% CI 0.96, 2.01) were marginally associated.
Conclusions: This study strengthens the evidence that the family history and prenatal environmental exposure increase the risk of atopic dermatitis in early stages of life.
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METHODS FOR ESTIMATING HEALTH EFFECTS OF MULTIPOLLUTANT MIXTURES IN COHORT STUDIES

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Background: Given the complexity of the pollutant mix in ambient air, it is reasonable to assume that the focus on a few regulated air pollutants in health effects research provides only a limited picture of air pollution health effects and may hamper the effectiveness of air quality management programs. Data on many features of the complex ambient mix are now becoming more readily available, both from government monitoring networks and research-related monitoring campaigns. Besides the opportunities that such data provide in furthering understanding of pollution effects, there are challenges in specifying exposure estimates based on these complex data for use in health effects analyses. Many options can be considered in attempting to tackle these challenges.
Methods: We are working on an integrated methodology to predict a multivariate exposure for members of a cohort that accounts for correlation in space and between pollutant components and for differential measurement error between pollutants. Prediction will be based on a universal kriging model that incorporates land-use and other geographic data, and a principal component analysis approach to reducing the dimension of the exposure in order to obviate the need for high-dimensional effect modification. Using this methodology, relative disease risks of contrasting pollutant mixtures will be estimated with the aim of better understanding the relative toxicity of different mixtures and more effectively focusing regulatory efforts to lessen air pollution exposure effects.

ASSOCIATIONS BETWEEN GREENSPACE AND MORTALITY IN A POPULATION-BASED COHORT STUDY OF 574, 834 ADULTS IN ONTARIO, CANADA

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Background: Access and exposure to green space is associated with a wide range of potential health benefits. Few studies have examined the direct impact of exposure to greenspaces on mortality. We investigated the association between greenspaces and mortality using a population-based cohort design.
Methods: A cohort of 574,834 adults who were residents in one of 10 urban areas in Ontario, Canada in the early 1980s was assembled using income tax records. Vital status was determined through record linkage to the Canadian Mortality Data Base until the end of 2004. Six-character postal codes, representing a block face or large apartment building, from income tax records were used to identify the geographical coordinates for subjects' place of residence. To these locations we assigned the Normalized Difference Vegetation Index (NDVI) as a measure of greenspaces. The NDVI is derived from Landsat Thematic Mapper (TM) data at 30m x 30m resolution for the years 1989-1997. Rate ratios for mortality were estimated using the Cox model and adjusted for income, marital status, neighbourhood characteristics, ambient PM2.5, and smoking prevalence estimates from the 1990 Ontario Health Survey. Mortality endpoints studied included: all non-accidental causes, cardiopulmonary disease, ischemic heart disease, and stroke.
Results: A total of 181,107 non-accidental deaths occurred in the cohort. An inverse association was observed across increasing quartiles categories of 'greenspace'. For all non-accidental causes of death, the risks in the upper three quartiles relative to the lowest greenness quartile were: 0.95 (95% CI=0.94 – 0.96), 0.95 (95% CI=0.94 – 0.96), and 0.93 (95% CI=0.92 – 0.95). The corresponding risks for cardio-pulmonary mortality were: 0.95 (95% CI= 0.93 – 0.96), 0.94 (95% CI= 0.92 – 0.96), and 0.92 (95% CI=0.90 – 0.94). Inverse associations were also observed with ischemic heart disease, and stroke mortality.
Conclusions: Our study suggests that greenspace in urban environments is associated with lower rates of mortality.

COMMUNITY PARTICIPATION TO LOWER ARSENIC EXPOSURE MORE EFFECTIVELY IN BANGLADESH

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Background/Aims: Millions of villagers in Bangladesh drink groundwater containing elevated levels of arsenic from their own well water even though arsenic safe water is often available within short walking distance. Well water arsenic testing has been shown to reduce arsenic exposure; however there have been no studies looking at the effectiveness of having a local villager conduct the well testing program.

Methods: We conducted a cluster-based randomized controlled trial(RCT) of 1000 households in 20 villages to investigate the impact of having a local person present within a village in comparison to an outside person conducting water arsenic testing and arsenic education in Singair,Bangladesh. Six months after the intervention the rate of well switching and the change in urinary arsenic from baseline was determined. This is the first RCT of arsenic education conducted in Bangladesh using a biological outcome indicator.

Results: The trained arsenic testers were able to convince 58% of study households with unsafe wells to switch to alternative drinking water sources. Although we did not find a statistically significant difference between the local and outside tester villages, this overall rate is more than twice the rate of well switching observed in areas that only received well testing from the nationwide Bangladesh Arsenic Mitigation Water Supply Project(BAMWSP). Furthermore the urinary arsenic levels of all study participants with unsafe wells that switched to safe drinking water sources(<50µg As/L) dropped from an average of 215µg As/g creatinine at baseline to 133µg As/g creatinine at follow-up, a 38% reduction in average urinary arsenic content. Those with unsafe wells that did not switch had an average urinary arsenic of 235µg As/g creatinine at follow-up.

Conclusions: The success of this intervention demonstrates that training upazila level staff to provide arsenic testing and education is an effective means of reducing arsenic exposure in villages in Bangladesh.

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PULMONARY EFFECTS AMONG CHILDREN EXPOSED TO ARSENIC IN UTERO IN MATLAB, BANGLADESH

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Background and Aims: The lung is a surprising target site for health effects of exposure to arsenic in drinking water (Smith et al. 2006; von Ehrenstein et al. 2005). Though we know such exposure causes lung cancer and respiratory effects in adults, we have yet to establish lung health effects after early life exposure. Exposure to arsenic is widespread in Bangladesh, but little is known about the effects on children (Smith et al. 2000). We will investigate lung health endpoints among children aged 7 to 16, after exposure in utero and in early childhood.

Methods: This population-based cohort study assessed the lung function and respiratory symptoms, including chronic cough and shortness of breath, of children 7 to 16 years old after arsenic exposure in utero and in the first five years of life. In utero exposure was assessed based on drinking water arsenic concentrations consumed by the mother during pregnancy. Here we compare children with in utero exposure to more than 500 ug/L of arsenic to children exposed to less than 10ug/L in utero.

Results: The most notable findings to date are that exposed children have considerably higher prevalence of several chronic respiratory symptoms compared to unexposed children. For example, children who had experienced in utero exposure to more than 500ug/L of arsenic were more likely to report shortness of breath when walking fast or climbing (OR=3.19, 95% CI 1.22-8.32, $p<0.01$), and nearly four times more likely to report shortness of breath when walking on level ground (OR=3.86 CI 1.09-13.7, $p=0.02$). However, there was little evidence of effects on lung function.

Conclusions: This is the first comprehensive study of early life exposure to arsenic in drinking water on lung health effects in children. Increased respiratory symptoms were identified, but so far we have found little measurable effect on lung function.

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Prenatal Exposure To Butylbenzyl Phthalate And Early Eczema In Seroatopic Versus Nonatopic Children

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Background and Aims: In a cross-sectional study, butylbenzyl phthalate (BBzP) concentrations in house dust were associated with eczema and rhinitis among children ages 3-8 years. Our aim was to test whether concentrations of monobenzyl phthalate (MBzP), a BBzP biomarker, in maternal urine during pregnancy are associated with allergic symptoms in young children and whether that varies by seroatopy.
Methods: MBzP was measured in a spot urine sample collected in 1999-2006 during the 3^{d} trimester of pregnancy from n=385 nonsmoking African American and Dominican women residing in New York City. Mothers completed repeat child symptom questionnaires through child age 60 months. Repeat child blood samples through age 84 months were analyzed for cockroach, dust mite, and mouse specific IgE defining seroatopy as ≥1 result of ≥0.35 IU/ml.
Results: MBzP was detected in >99% of urine samples (geometric mean (IQR), 18.4 (7.9, 41.0) ng/ml). By 24 months, 30% of children reported ever having eczema, with the proportion higher among African-Americans (48%) than Dominicans (20%), p<0.001. In multivariable logistic regression analyses, MBzP urinary concentration was associated positively with the odds of eczema (Odds Ratio 2.02, 95%CI [1.32, 3.09], p<0.001, n=385) for an IQR increase in log MBzP concentration, adjusting for specific gravity, child sex, and ethnicity. Stratified analysis suggests a stronger association for ever-eczema up to 24 months among non-atopics (OR 2.52, 95%CI [1.49, 4.25], p<0.001, n=264) than among atopics (OR 1.28, 95%CI [0.48, 3.41], p<0.62, n=92) for an IQR increase in MBzP. The association between MBzP and child ever-eczema remained significant through child age 60 months.
Conclusions: Prenatal exposure to BBzP may influence the risk of developing eczema in early childhood, especially among nonatopics.
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A COHORT STUDY OF TRAFFIC-RELATED AIR POLLUTION AND CARDIOVASCULAR MORTALITY AMONG ADULTS IN THREE CANADIAN CITIES

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Background: Several longitudinal studies have demonstrated associations between air pollution and cardiovascular mortality, but few studies have assessed intra-urban variation in traffic-related pollution or evaluated health effects at lower levels of pollution that are typically seen in Canadian cities. The purpose of this study was to determine whether an association exists between traffic-related air pollution and cause-specific cardiovascular mortality among adults living in Ontario, Canada.

Methods: This population-based cohort study used as a sampling frame the Federal income tax database which captures 95% of Canadians. More than 660,000 adults who were 35 years of age and older and lived in 10 cities in Ontario between 1982 and 1986 were randomly selected from income tax database and were followed up through 2004. Mortality from cardiovascular and cerebrovascular disease were ascertained for all subjects over the period of 1982-2004 using the Canadian Mortality Database. We report herein an analysis of a sub-cohort who, at the time of entry, lived in either Toronto, Hamilton, and Windsor, Ontario (n=205,430), for whom we were able to make use of concentrations of NO_2 estimated from land use regression models. Adjusted Cox models included known individual risk factors and ecological covariables, and we conducted sensitivity analyses using indirect methods to adjust for smoking.

Results: For each increase of 5ppb of NO_2, the adjusted rate ratios (RR_{5ppb}) were 1.08 (95%CI: 1.04-1.11) for all cardiovascular mortality and 1.09 (95%CI: 1.04-1.14) for ischemic heart disease. Further indirect adjustment for smoking reduced the effect estimates, but the positive associations remained: all cardiovascular mortality, 1.04 (95%CI: 1.00-1.09) and ischemic heart disease, 1.05 (95%CI: 1.00-1.11). We did not find any effect for cerebrovascular disease (RR_{5ppb}=0.96; 95%CI: 0.89-1.03).

Conclusion: Our findings support the hypothesis that long-term exposure to traffic-related air pollution increases the risk of cardiovascular disease and in particular, from ischemic heart disease.

RESIDENTIAL PROXIMITY TO MAJOR ROADS AND PLACENTAL WEIGHT RELATIVE TO BIRTH WEIGHT

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Background and Aims: The ratio between placenta and birth weight could be a useful indicator of placental function and a disproportionately large placenta may show an inefficient placenta with decreased ability to translate its own growth to fetal growth. A recent study suggests that a disproportionately large placenta is associated with increased risk of cardiovascular disease death in later life. We thus evaluated the association between proximity to major roads (as an index for air pollution) and placental weight relative to birth weight.
Methods: Data on parental information and birth outcomes were extracted from the database maintained by the perinatal hospital in Shizuoka, Japan. We restricted the analysis to mothers who delivered liveborn single births from 1997 to 2008 (n = 14,189). Using the geocoded residential information, each birth was classified on its proximity to major roads. We estimated the multivariate-beta coefficients and their 95% confidence intervals (CIs) for the association of proximity to major roads with the placenta-birth-weight-ratio as well as placental weight, using multiple linear regression.
Results: We found a positive association between proximity to major roads and the placenta-birth-weight-ratio. Mean of the placenta-birth-weight-ratio was 20.1 % for mothers living outside 200m from major roads, in contrast the mean was 20.5 % for mothers living within 200 m. After adjusting for potential confounders, living within 200 m increased the ratio by 0.45 % (95% CI = 0.13 – 0.78). Proximity also decreased the placental weight by 13.67 g (95% CI = 5.15 – 22.18); however the association was attenuated after birth weight adjustment.
Conclusions: This study demonstrates that exposure to traffic-related air pollution increases the placenta-birth-weight-ratio.

BREAST CANCER RISK AND TETRACHLOROETHYLENE-CONTAMINATED DRINKING WATER IN CAPE COD, MASSACHUSETTS: A REANALYSIS OF CASE-CONTROL DATA USING GIS, RESIDENTIAL HISTORIES, AND A MODIFIED EXPOSURE ASSESSMENT

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Background and Aims: A population-based case-control study was undertaken to investigate the association between tetrachloroethylene (PCE) exposure from public drinking water and breast cancer among residents of Cape Cod, Massachusetts. PCE, a volatile organic chemical, leached from the vinyl lining of water distribution pipes into drinking water from the late 1960s through the early 1980s. A retrospective exposure model was needed given the lack of historical environmental data and the long latency of breast cancer.

Methods: Historic PCE exposure estimates were generated by integrating residential histories with a water distribution modeling software (EPANET 2.0) using GIS. We modified the publicly available source code for EPANET to include an algorithm for the PCE-leaching component. The exposure distribution using the modified EPANET model was compared to estimates generated with a simplified location-only exposure method that did not account for water flow patterns and to PCE concentrations measured in water samples. Lastly, we reanalyzed the risk of breast cancer using the modified EPANET exposure model to determine how an improvement in exposure assessment changes the results of an earlier study.

Results: Estimates using the modified exposure model had a higher correlation with PCE concentrations in water samples (Spearman correlation coefficient =0.65, $p<0.0001$) than estimates generated using the location-only exposure method (0.54, $p<0.0001$). However, we found a similar modest increase in the risk of breast cancer for women with high PCE exposure levels for both exposure methods (adjusted ORs 1.3-2.0).

Conclusions: The incorporation of sophisticated flow estimates in the exposure assessment method shifted the PCE exposure distribution downward, but did not meaningfully affect the exposure ranking of subjects or the strength of the association with the risk of breast cancer found in earlier analyses. Thus, these breast cancer associations are relatively robust to refinements in exposure modeling.

A CALIBRATION FUNCTION FOR HANDHELD PM2.5 MONITORS IN DIESEL-POLLUTED ENVIRONMENTS

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Background and Aims: Handheld fine particulate matter ($PM_{2.5}$) monitors are increasingly used for exposure assessment due to the expense and lack of portability of reference methods. These handheld monitors have been shown to provide data that is not directly comparable to reference monitors. Although typically calibrated with dust standards (e.g., Arizona Road Dust), they are often used to measure particles dominated by compositions with different characteristics, such as diesel. Previous authors have attempted to determine a constant factor by which measurements of handheld monitors can be corrected. In urbanized areas where PM predominantly derives from diesel emissions, distribution of particle sizes differs from dust, and a constant calibration factor may not be appropriate. Instead, we derive a linear calibration function which more accurately represents the relationship between handheld and reference readings of diesel-related $PM_{2.5}$.
Methods: We collected data with co-located handheld and reference monitors simultaneously at sites contaminated with diesel PM in Boston, MA and Carlisle, PA. Handheld monitors were Sidepak AM510 (TSI Inc); references were beta attenuation monitors. Pilot data consisted of 80 hours (four monitor-days) of simultaneous measurements. Data collection continues during the summer of 2011.
Results: The Sidepaks read PM2.5 values substantially higher than the BAMs, consistent with previous studies. A linear calibration function was observed, ranging from about 1.0 at low $PM_{2.5}$, to about 3.5 at the highest PM2.5 levels (over 30 $\mu g/m^3$, twice the USEPA annual average standard), resulting in an excellent fit (R^2=0.8). Slopes and intercepts of each monitor-day regression were similar. A simple equation for a calibration function was then derived to correct Sidepak to BAM readings.
Conclusions: The proposed calibration function substantially improves correction of handheld monitor $PM_{2.5}$ data. In areas where transportation-related diesel contributes to PM, this provides more accurate PM measurements for exposure assessment and comparison with national standards.

ATRAZINE EXPOSURE FROM DRINKING WATER AND ADVERSE BIRTH OUTCOMES IN KENTUCKY, U.S.A.

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Background and Objectives: Herbicide useis widespread worldwide, with atrazine being one of the most common in the U.S.A. and other countries. Recent studies suggest a possible association betweenatrazine exposure and adverse birth outcomes. Kentucky, a largely ruralstate with high atrazine use, ranks among the highest in the U.S.A.in rates of prematurity and low birth weight.We examinedthe relationship between atrazine in drinking water andpreterm births, gestational age and birthweight.
Methods: Kentucky birth certificate data were analyzed to assess birth outcomes and other individual-level covariates. Data from 2004-2006 were used for all singleton births toKentucky residents. Atrazine levels in drinkingwater were assessed at the county level using data from the Department of Water andthe Kentucky Geologic Survey.Counties were categorized into tertiles of atrazine exposure (high, moderate, low). Multivariate linear and logistic models were used to assess the potential risk contribution of atrazine to birth weight, gestational age and preterm births (<37 weeks of gestation).
Results: A significant risk was observed for preterm births forwomen residing in the high versus low exposure counties while controlling for relevant individual covariates (OR= 1.26; 95% CI 1.19, 1.33). Similar results were found for gestational age as a continuous variable, with a difference of -0.20 weeks (95% C.I. -0.25, -0.16), and for birth weight, with a decrease of -25.8 grams (95% C.I. -34.9,-16.6).
Conclusions: The results of this study indicated a modest association between atrazine exposure and adverse birth outcomes. The results were consistent with similar recent studies.However, due to the ecologic nature of the exposure assessment and the possibility of exposure misclassification further individual-levelresearch is strongly recommended to assess the relationship between atrazine exposure and adverse birth outcomes.

PARTICULATE AIR POLLUTION AND SURVIVAL: PROPORTIONALITY ASSUMPTION, TIMING OF DOSE, AND DOSE-RESPONSE RELATIONSHIP IN THE HARVARD SIX CITIES STUDY

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Background and Aims: The association of fine particulate air pollution ($PM_{2.5}$) with mortality is well established, however questions have been raised about the sensitivity of results to model specification, including whether covariates are proportional and whether the dose-response is linear. We addressed these issues using an extended follow-up of the Harvard Six Cities Study through 2006, incorporating more recent lower exposures.
Methods: 8111 white adults were included. Personal characteristics were collected at enrollment (1974). Vital status has been updated using the National Death Index. Annual $PM_{2.5}$ was measured by study or US EPA monitors. We replicated the original results for $PM_{2.5}$ and all-cause mortality using a Cox regression and repeated with a Poisson survival analysis with separate hazard rates for each year of follow-up. To relax the proportionality assumption, we included interactions between year of follow-up and smoking, sex, and education. We examined the shape of the dose response relationship using penalized splines and the fit of models with different lags.
Results: Poisson and Cox models produced similar results, which did not change with time-varying covariate effects. Akaike's information criterion was lower for models using current year's $PM_{2.5}$ than for the models including earlier years. Each 10µg/m^3 increase in $PM_{2.5}$ exposure in the year of death was associated with an adjusted RR=1.13 (95% CI, 1.06-1.20). The penalized spline model chose one degree of freedom, indicating a linear dose-response relationship. The results did not show any rationale for threshold in the association, and the effects of $PM_{2.5}$ did not change by time period.
Conclusions: Including more recent observations with exposures below the US standard (15µg/m^3), we found a strong linear association without any threshold between $PM_{2.5}$ and all-cause mortality. Results showed that current year was the best exposure window and that the toxicity of $PM_{2.5}$ has not changed over time.
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ASSOCIATION BETWEEN VEHICULAR DENSITY AND HOSPITALIZATION BY RESPIRATORY DISEASES AMONG CHILDREN IN THE CITY OF SAO PAULO, BRAZIL

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Background and aims: Traffic-related air pollution has been associated with respiratory disease (RD) in children in different developed countries. In Brazil, this is the first study to look at the impact of this exposure on the respiratory health of this population subgroup.

Methods: Hospital admissions by RD (ICD-10: J00-J06; J10-J16; J18; J20-J22 and J45-J46) of children <5 years old, from public and private hospitals of the city of Sao Paulo in the period 2004-2006, were geocoded according to their residence addresses . Vehicular density (VD) was calculated for micro-areas of 500m2 of the city and was used as the indicator of exposure to traffic-related air pollution. The number of resident people, household density (HD) and the Human Development Index (HDI) were available for these micro-areas. Admission rates for children were calculated for the micro-areas and VD, HD and HDI were categorized into quartiles. Multiple logistic regression models with the admission rates as the dichotomous dependent variable (equal or greater than the median) and VD, HD and HDI as independent variables were used.

Results: 76,351 admissions of children were analyzed in 3,755 micro-areas of Sao Paulo. Having the first quartile of VD as baseline and allowing for HD and HDI, the adjusted OR for children admissions were: 1.87(95%CI:1.53-2.93); 2.42(95%CI:1.93-3.02); 2.49(95%CI:1.98-3.12). When VD was treated as continuous, a significant association was observed (OR=1.009; 95%CI:1.004-1.014). Thus, for a vehicle per 500m2 increase there was an increase of 0.9% in the chance of a child being hospitalized by RD. Similar associations were observed when the type of fuel (gasoline or diesel) and disease subgroups (asthma, pneumonia and upper respiratory infections) were considered separately.

Conclusion: These findings indicate that mobile sources of air pollution have great influence on hospitalization by RD among children in the city.

TRANSFER RATE DIFFERENCE ACCORDING TO THE CONGENERS AND ISOMERS SHOULD BE CONSIDERED IN RISK ASSESSMENT OF FETAL EXPOSURE TO PBDEs AND POPs

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Background and Aims: Polybrominated Diphenyl Ethers (PBDEs) and Persistent Organic Pollutants (POPs) have been reported to have toxicity and endocrine disrupting effects. However, the health effects of PBDEs, PCBs and Dioxins have been reported to be different among the congeners and isomers. The purposes in the current study were; 1) to see the current exposure level of PBDEs and POPs in human adults and fetuses by using maternal blood (MB), cord blood (CB) and umbilical cord tissue (UC), 2) to see the difference of trans placental transfer situation of PBDEs, PCBs and Dioxins, and 3) to see the correlations among the POPs in fetus by using UC.
Methods: Eighty set samples (MB, CB and UC) and 86 UCs were collected at deliveries in Chiba University Hospital and some other obstetrics in Japan. The congeners and isomers of PBDEs, PCBs and Dioxins(PCDDs+PCDFs+Co-PCBs) were measured in 10 set samples, 29 set samples and 41 set samples, respectively. Also, PCBs and POPs (p,p'-DDE, trans-Nonachlor, cis-Nonachlor, Oxychlordane, HCB, Mirex, • -HCH) were measured in 86 UCs. All the measurements were done by GC/MS.
Results: PBDEs, PCBs and Dioxins were found from all the set samples. Also, PCBs and POPs were found from all the UC. Transfer rates of each congener and isomer of PBDEs, PCBs and Dioxins from MB to CB and from MB to UC were different. Also, a negative correlation was found between transfer rates of each congener and isomer and molecular weight (MW). It was found that the congeners and isomers larger than 1000MW didn't transfer from mother to fetus. Also, significant correlation between PCBs and other POPs was found in UC.
Conclusions: In risk assessment of chemicals, it is important to consider the difference of exposure level and the difference of transfer rate among congeners and isomers between adults and fetuses.

SHIFTS IN MORTALITY DURING A HOT WEATHER EVENT IN VANCOUVER, CANADA: RAPID ASSESSMENT USING CASE-ONLY ANALYSIS

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Background: During the summer of 2009, greater Vancouver (in British Columbia, Canada) experienced several days of unusually hot temperatures. Episodes of extreme heat in other northern cities have been associated with considerable excess mortality, especially among the most elderly, and those living in dense, and/or disadvantaged urban neighbourhoods.
Methods: A case-only analysis was used to compare characteristics of individuals who died during the hottest week of 2009 with those who died (1) during earlier summer weeks in 2009 and (2) during the same calendar weeks in the summers of 2004-2008.
Results: Risk of mortality during the hot weather event was significantly higher in the 65-74 age category than in the 85+ category (OR = 1.50; 95%CI = 1.09–2.06). Deaths at home were increased over deaths in hospitals or institutions (OR = 1.39; 95%CI = 1.06–1.80). Densely populated administrative health areas were more affected.
Conclusions: A significant shift towards deaths at home suggests that home-based protective measures should be part of planning for hot weather in Vancouver. Targeting should be considered for persons in the 65-74 age category. The case-only approach is quick and easy to apply, and it can provide authorities with useful information about patterns of mortality during localized, time-limited events

EFFECTS OF DIURNAL TEMPERATURE CHANGES ON ASTHMATIC CHILDREN: A CASE CONTROL STUDY

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Background and Aims: The prevalence of childhood asthma has been increasing in Taiwan despite the efforts of air pollution control. This case-control study was performed to evaluate whether diurnal temperature changes may affect the exacerbation of asthma.

Methods: Data on both climate factors and air pollutants were obtained from local governmental agencies. During our year long study period, the case group was defined as the days of admission for asthma and the other days were classified as the control group. The days with admissions included the days when patients under 18 years of age were admitted to hospitals with the chief problem of asthma. We assessed 7,623 patients with asthma (age Ž 18) and compared the characteristics between these two groups of days, including diurnal temperature changes. Multiple linear regressions were used to assess the effects of both temperature changes and air pollution.

Results: The effects of diurnal temperature changes were relatively consistent in a given geographic area during a specific season. During the winter period, there were positive correlations in the regions south of the Tropic of Cancer and negative correlations in the northern regions. In other seasons, we found positive associations in plain regions near the coastline and negative associations in mountain regions away from the coastline.

Conclusions: Diurnal temperature changes may affect the exacerbation of childhood asthma, but the effects vary across different geographic areas and seasons. The relatively consistent trends in a given season within a given geographic zone indicated both the seasons and landforms might affect the associations. The diurnal changes of temperature can be an important index to predict the acute onset of asthma, and it may affect the exacerbation of asthma in children through the mechanism of physical accommodation.

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DIARRHOEAL MORBIDITY PREVALENCE IN UNDER-FIVE CHILDREN ASSOCIATED WITH ENVIRONMENTAL FACTORS AND HYGIENE PRACTICES IN DANGILA ZURIA WOREDA, NORTHWEST ETHIOPIA

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Background and Aims: Though the relationship between environmental and hygiene risk factors, and the occurrence of diarrhoea in children have been documented elsewhere, there are limited studies in Ethiopia in general and in Dangila Zuria Woreda in particular. The present study aimed to assess under-five diarrheal morbidity prevalence associated with environmental factors and hygiene practices.
Methods: Community-based cross-sectional study was conducted in Dangila Zuria Woreda from March 24-April 21, 2010. 520 mothers of index under-five children living in systematically taken households from 7 randomly selected Kebeles out of 28 in the Woreda constituted the study population. Data were collected using structured and pre-tested questionnaire, entered into a computer, edited and analysed using SPSS version 15.0. Stepwise logistic regression model was used to calculate the Odds ratios and 95% confidence interval for the different risk factors.
Results: Out of 520 sampled mother-child pairs, 498 participated in the study giving a response rate of 95.8%. Prevalence of diarrheal morbidity over a period of two weeks preceding the study was about 24.9%. In the bivariate analysis, a number of risk factors including latrine condition, presence of handwashing facility ($P<0.001$) and latrine availability, all family latrine use, reason to use latrine as excreta dangerous, proper child faeces disposal, mothers' handwashing practice and handwashing with soap after defecation ($P<0.05$) appeared to be significantly associated with under-five childhood diarrheal morbidity. However, all family latrine use, reason to use latrine as excreta dangerous, proper child faeces disposal, mothers' handwashing practice and handwashing with soap after defecation were the only significant variables on multivariate analyses ($P< 0.05$).
Conclusions: As diarrhoea morbidity was major problem among under-five children in the Woreda, continuous, regular and targeted hygiene education programs are very essential in order to bring about behavioral change and reduce the risk of childhood diarrhoeal morbidity.

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ASSOCIATIONS BETWEEN OZONE EXPOSURE AND DYSFUNCTOIN OF CARDIAC AUTONOMIC NERVOUS SYSTEM IN HEALTHY ELDERLY SUBJECTS

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Background and Aims: Previous studies have provided strong evidences that elevated levels of ambient ozone (O_3) are associated with the increased cardiovascular mortality and morbidity. The dysfunction of cardiac autonomic nervous system (ANS), indicated by the disturbed heart rate variability (HRV) indices, is the major contributor to the triggering of electro-physiologic diseases. Heterogeneous associations between O_3 exposures within several hours and HRV in subjects with compromised health status are reported in some previous studies. No studies, however, have focused on the effect of several minutes O_3 exposure on healthy elderly subjects.

Methods: Real time ambient O_3 concentration and HRV indices of 20 healthy elderly subjects were measured continuously and concurrently by 5-min segment in winter, Beijing. Mixed linear model was used to evaluate the associations between ambient 5-min average O_3 and concurrent 5-min HRV frequency indices adjusting for the time-variant variables (temperature and relative humidity) and subject characteristics.

Results: Elevated ambient O_3 exposure was associated with decreased High Frequency (HF) (• =-0.00213, *p*=0.024) and increased low-frequency/high-frequency ratio (LFHFR) (• =0.00177, *p*=0.016) in healthy elderly subjects.

Conclusions: We conclude that ambient O_3 exposures within several minutes may exert predominance of cardiac sympathetic nervous activity, which may increase the risk for acute cardiac events.

HEALTH CONCERN AND CHALLENGES OF ADOLESCENTS

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Background and Aims: Adolescence is a time where they tend to become involved in high-risk, health compromising behaviors and yet feel invincible to the negative consequences of their actions. The aim of this study is to asses the health concerns and challenges and factors influencing their health care utilization to fill gaps of scarcity of literature in Jimma zone Southwest Ethiopia.
Methods: this is a cross-sectional study conducted among adolescents 10-19 years The source population for the study were all (N= 11, 048) adolescents aged 10-19 years enrolled in 8 Junior and senior high schools in seven Districts. 1768 adolescents were proportional to class size were randomly selected from the school roasters stratified (grades 7&8; 9&10, & 11&12th) according to operational definition of age of the adolescents. Pre-tested, self- administered questionnaires was used to collect the required information. Data was analyzed using SPSS/PC + computer statistical package version 12.0.
Results: 1768 adolescents responded to the questionnaire making a response rate of 100%. Male respondents (53.6%) and female (55.1%) age lies in the age group of 17-19 and 14-16 years respectively. 75.1% reported ill-health conditions that include headache (29.9%), dental problems (20.6%), Sexually Transmitted Infections (20.4%) and abdominal problems (8.7%). 56.8% sought help for their health problem. Gender, grade, occupation of parents and living with both biological parents showed statistically significant association with encountered health problems reported and seeking health care ($p<0.001$).
Conclusions: this study showed important health problems of adolescents, with their influencing factors. The proportion of treatment seeking behaviors is discouraging. Factors contributing to health seeking behavior should be strengthened and sustained to the current trend. Identification and early prevention of adolescents behavioral, social and physical health problems, establishment of special adolescent health service in schools and at the community setting at large is recommended.
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URBAN AIR POLLUTION AND EMERGENCY VISITS AND IN-HOSPITAL MORTALITY IN TEHRAN HEART CENTER

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Background and Aims: Tehran -the capital of Iran- with a population of approximately 7.9 million, only 30% of the days in a year profits healthy air quality. Critical air pollution happened in the June 2009 that resulted in closure of governmental offices in this city. The aim of this study was to evaluate the effect of air pollution on the emergency visit, hospitalization and in-hospital mortality of acute coronary syndrome (ACS) patients referred to a referral heart center (THC) in the capital of Iran.
Methods: Patients admitted to the emergency ward of THC between 22 June and 22 July 2009 were included in this cross sectional study. Meteorological data were obtained from "Air Quality Control Corporation Geophysics station" which is located about 1000 meters away from THC. A principal component analysis was utilized to extract a linear combination of air pollutants which represented eigenvalue > 1. Then, a regression analysis was utilized to determine the air pollution exposure level and the frequency of patients admitted with unstable angina, myocardial infarction and arrhythmia. The principal component linear combination was considered as the exposure level for the regression analysis.
Results: Three thousands and ninety patients were included. The mean daily number of patients referred to THC was 112.5±12.6 during the polluted period and 100.8±17.6 during the other days ($P<0.001$). Hospitalization rate and the in hospital mortality were 20.0±4.9 and 0.9±0.1 during the pollution period compared to 17.0±3.9 and 0.2±0.4 in other days ($P<0.001$).
The proportion of patients aged 85 and more referred to THC, was directly associated with the concentration of PM-10 during the study period. The principal component score was higher in admission date of patients expired during hospitalization compared to that of patients discharged alive from the hospital ($P<0.05$).
After adjustment for the effect of age, sex, smoking, hypertension, hyperlipidaemia and diabetes, a statistically significant relationship between principal component score at the admission date of patients and the frequency unstable angina ($P<0.05$) and arrhythmia ($P<0.05$) was detected.
Conclusions: Air pollution is associated with increased emergency visit and hospitalization of patients, especially elderly, referred with unstable angina and arrhythmia. It is also associated with increased in-hospital mortality of patients admitted with ACS.

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TRAFFIC-RELATED AIR POLLUTION AND HEART RATE VARIABILITY IN A PANEL OF HEALTHY ADULTS

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Background and Aims: Epidemiological studies have linked particulate matter (PM) and carbon monoxide (CO) exposures with alterations in cardiac autonomic function as measured by heart rate variability (HRV) in populations. Recently we reported association of several HRV indices with marked changes in particulate air pollution around the Beijing 2008 Olympic Games in a panel of healthy taxi drivers (Wu et al., 2010). We further investigated the cardiac effects of traffic-related air pollutants over wide exposure ranges with expanded data set in this panel of healthy adults.

Methods: We obtained real-time data on nine taxi drivers' in-car exposures to particulate matter ≤2.5 μm in aerodynamic diameter ($PM_{2.5}$) and CO, and on multiple HRV indices during a separate daily work shift in four study periods with dramatically-changing air pollution levels around the Beijing 2008 Olympic Games. Mixed-effects models and a loess smoother method were used to investigate the associations of exposures with HRV indices.

Results: Results showed overall negative associations of traffic-related air pollutants with HRV indices across periods, as well as differences in period-specific and individual associations. After stratifying the individuals into two different response groups (positive group/negative group), cardiac effects of air pollutants became stronger within each group. For example, a 7.5% (95% CI, 2.8%, 12.5%) increase and a 3.6% (95% CI, -5.4%, -1.8%) decline in standard deviations of normal-to-normal (SDNN) intervals per interquartile range (IQR: 75.1 $\mu g/m^3$) increase at 30-min $PM_{2.5}$ moving average were found for the positive group and negative group, respectively. Exposure-response modeling identified changed curvilinear relationships between air pollution exposures and HRV indices with threshold effects.

Conclusions: Our results support the association of exposure to traffic-related air pollution with altered cardiac autonomic function in healthy adults free of cardiovascular compromises. These results suggest a complicated mechanism that traffic-related air pollutants influence the cardiovascular system of healthy adults.

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HEALTH BENEFITS OF POLICIES TO CLEAN UP POLLUTED SITES OF GELA AND PRIOLO, ITALY.

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Background and Aims: In 1998, law 426/98 established Priolo and Gela among the first 15 Italian sites included in the National Reclaim Program. Since then little has been done to reclaim the two petrochemical industrial sites. To date the agreed funds allocated for cleanup are €774.5 million for Priolo and € 127.4 million in Gela. However, these estimates cover only a part of the cost for the interventions required. This study aims to quantify in monetary terms the health benefits resulting from cleanup interventions in the toxic hot spots of Gela and Priolo and to evaluate if further needed investments would be cost beneficial (benefits outweigh cost).
Methods: A damage function approach was used to estimate the number of health outcomes attributable to industrial pollution exposure. Extensive one-way analyses and probabilistic analyses were conducted to investigate the sensitivity of results to different model assumptions.
Results: It has been estimated that, on average, 47 cases of premature death, 281 cases of non-fatal cancer and 2,702 hospital admissions could be avoided each year by removing environmental exposure in these two areas. Assuming a 20 years cessation lag and a 4% discount rate we calculate that the potential monetary benefit of removing industrial pollution is €3,592 million in Priolo and €6,639 million in Gela.
Conclusions: Given the annual number of health outcomes attributable to pollution exposure and the limited amount of funds up to now established, the effective cleanup of Gela and Priolo should be prioritised. This study suggests that cleanup policies costing up to €6,639 million in Gela and €3,592 million in Priolo would be cost beneficial. These two amounts are notably higher than the funds allocated thus far to clean up the two sites, implying that further economic investments – even considerable ones - could still prove cost beneficial.

EPIDEMIOLOGY OF TRAFFIC INJURIES AND MOTOR VEHICLES UTILIZATION IN TEHRAN: A POPULATION BASED STUDY

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Background and Aims: Road traffic injuries are considered to be the second highest cause of mortality in Iran (1). Iran has one of the greatest fatality rates from RTIs. There is not a reliable national injury surveillance system available in Iran and there is uncertainty on measures of RTIs.
We studied the annual incidence of RTIs, the incidence of RTIs per 1000 vehicles and utilization of vehicles in Tehran, the capital of Iran.
Methods: In this population based study, 2488 households were randomly selected to be interviewed using the registry of residential addresses. They were asked to report any RTIs in their household during the past year.
Results: Nine thousand and one hundred inhabitants were included. There were 119 RTI (38.7% pedestrians, 46.2% motor cyclist and 15.1% car occupants) and 3 deaths in the survey sample. The annual incidence of all RTIs for 100000 population was 1310 (CI: 1080-1560) and that of fatal traffic injuries was 32.97 (CI: 6.8-96.3). Motorcycles were involved in 41.3% of RTIs that occurred for pedestrians. 19.7% of the households had motorcycle; 2.4% belonged to women. Women mostly rode as passengers rather than driving a motorcycle. The annual incidence of collision RTI for 1000 motorcycle was 95. Moreover, 32.5% of the Motorcycle riders had experienced non-collision transport accident (i.e. fall). 58.5% of the households owned a car; 12.3% belonged to women. The annual incidence of car occupant RTI per 1000 car was 10.
Conclusions: This population-based study showed that the morbidity rate of RTIs is about ten times higher than the national figures reported by other available sources. This is an important alarm to countries like Iran to put the issue as a priority in their public health activities. Although the number of motorcycles was one thirds of cars, they are involved in a considerable proportion of RTIs. The attributable risk of RTI for motorcycles is estimated as 46.3%. There is need for effective safety regulations to control this pattern.
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STUDY DESIGNS THAT MAY LEAD TO UNETHICAL RESEARCH OR THE INAPPROPRIATE INTERPRETATION OF FINDINGS; ADDRESSING WHISTLE BLOWING

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Several stakeholders are involved in the discipline of Environmental Epidemiology and conflicting interests are regularly encountered by researchers and professionals working in this field. Guidelines are therefore needed to provide an ethical framework for environmental epidemiologists to help minimize ethical challenges when conducting research and when applying their knowledge in practice. In this symposium, presenters highlight these guidelines which are now revised to address more recent ethical challenges. In this presentation, two topics related to these guidelines will be addressed citing examples involving fellow epidemiologists. The first is study design as the responsibility of the epidemiologist. The design must enable researchers to test the hypothesis and association in question. An environmental epidemiologist has to decide on the most appropriate design, given all other factors of cost, feasibility, study power, and the ability to measure the exposure and outcomes. Study design will influence the quality of results, interpretation, and the impact the study may have on public health practice, education and policy. It therefore becomes unethical to conduct a study with an inappropriate study design that could lead to biased and invalid findings. This becomes further ethically unacceptable when these biases and weaknesses are not clearly described in the limitations of the study and its conclusion. Another important topic in environmental epidemiology is the persecution, discrimination, harassment and threats that fellow epidemiologist face when they become whistle blowers and report inappropriate institutional conduct or release important study findings that are being obstructed by their institutions. ISEE has clear guidelines on dealing with whistleblowers which has helped in support of such cases in the past. This presentation will engage the audience and provide the opportunity for discussion during the session by addressing the above points in light of the revised ethics guidelines and explicated through case studies.

(296 words)

BIOMARKERS IN ENVIRONMENTAL EPIDEMIOLOGY: ETHICAL CHALLENGES

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Environmental epidemiology is a multidisciplinary science and covers a range of methodological and design approaches. Exposure assessment is a critical component of the discipline and there are continued efforts to improve it in order to determine smaller scale, but widespread, environmental risks. Biomarkers are promising tools to overcome measurement error from subjective, less sensitive, and nonspecific questionnaires. However, this involves collection of bodily fluids or tissue, which is an invasive and potentially more ethically challenging approach than self-reports or other forms of exposure assessment. If such biospecimens are collected from study participants, the benefits, risks, and discomfort associated with collection should be explained during the consent of participants. This can lead to lower response rates and more scrutiny by Institutional Review Boards. The study aims that biospecimens will be needed to address, must be disclosed beforehand to study participants. Furthermore, the final disposition of any remaining samples after the study is completed must be explained. If future studies require the use of these samples for different questions there must be prior approval and consent by participants to that. If less invasive or more accurate methods of exposure assessment are available, it may be unethical to utilize biomarkers that do not offer better quality measurement data. There are more biobanks established through out the world than in previous years, but there is no corresponding increase in literature on ethical use of these biomarkers in environmental epidemiology. The presentation will discuss some of these questions in light of the relevant oral sessions in the symposiums that involve biomarkers.

ASSOCIATION BETWEEN VEHICULAR DENSITY AND HOSPITALIZATION BY RESPIRATORY DISEASES AMONG THE ELDERLY IN THE CITY OF SAO PAULO, BRAZIL

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Background and aims: Traffic-related air pollution has been associated with respiratory disease (RD) in the elderly in different developed countries. In Brazil, this is the first study to look at the impact of this exposure on the respiratory health of this population subgroup.
Methods: Hospital admissions by RD (ICD-10: J00-J06; J10-J16; J18; J20-J22, J30-J39 and J40-J47) of people aged 65 and over, from public and private hospitals of the city of Sao Paulo in the period 2004-2006, were geocoded according to their residence addresses . Vehicular density (VD) was calculated for micro-areas of 500m2 of the city and was used as the indicator of exposure to traffic-related air pollution. The number of resident people, household density (HD) and the Human Development Index (HDI) were available for these micro-areas. Admission rates for the elderly were calculated for the micro-areas and VD, HD and HDI were categorized into quartiles. Multiple logistic regression models with the admission rates as the dichotomous dependent variable (equal or greater than the lower quartile Q1) and VD, HD and HDI as independent variables were used.
Results: 132,976 admissions of elderly people were analyzed in 3,367 micro-areas of Sao Paulo. Having the first quartile of VD as baseline and allowing for HD and HDI, the adjusted OR for elderly admissions were: 2.16(95%CI:1.70-2.75); 2.28(95%CI:1.77-2.93); 1.43(95%CI:1.1-1.82). Similar associations were observed when the type of fuel (gasoline or diesel) was considered separately. Hospitalization by RD decreased with increasing HDI ($p<0.001$).
Conclusion: These findings indicate that mobile sources of air pollution have great influence on hospitalization by RD among the elderly people in the city.

Background and Aims. Associations between damp/mouldy homes and depression among adults were described for the first time in the European LARES Study. As they were found in a cross-sectional epidemiological study, causal relationship could not be established though clear dose-response relationships were observed between size of the mouldy areas and the prevalence of depression. It was not clear either whether people suffering from depression neglected their home which became damp and mouldy or damp/mouldy homes had some kind of direct or indirect (e.g. through asthma) impact on the mental health of the inhabitants. These associations were further explored using the database of our country-wide survey among 9-10 year old children.

Methods. Out of the 62,711 questionnaires completed by the parents 57,362 contained data on the children's behaviour. Fatigue, sleeping disorders and reservedness were the three symptoms considered to be characteristic for depression. Associations between the number of symptoms and the size of the mouldy areas (no; some cm^2; some dm^2; $>1m^2$) were analysed by logistic regression adjusted for age, gender, smoking during pregnancy, the parents' respiratory or allergic diseases, the mother's education and busy traffic nearby.

Results. At least one of the three depression symptoms was found in 20.35%, and all the three ones were present in 1.29% of the children. Significant dose-response relationships were found (independently of the presence of asthmatic symptoms) between the prevalence of depression symptoms and the presence of damp/mouldy areas in the homes (adjusted OR=1.47; 95% C.I.: 1.39-1.56) for at least one symptom and aOR=1.83; 95% C.I.: 1.49-2.26) for all three symptoms present, respectively.

Conclusion: The possible significant association between damp/mouldy homes and depression was confirmed in our study involving large number of children, though the biological mechanism is still not clear.

A RAPID, DATA-DRIVEN APPROACH TO SETTING TEMPERATURE THRESHOLDS FOR HEAT HEALTH EMERGENCIES

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Background and Aims: During the summer of 2009 a hot weather event in Vancouver, Canada resulted in considerable excess mortality (Kosatsky et al. *Submitted.*). As a direct result local authorities decided to develop a Heat Health Emergency (HHE) action plan. In late spring 2010 the BCCDC was asked to provide a rapid, evidence-based recommendation for the temperature at which an HHE should be called.
Methods: Data on all-cause mortality for the summers of 2004-2009 were obtained from the BC Vital Statistics Agency. Measured and forecasted temperatures at the Vancouver (coastal) and Abbotsford (inland) airports were obtained from Environment Canada for the same period. Candidate thresholds were identified and tested by combining forecasted and measured temperatures in four early warning scenarios with different lead times, which has been identified as a priority for such work (Hajat et al. 2010). Early warning estimates were compared with measured temperatures using their sensitivity and positive predictive values (PPV).
Results: In Vancouver the relationship between early warning estimates and measured temperatures deviated considerably from the 1:1 line, which resulted in multiple false positive HHE identifications for a 2-day average of maximum temperatures • 30ºC. All three true positive events were succesfully identified at the 18- and 6-hour lead times (sensitivity = 1, PPV = 0.43). In Abbotsford the relationship was more linear for a 2-day average of maximum temperatures • 36ºC, but the three true positives were not all identified until the 6-hour lead time (sensitivity = 1, PPV = 0.6).
Conclusions: The BCCDC recommended that the HHE early warning system be based on data from Abbotsford, where the relationship between predicted and measured temperatures was most stable. We also suggested that a long-term educational campaign should be concurrently developed, especially if the HHE system is based on 2-day averages (i.e. one hot day must pass to trigger it).
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ASSOCIATION BETWEEN CLIMATIC VARIABLES AND DENGUE IN THE REGION OLMECA, MEXICO

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Background and Aims: Dengue is the most serious and prevalent arboviral disease in the world today. Roughly three billion people are at risk of contracting dengue virus. From 1995 to 2005, Veracruz remained one of the states with a high number of reported cases of dengue fever. For 2005 the national rate in Mexico of classic dengue morbidity was 16.3 per 100,000, however in the state of Veracruz this was 53.5 per 100,000 inhabitants. The main aim of this study was to assess linkages between the climatological variables and longer-term ENSO related weather forcing on the week-to -week changes in dengue incidence in 10 municipalities of the region Olmeca, over a recent decade of dengue observations.
Methods: A study ecological time series analysis was made using the weekly dengue cases registered in the municipalities of the Region Olmeca of Veracruz during the period 1995-2005 and daily weather data from the same period. Information on the index of social backwardness for 2005 was obtained from the National Council of Evaluation of Social Development Policy .We used a negative binomial model to assess the relation between climatic variables and dengue and including sine and cosine functions for seasonal adjustment. We evaluated the goodness of fit.
Results: In Mecayapan there is a statistically significant relationship between minimum temperature and incidence rates given at one week time lag. In Acayucan there is a statistically significant relationship between SST and incidence rates given at 5 months time lag. The results indicate that it takes aprox. 5 months for environmental conditions, as measured by SST and adjusted by precipitation and minimum temperature, to affect dengue incidence.
Conclusions: We need to incorporate to the model: social, demographic, geographical and physical factors, which determine the vulnerability into the each municipality.

MATERNAL LEAD LEVELS AT ONE-MONTH POSTPARTUM IN RELATION TO DIETARY FOOD GROUP INTAKE

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Background and Aims: Increasing evidence suggests that dietary intake of fiber and micronutrients such as calcium, iron and vitamin C may interact with lead absorption, deposition, and excretion; however, there is limited information on the association with specific food groups so we assessed relationships between their intake over the course of pregnancy and lead levels in blood, bone, and breast milk at one-month postpartum in a cohort of 613 lactating women in Mexico City.

Methods: Maternal dietary intake was assessed using a semi-quantitative food frequency questionnaire of 120 foods that were grouped into 8 groups: dairy products, legumes, fruits and vegetables, whole grain cereals, refined cereals, all-meats, fats and oils and typical Mexican foods. Blood and breast milk were analyzed for lead by ICP-MS and maternal bone lead was estimated by K-x-ray fluorescence (KXRF).

Results: In a multivariate linear regression model using log-transformed blood and breast milk lead, women in the highest (v. lowest) tertile of intake of whole grain cereals had 0.10□g/dL lower blood lead levels (95% CI: -0.19, -0.01). Women in the highest (v. lowest) tertile intake of fruit and vegetables had lower lead levels in breast milk and tibia bone: -0.21 □g/L (95% CI: -0.42, 0.007) and -1.05□g/g (95% CI: -1.97, -0.12), respectively. Results were adjusted for parity, exclusive or partial breastfeeding, current use of lead-glazed ceramics, hemoglobin, body mass index, dietary energy intake, years of living in Mexico City, education and number of previous pregnancies. We found no association with patella lead levels.

Conclusions: Dietary fiber in whole grain cereals may inhibit lead absorption. The lower lead levels associated with higher intake of fruits and vegetables may be related to decreased absorption and/or the impact of Vitamin C, which has been previously reported to increase excretion of lead by acting as a natural chelating agent.

Background. Bakery and hairdressing rank high among occupations at risk of asthma. We explored the early incidence of occupational asthma (OA) along the first years of activity among young workers.
Methods. Subjects who graduated between 2001 and 2006 underwent telephone interviews on the occurrence of respiratory symptoms. Workers in occupations not exposed to known airways irritants or allergens were also included. Subjects who had asthma when starting apprenticeship were excluded. Those who declared work-related respiratory or ENT symptoms and a sample of asymptomatic subjects were proposed a medical visit (spirometry tests, exhaled NO measurements, daily surveillance of peak flow values, blood sample for assessment of common allergens and work-specific IgE). Diagnosis of OA was established by expert judgment and the sensitivity and specificity of symptoms declared during the telephone interviews were assessed.
Results. 866 subjects were interviewed (mean age: 25.3 years), among which 282 underwent a medical visit. The cumulative incidence of 'probable' OA among bakers was high in the first quartile of exposure duration (median value=3.0 years; risk = 15.8 % [95%CI=9.9–21.7]); several had to quit this activity because of this condition. It was reduced to 13.1 % [7.2–19.0] in the second exposure duration quartile (5.3 years) and increased regularly across the third (7.4) and fourth (9.5) quartiles, with 14.7 % [7.8–21.7]) and 17.2 % [8.7–25.6]), respectively. The corresponding figures among hairdressers are 8.3 % [0.6–16.0]), 6.1 % [0.7–11.5], 4.3 % [0.1–8.6] and 6.4 % [1.5–11.3]. Atopy is highly associated with incidence of OA among bakers (RR= 7.4), and, to a lesser extent, among hairdresser (RR= 3.6). No new case of OA occurred in the reference group.
Conclusion. Incidence of OA starts soon after engaging in bakery and hairdressing, activities that entail exposure to low or high molecular weight agents.

Temperature, Myocardial Infarction, and Mortality: Effect Modification by Individual and Area-Level Characteristics

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Background and Aims: Many studies have reported associations between temperature and cardiovascular disease (CVD) mortality, but fewer have investigated the relation between temperature and CVD incidence rates and at risk groups. We examined the association between temperature and incidence of myocardial infarction (MI) and subsequent mortality in a population-based study of residents of central Massachusetts. We also examined patient vulnerability by individual and area-level characteristics.

Methods: Data for this study were obtained from the Worcester Heart Attack Study, a community-wide investigation of confirmed episodes of MI occurring during the 5 biennial study years of 1995, 1997, 1999, 2001, and 2003. Temperature measurements were obtained from a nearby airport. We used a case-crossover approach to examine the association between temperature and MI incidence, and subsequent all-cause mortality, while adjusting for $PM_{2.5}$ and humidity. We examined effect modification by individual and area-level socio-demographic characteristics, medical history, clinical complications, and surrounding physical environment.

Results: A total of 4,765 incident MIs were included in our analysis. A decrease in an interquartile range (IQR) in temperature on the same day was associated with an increased risk of MI [RR=1.15 (95% CI: 1.01, 1.32)]. Extreme cold during the 2 days prior was associated with an increased risk of MI [RR=1.36 (95% CI: 1.07, 1.74)]. Extreme heat during the two days prior was associated with an increased risk of mortality [RR=1.43 (95% CI: 1.05, 1.95)]. The effect of cold on MI incidence was stronger in individuals living in census tracts with the lowest median income and individuals with a previous MI. Individuals living within 400 m of a large water body were protected from the effect of cold on MI incidence.

Conclusions: Exposure to cold increased the risk of MI and exposure to heat increased the risk of mortality. Individual and area-level characteristics modified this association.

HEALTH HAZARD FROM ENDOGENOUS GAS EMISSIONS AT CAVA DEI SELCI (ROME, ITALY)

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Background and Aims: Hazardous emissions of endogenous gas (mostly CO_2 and H_2S) occur in many volcanic or geothermal areas. Cava dei Selci (Roma) is a densely inhabited zone on the flank of Colli Albani quiescent volcano where many lethal accidents to animals and also to one person occurred in recent years. In 2010, three houses had to be evacuated because the indoor gas concentration (CO_2 and H_2S) reached hazardous values. A systematic investigation of gas air concentration in houses, near the main gas emission site, has been carried out in 2010-2011 with the aim of assessing the gas hazard.
Methods: In more than 300 houses the CO_2 and H_2S air concentration was measured, by Draeger devises (Xam-7000, IR for CO_2 and electrochemical cell for H_2S). In each house gas analyses were made in bedroom, diningroom bathroom and cellars for a total of 1300 investigated rooms. For a few days, continuous gas monitoring was carried out in houses exposed to high risk. Outdoor gas release from the soil was also estimated by flux measurements (accumulation chamber method).
Results: The investigation has given very worrying results. In the three evacuated houses lethal levels of both gas were found (CO_2 28vol% and H_2S ≥500ppm). An additional 30% of inhabited houses show a potentially hazardous gas concentration that might become very dangerous should the endogenous gas release increase (as in case of local earthquakes). Preliminary indoor Rn concentration measurements (max 23,500 Bq/m^3) indicate that it often exceeds the recommended thresholds and the inhabitants are potentially exposed to a severe risk of lung cancer.
Conclusions: Dangerous indoor air concentrations of H_2S (>250 ppm) and CO_2 (>8 vol%) occur in many houses at Cava dei Selci due to endogenous gas emissions creating a delicate health and socio-economic problem.

TRANSPORTATION, AIR POLLUTION, AND PHYSICAL ACTIVITY (TAPAS), A SIX-CITY INTEGRATED HEALTH RISK ASSESSMENT PROGRAM OF ACTIVE TRAVEL POLICIES: COPENHAGEN CASE STUDY

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Background and Aims: Within the TAPAS research program, quantitative assessments are developed for six case study cities in Europe, linking determinants of active travel to potential co-benefits and co-risks of modal shifts from motorized to non-motorized modes of travel. We describe here the Copenhagen case study.
Methods: We identified local sources of information from government agencies and municipalities describing active travel and environmental conditions. We selected policies of local and international interest, with quantifiable or demonstrated effectiveness. We reviewed local municipality and national governmental publically available data and documents on respective websites and met individually with elected officials and other stakeholders. We are also conducting epidemiological study generating new data to help fill research gaps in current framework.
Results: Copenhagen, capital of Denmark, has 620.000 inhabitants. With 37% of Copenhagen inhabitants commuting by bike (28% by bus or train, 31% by car, 5% on foot) and 383km of bike lanes, Copenhagen is proud to be one of the most biking-friendly cities in TAPAS, and in Europe. Copenhagen is still working hard to improve its biking statistics, by improving biking infrastructure, establishing green biking lanes (40km currently, goal 110km) and improving safety. In 2008, 121 cyclists were seriously injured and 5 died, which is a half of the numbers from 1996. Copenhagen air pollution levels have been decreasing in a last decade, with 21 $\mu g/m^3 PM_{10}$, 13 $\mu g/m^3 PM_{2.5}$, and 20$\mu g/m^3$ NO_2 average annual concentrations in 2008, but street levels for NO_2 still exceed the limit values. About 38% of Copenhagen inhabitants are active less than recommended 30 minutes per day, and 37% are overweight. Relevant policies we are considering for assessment include 1) Congestion charging and 2) Regulation of Parking Fees.
Conclusion: Copenhagen with its high and increasing biking rates, but also increasing number of cars, is an interesting case for assessing potentials to increase physical activity while addressing challenging environmental conditions to mitigate risks.

DIABETES INCIDENCE AND LONG-TERM EXPOSURE TO AIR POLLUTION: A COHORT STUDY

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Background and Aims: Emerging data from cross-sectional epidemiological and animal studies suggest air pollution as a risk factor for diabetes, whereas prospective data are sparse and conflicting, precluding conclusions about causality. We examined the association between exposure to traffic-related air pollution over 35 years and incident diabetes in a prospective cohort study.

Methods: We followed 57 053 participants of the Danish Diet, Cancer and Health cohort in the Danish National Diabetes Register between baseline (1993-1997) and 2006 and used two definitions of incident diabetes: original from Diabetes Register and more strict, by excluding those with unconfirmed diabetes diagnoses. We estimated the annual mean levels of nitrogen dioxide (NO_2) at residential addresses of the cohort participants since 1971 and modeled association between mean NO_2 levels and incident diabetes by Cox regression analyses. We tested for modification of the effect of air pollution by gender, body mass index, waist-to-hip ratio, smoking status, physical activity, educational level, and cardiovascular diseases.

Results: Over a mean follow-up of 9·7 years of 51 818 eligible subjects, there were 4 040 (7.8%) and 2 877 (5.5%) diabetes cases with all original and confirmed only diabetes cases, respectively. We found no association between mean levels of NO_2 since 1971 and diabetes according to the original definition (hazard ratio1.00; 95% confidence interval 0.97-1.04, per IQR of 4.9 $\mu g/m^3$), whereas borderline significant association was detected when using the modified definition of diabetes, (1.04; 1.00-1.08). Identical associations were observed with mean NO_2 levels since 1991 and 1-year mean at the follow-up (mean exposure during the year prior to stroke), and attenuated with 1-year mean at baseline (1.02; 0.98-1.05). Non-smokers, physically active, and those generally more healthy, seemed to be most susceptible to the effects of air pollution.

Conclusions: Long-term exposure to traffic related air pollution may contribute to the development of diabetes.

URINARY CONCENTRATIONS OF BISPHENOL-A IN AN URBAN MINORITY BIRTH COHORT IN NEW YORK CITY, PRENATAL THROUGH AGE 7 YEARS

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Background and Aims: There is growing epidemiologic evidence that prenatal and early childhood exposures to ubiquitous endocrine disruptors, such as bisphenol A (BPA) can result in adverse disease outcomes. Insufficient information is available on the effects of BPA on minority populations in the US. Our aim is to describe BPA concentrations and correlated factors in a birth cohort through age seven years.
Methods: As part of the Columbia Center for Children's Environmental Health (CCCEH) birth cohort of African American and Dominican children living in the South Bronx and Upper Manhattan, 568 mother-child dyads were analyzed for total BPA in spot urines. Mothers were selected if they had a sample analyzed prenatally and their children were selected if they had at least one sample analyzed at age three, five or seven years. All analyses used log-transformed BPA and adjusted for specific gravity.
Results: BPA was analyzed in 377 prenatal samples (94% above limit of detection (LOD)), 419 age three year samples (98% above LOD), 401 age five year samples (98% above LOD), and 318 age seven year samples (96% above LOD). BPA concentration geometric means were higher among African Americans compared to Dominicans in prenatal ($p=0.007$), five year ($p=0.001$) and seven year ($p=0.001$) samples. Geometric means for the five and seven year samples were higher ($p=0.002$, $p=0.015$ respectively) for children of mothers never married at baseline compared to mothers ever married at baseline. BPA concentrations were significantly correlated with eight phthalate metabolite concentrations prenatally and at three and five years (r values from 0.12 to 0.35, all p-values <0.05). Calendar season predicted BPA concentrations in children ages three, five and seven years (summer=reference, Beta estimates -.26 to -.12 ng/ml, all p-values <0.05).
Conclusions: The CCCEH is uniquely poised to evaluate early life exposures to BPA in urban minority children.

INVESTIGATION OF THE RISK FACTORS FOR PULMONARY TUBERCULOSIS: CASE CONTROL STUDY IN THE ABSHERON RAYON OF AZERBAIJAN REPUBLIC

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Background. With the re-emergence of TB, affecting mainly developing countries, investigation of the risk factors is important for identification of high risk groups in a community to adjust and adapt TB control policies. The study was carried out to assess the contribution of host related, socio-economic and environmental factors in the development transmission of TB in Azerbaijan.
Objective. The objective of the study is to provide information that will help to identify high-risk groups and will be useful for the improvement of TB control program in Azerbaijan.
Methods. A population-based case-control study was conducted in the Absheron rayon of Azerbaijan republic from May 2010 till October 2010. Cases were all TB patients >15 newly registered at the Absheron rayon policlinic between 1 January, 2008 and December 31, 2009 and recruited to a WHO DOTS program. Three controls were recruited for each case.
Results. The univariate analysis by logistic regression of host related factors based on the comparison of 178 cases/household controls and 222 cases/community controls showed that male sex is a significant risk factor for TB. Male sex also remained as a significant risk factor in multivariable analysis of the host-related factors in these comparison groups. The univariate analysis of environmental risk factors among cases and community controls/polyclinic controls showed that those not having a house and living in a single room, have no or less number of the selected domestic items and low household monthly income were significantly more likely to have TB. Multivariable models were then constructed, including variables that showed an effect in the prediction of TB in the univariable analysis at the $p<0.05$ level of significance.
Conclusion. In the Absheron rayon male sex (OR=8.69), none/basic education (OR=4.69), secondary education (OR=2.41), not having a house (OR=16.1), and low household monthly income (OR=13.88) are the standout risk factors for TB disease.

Acute coronary syndrome and long-term exposure to air pollution: a cohort study

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Background and Aim: Air pollution is one of the most important triggers of myocardial infarction.[1] Long-term exposure was also linked to coronary heart disease including myocardial infarction, but data show consistent associations only with fatal events.[2] We studied the association between exposure to traffic-related air pollution over 35 years and incidence of acute coronary syndrome (ACS) in a prospective cohort study.

Methods: We followed 57 053 participants of the Danish Diet, Cancer and Health cohort since baseline (1993-1997) until 2006 in the Danish National Patient Register for incident (first-ever admission) cases of ACS, and included only confirmed cases through review of hospital records. ACS diagnoses include myocardial infarction, angina pectoris, and cardiac arrest. We estimated the annual mean levels of nitrogen dioxide (NO_2) at residential addresses of the cohort participants since 1971, and linked mean levels of NO_2 to incident ACS by Cox regression analyses. We tested for modification of the effect of air pollution by gender, body mass index, waist-to-hip ratio, smoking status, physical activity, and educational level.

Results: Over a mean follow-up of 9·7 years of 50 141 eligible subjects, there were 1 535 (3.1%) incident ACS cases. We detected significant association between incident ACS and mean levels of NO_2 since 1971 (hazard ratio 1.09; 95% confidence interval 1.02-1.16, per IQR), as well as with proxies of major road within 50m (1.24; 1.06-1.46) and 100m (1.17; 1.03-1.32) at baseline.

Conclusions: Long-term exposure to traffic related air pollution may increases the risk of coronary heart disease.

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MAPPING VULNERABILITY AND ENVIRONMENTAL CONTEXTS OF HEALTH PROMOTION IN RURAL VALLEY JAGUARIBE, CEARÁ, BRASIL, 2011.

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Background and Aims: Brazil has long adopted an agro-export model, intensifying agricultural expansion in all regions. The impacts are felt differently in each region, since those cover quite diverse biomes. At the national level, the northeast region is one of the poorest in the country yet has recently attracted investments for the purpose of promoting economic development. Such investments are focused on fruit production for export resulting in critical social and environmental impacts.
Methods: The present project that looks into the epidemiological impact of pesticide contamination, held a workshop with communities focusing on the mapping of socio-environmental vulnerability and approaches to environmental health promotion. Through the use of a matrix, each community reported on aspects in their environment that they considered as promoting and, or threatening their lives and their territories. As such, they were able to record their perceptions and observations concerning changes taking place in their territories pointing out a variety of related factors. To facilitate the presentation of these perceptions the community drew a map depicting the dynamics of community life, featuring the main factors present in the matrix.
Results: The results showed a perception of communities about the changes that are happening in the territory. Hence, the process of agricultural modernization leads a re-structuring of the social space contributing to the deterioration of various social, economic, cultural and environmental factors which impact the health of residents and workers.An increase in domestic and urban violence, alcoholism, drug use and prostitution are other conditions that ensued. Other situations that were cited were work-related accidents, cases of poisoning, acute and chronic exposure to pesticides by the workers.
Conclusions: Strengthening production models that include an agro-ecological perspective was presented as a possible route to social and environmental sustainability and to the promotion of human and environmental health in the region.

BROUSSONETIA PAPYRIFERA, THE MOST DOMINANT POLLEN ASSOCIATED WITH ALLERGIC RHINITIS AND ASTHMA ATTACK IN TROPICAL TAIWAN

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Background and Aims: Pollen is one of the most common aeroallergens that contributing to the development and occurrence of seasonal allergic respiratory illness in European and North American countries. The sensitive pollens are different geographically because of the variants of climate, nature, and vegetation. Comparing to the abundant literatures of pollen allergy in many parts of the world, very few studies have been conducted in tropical regions. Because of lacking of pollen monitoring database in Taiwan, the prevalence of pollen allergy were usually misleading the information for using the pollen taxa usually in European and North American countries. Our study establish an aeroallergen monitoring station in southern Taiwan to collect and quantify the daily pollen concentration in atmosphere for studying the contribution of major pollen allergen in allergic respiratory illness in Taiwan.
Methods: A Burkard 7-day volumetric sampler was set up to collect atmospheric pollen at a flow rate of 10 l min-1 in Tainan City and operated routinely all year round. Counts and taxa of pollen during Jan. 2005 to Dec. 2006 were identified and daily concentrations in atmosphere were estimated. Daily clinic visits of various allergic diseases were collected from Medical Center where the station was located. The meteorological and air pollutants data were also obtained from Central Weather Bureau and Environmental Protection Administration. Generalized Additive Mixed Model (GAMM) was used to assess the multiple-lag effects of pollen concentrations and air pollution components on allergic diseases. The multiple-lag effects were examined from 0 to 4 days.
Results: *Broussonetia papyrifera*, paper-mulberry, is the most dominant pollen comprised around 30.38% and 39.51% of total pollen in 2005 and 2006. The temporal trend of *B. papyrifera* pollen level was consistent with total pollen with highest concentrations in Mar. and consistent to Nov. Elevated daily *B. papyrifera* pollen was significantly associated with increasing relative risks of allergic rhinitis visits (RR=1.023, 95% C.I.=1.003, 1.043) at lag 2 and 3 when adjusting daily average temperature and other air pollutants. Increasing relative risks of asthma visits was also shown at lag 3 when increase equal in magnitude to its mean (RR=1.023, 95% C.I.=1.009, 1.036). The effects of *B. papyrifera* also shown to be an independent role on increasing risk when adjusting different weather and air pollutants in the model. One study had shown that allergy of *B. papyrifera* might only triggered by fresh pollen materials and that might be the rationale of allergic sensitization to *B. papyrifera* may regard in many places of the world.
Conclusions: Our study is the first study showing pollen calendar and trying to establish the relationships between dominant pollen taxa and the occurrence of allergic diseases in tropical Taiwan. This preliminary analysis addresses the need of aeroallergen monitoring station and using the regional pollen taxa for diagnosis and prevalence investigation in our region.
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PROSPECTIVE STUDY ON MINOR ACCIDENT AND INJURY RISKS PER TRAVELLED DISTANCE FOR CYCLISTS

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Background and aims: Utilitarian cycling reduces risks for adverse health outcomes such as obesity and cardiovascular diseases. Active transport also contributes to better environmental conditions and hence better health for other inhabitants. Unfortunately there are also health risks which are poorly understood. Cycling accidents are the most important health risk to cyclists yet available statistics are very poor. Only a small fraction of accidents is officially registered and reliable data on minor injuries and the distance cycled are not available. This lack of data hampers policy decisions on cycling.
Methods: The SHAPES-project executed a full year prospective cohort study using electronic surveys. 1,187 participants reported their bicycle use for a total of 20,107 weeks (1,474,978 kilometres; 214,644 trips). A Poisson regression was performed to analyse contributing factors. Injured cyclists were also asked to fill out a questionnaire to determine injuries and other indirect costs.
Results: 219 minor accidents were reported (148 per million kilometres). Most accidents occurred on roads (69%), and fewer on bicycle lanes (21%) or bicycle paths (10%). Slipping (36%) and collisions with cars (19%) were the most frequent causes of injuries (mostly abrasions (42%) or bruises (27%) to arms and legs. Fractures and head injuries are rare. The average cost per accident is 841€ (95% CI: 579-1205€) or 0.125€/km cycled. Women (-3.3 km/h) and urban cyclists (-3.1 km/h) cycle slower and shorter distances. Age and gender are significantly related to the accident risk but there is no gender difference for the injury risk. Cycling paths are associated with longer trip distances to work (+38%) and higher speed (+1.5 km/h)
Conclusions : A prospective cohort study including accidents and distance cycled can be used to calculate accident and injury risks. Risks and costs have been accurately quantified and can now be objectively compared to the health benefits of cycling.

EFFECT OF SPEED AND PHYSICAL CONDITION ON EXPOSURE OF CYLISTS TO PM AND UFP IN TRAFFIC

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Background and aims: Cyclists are more exposed to air pollution compared to motorists, due to increased ventilation which the SHAPES project estimated is 4.3 times higher for cyclists. We examine whether this higher exposure is linked to cycling speed. We define the optimal speed that minimizes inhalation of pollution and compare this to field trips to determine the scope for reducing exposure.
Methods: Maximal Exercise Test data (with heart rate and minute ventilation measured simultaneously at increasing intensities) are used to convert power into cycling speed. We check the results with heart rate and speed recorded during real life cycling. We group persons according to gender and VO2max to check if differences depend on the physical condition of the test persons.
Results: There is an optimal cycling power range that minimizes exposure associated with a minute ventilation below the first ventilatory point. When power is converted into speed the optimal interval is 18.6-21.8 km/h for men and 15.3-19.2 km/h for women. Higher speeds increase exposure to air pollution. When comparing the optimal cycling speed with the self-selected speed during the field trips, we conclude that cyclists tend to cycle at a speed that is slightly too high. Cyclists could have cycled 2.5 km/h slower than their self-selected speed, resulting in 10.7 % less pollution exposure and 14.0 L/km less air intake. There are no differences in ventilation (L/km) between well trained and less trained cyclists around the optimal speed interval.
Conclusions : Reduced ventilation associated with cycling at the optimum speed will not offset the large exposure difference between cyclists and car passengers. Well trained cyclists can cycle at higher speeds without increasing their exposure per kilometre. Their interval of optimal speed tends to get wider when physical condition improves, but it is important not to train in highly polluted areas.

SYNERGISTIC ECOTOXICOLOGICAL IMPACT OF CHRONIC EXPOSURE TO PERSISTENT ENDOCRINE DISRUPTING CHEMICALS (EDCs) MIXTURES IN WASTEWATER EFFLUENTS

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Background and Aims: The occurrence and persistence of anthropogenic pollutants in the environment showing estrogenic-endocrine modulating effects in aquatic organisms is a “hot” issue of major health- and environment-related concern worldwide. The population growth and the increasing scarcity of water in many regions of the world have led to a comprehensive reuse of treated wastewater that, ultimately, may cause a long-term concentration build-up of toxic persistent organic pollutants (POPs) in both the cycles of the reused wastewater and the aquatic environment at large. Given the well established presence in *mixtures* of endocrine disrupting pharmaceuticals/hormones, non-ionic alkylphenol ethoxylates (APEOs) and carcinogenic polycyclic aromatic hydrocarbons (PAHs) in wastewater effluents, worldwide, the overriding aims of our study were: Determining (1) the concentrations/isomeric-homologic profiles of the actual EDCs-PAHs mixtures in waste water treatment plants (WWTP) (to be) reused effluents; (2) the ecotoxicological impact of *chronic* exposure to each of the individual EDCs in these mixtures; and (3) the ultimate synergistic (or antagonistic) ecotoxicological impact of *chronic* exposure to *real* 2-4 component EDCs mixtures in conventional (activated sludge-based) WWTP effluents in Israel.
Methods: EDCs concentrations were determined via HPLC- and GC/MS-based chemical analysis and the *chronic* ecotoxicological impact by the zebrafish egg production test (ZFEPT).
Results: The most important: A meaningful *synergistic* ecotoxicological impact of chronic exposure of zebrafish to persistent EDCs mixtures in WWTP effluents was observed and quantitatively determined**.**
Conclusions: The magnitudes of these impacts (their implications to be critically discussed) suggest, that (a) even an extremely low concentration of certain EDCs, not exerting any ecotoxicological impact while ‘standing alone’, the synergistic impact of EDCs mixtures is very meaningful ecotoxicologically; and therefore, (b) there is a potential long range *health risk* in being chronically exposed to low concentrations (ng-• g) of EDCs-PAHs mixtures in reused effluents and receiving aquatic environments (Zoller & Hushan, 2010).
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ASSESSMENT OF REPEATABILITY AND RECALL BIAS OF REPORTED PERI-CONCEPTION ENVIRONMENTAL EXPOSURE AMONG PREGNANT WOMEN IN SOUTHERN ISRAEL

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Background. A growing number of environmental exposures in the peri-conception period have shown to cause adverse pregnancy outcome (APO): low birthweight, small for gestational age, preterm birth and cardiac birth defects. Validity of exposure information collected retrospectively in case-control studies has been questioned. We aimed to assess repeatability and possible recall bias of self-reported environmental exposures collected after birth. .
Methods. Women registered for prenatal care in Maternal and Child Health clinics (MCHC) by week 25 of gestation comprised the study population (n=411). Information about place of residence and exposures to various risk factors during the 3 months prior to conception and first 3 months of pregnancy was obtained by personal interviews, using a structured questionnaire. Women with APO (gestational age at birth/miscarriage/induced abortion, low birth-weight, perinatal morbidity, fetal death, and in-hospital neonatal death), and a sample of control women without adverse outcome, matched by MCH clinic, were re-interviewed, after end of pregnancy (n=241). Kappa statistics was used to assess reliability of retrospectively reported exposures.
Results. Low agreement (kappa <0.4) between 1st and 2nd interview was observed regarding exposures to flu, fever, medications and vitamins consumption, cellphone use, home and work repairing, disinfestations, passive smoking. Better agreement (kappa >0.4) was observed regarding water filtering, maternal occupational exposures, living in proximity to antennas, contraceptive methods, urinary tract infections, smoking before/during pregnancy ,fertility treatment, and physical exertion at work. There were no differences in agreement estimates for cases and controls.
Conclusions. While no recall bias was found, the validity of most retrospectively reported exposures was rather low, suggesting that OR estimated from case-control studies may be underestimated it is therefore advisable that, whenever possible, cohort studies should be performed to detect effects of perinatal exposures on pregnancy outcomes.

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PM2.5, NO2 AND CO2 IN PRIMARY SCHOOLS IN THREE CLIMATIC REGIONS ACROSS EUROPE: THE HITEA STUDY

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Background and aims: Indoor air quality is essential for human's health. The HITEA-project evaluates health effects of biological and chemical exposures in primary schools. The aim of this study was to characterise exposure to PM2.5, absorbance (soot), NO2 and CO2 in schools in Spain, The Netherlands and Finland.

Methods: Schools with (index) and without (reference) dampness problems were selected based on building questionnaires and on-site inspections. Indoor PM2.5, soot, NO2 and CO2 was measured during 5 consecutive school days. PM2.5, soot and NO2 were measured in the school's central hallway, CO2 was measured in a classroom, and NO2 was additionally sampled in 2-3 classrooms. Measurements were performed twice: during winter/spring 2009 and winter/spring2010.

Results: 7 Spanish, 10 Dutch and 6 Finnish schools were included. Average soot and NO2 concentrations were highest in Spain (median: soot=2.27$m^{-1}10^{-5}$, NO2=30µg/m3), intermediate in the Netherlands (soot=1.20$m^{-1}10^{-5}$, NO2=20µg/m3) and lowest in Finland (soot=0.60$m^{-1}10^{-5}$, NO2=10µg/m3). PM2.5 was comparable in Spain and the Netherlands (17.51 vs 17.16µg/m3) and lowest in Finland (5.65µg/m3). PM2.5, soot and NO2 stayed constant over the two assessments, only NO2 in Finland concentrations were higher during the second measurement. CO2 (during school hours) reached highest levels in Spain (median:1165ppm) vs the Netherlands (median:844ppm) and Finland (median:701ppm). CO2 levels were not related with PM2.5, soot and NO2. PM2.5 and soot did not depend on a school's damage status. NO2 was higher in Finnish index schools, while in Spain NO2 was lower in index schools. In Dutch index schools CO2 was higher, while in Spain levels were higher in reference schools.

Conclusions: PM2.5, soot, NO2 and CO2 levels in schools differed considerably between countries, probably because of differences in outdoor air pollution levels, climate and building construction. These agents may, in addition to biological pollutions, play a role in occurrence of potential health effects of occupants.

ADAPTIVE RESPONSE TO HIGH EXPOSURE OF CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBONS

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Background and Aims:. Ostrava Region in the Northern Moravia (Silesia) is the most polluted region in the Czech Republic by carcinogenic polycyclic aromatic hydrocarbons (c-PAHs) as benzo[a]pyrene (B[a]P). The aim of the study is to gain new knowledge on the mechanisms of the effects of complex mixtures bound on dust particles (c-PAHs) in the ambient air on biomarkers of exposure and effect during the period of inversion.
Methods: In the Ostrava City were selected 78 volunteers- working in the office, as controls were city policemen from Prague (N=65). All volunteers were nonsmokers. The personal monitoring to c-PAHs was carried on in January-February 2010. The determined concentration of B[a]P was in the Ostrava region vs. Prague 14.8±13.3 vs. 2.80±1.87 ng/ m^3. The impact of these concentration to biomarkers as DNA adducts, chromosomal aberrations, 8-oxodG, lipid peroxidation, and gene expression profiles are followed. DNA adducts were analysed in lymphocytes by ^{32}P-postlabeling assay, chromosomal aberrations by fluorescent in situ hybridization (FISH) by whole chromosome painting #1 and #4, and by the determination of micronuclei, oxidative damage as 8-oxodG and 15-F2t-IsoP.
Results: Obtained results indicate no differences between the level of biomarkers determined in the Ostrava region and Prague. Multivariate analyses revealed that subjects living in Ostrava had increased odds of having above-median levels of *XRCC5* expression (OR; 95% CI: 3.33; 1.03-10.8; q=0.046). Above-median levels of 8-oxodG were associated with decreased levels of vitamins C (OR; 95% CI: 0.37; 0.16-0.83; p=0.016) and E (OR; 95% CI: 0.25; 0.08-0.75; p=0.013), which were elevated in subjects from Ostrava.
Conclusions: We may speculate, that high environmental exposure to B[a]P does not correspond to DNA damage according to dose effect relationship in a population affected by these concentrations for years, probably due to a possible adaptive response.
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ENVIROMENTAL EXPOSURE TO CADMIUM IS ASSOCIATED WITH INCREASED RISK OF CANCER

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Background and Aims: Association between environmental exposure to Cadmium and cancer incidence was reported by few studies with conflicting results. The aim of the current study was to evaluate the association between Cadmium exposure and cancer incidence in a cohort of people living in an industrial subdistrict of Israel, followed for 13 years.

Methods: A historical prospective study, with cohort inception and baseline measurement of people participating in the Central Bureau of Statistics 1995 census, was designed. To asses Cadmium soil concentration possible contribution to cancer incidence, a geochemical survey was analyzed. Cadmium concentration in soil was analyzed in 1823 samples in Haifa and the West Galilee (total 162 km^2), which houses major industrial facilities. An Arithmetic mean of Cadmium measurements in a census block (aCd) was calculated. Cancer incidence was ascertained through the Israel Cancer Registry and was calculated after adjusting for age, sex, origin and years of education.

Results: 37,690 people were followed and 1759 developed cancer throughout the study's follow-up period. Of these 18,408 people live in areas with aCd above the limit of detection. Living in areas where aCd is detected was associated with increased cancer incidence (Hazard ratio (HR) 1.11 95% CI: 1.01-1.23, *P*=0.038). People age 41-65 living in areas where aCd is detected were found to have an increased cancer incidence (HR 1.21, 95% CI: 1.09-1.40, *P* =0.014). In this age group, people living in areas where aCd is 0.1-1.5 ppm show no difference in cancer incidence (HR 1.15, 95% CI: 0.96-1.36, *P* =0.118), where as in people living in areas where aCd is above 1.5 ppm an increase in cancer incidence is found (HR 1.27, 95% CI: 1.07-1.51, *P* =0.007).

Conclusion: We report an increase of cancer incidence in Cadmium rich areas in a dose dependent manner among people age 41-65.

STATISTICAL METHODS FOR EXPOSURE RESPONSE ANALYSIS OF HIGHLY CORRELATED EXPOSURES

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Background and Aims: Standard multiple regression techniques for exposure response analysis may fail for highly to moderately correlated exposure data due to the strong co-linearity and resulting instability of effect estimates. To identify single polychlorinated biphenyls (PCBs) congeners causally related to Non-Hodgkin Lymphoma in a nested case-control study from among a mixture of 36 different PCBs we performed a simulation study to assess the utility of statistical techniques that were developed to deal with highly dimensional data.
Methods: We simulated 150 different datasets based on the observed standardized multivariate lognormal distribution of 36 PCBs in the JANUS nested case/control study. Of these 50 simulations used the observed means and covariance matrix, 50 used a reduced covariance matrix (off-diagonal entries scaled by 1/3), and 50 used a diagonal covariance matrix to simulate uncorrelated exposures. For every dataset we simulated 6 different exposure-response scenario´s corresponding to either two or four randomly selected PCBs related to the outcome with a weak (OR=1.2), medium (OR=1.5), or strong (OR=2.0) effect. All datasets were analyzed using standard univariate and (stepwise) multiple regression analysis as well as Sparse Partial Least Squares Discriminant Analysis (SPLS-DA), an elastic net for Generalized Linear Models (GLMNET), and a Bayesian hierarchical variable selection model. Models were compared using measures of sensitivity, specificity, and relative bias.
Results: With uncorrelated exposures, univariate analysis outperformed all others in sensitivity and specificity, and had lowest bias. With moderate and strong correlations, naive multiple regression often failed to identify the true causal agents, while more appropriate techniques were often more sensitive and only slightly less specific. No method was uniformly best, but the elastic net appeared to offer a good compromise.
Conclusions: More sophisticated statistical techniques may be needed to identify causal agents in exposure response analysis of highly and moderately correlated exposure data. However, the lack of a formal inference framework for some of these methods may hamper more widespread use.

CANCER INCIDENCE AND CAUSE-SPECIFIC MORTALITY FOLLOWING BALKAN DEPLOYMENT

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Background and aims: In 2000 the media reported on cases of leukaemia among Balkan-deployed soldiers, which some attributed to alleged exposure to depleted uranium (DU), originating from DU-containing ammunition. These media reports prompted questions about the occurrence of leukaemia, and its relationship with Balkan deployment and DU exposure in particular. Although the NATO reasoned the DU-related health risk to be very low, it was nevertheless recommended that the NATO countries would perform epidemiological studies on cancer among Balkan veterans. This study describes the results of analyses comparing the risk of different types of cancer and mortality among 18,000 Dutch Balkan-deployed military versus 140,000 non-Balkan-deployed military personnel. In addition, a comparison is made with cancer risk and mortality in the general population of the Netherlands.
Methods: A historical cohort study was performed, comparing military personnel deployed to the Balkans between 1993 and 2001 and their peers by using Cox regression analysis. In addition, expected numbers of cases of cancer and deaths in the Balkan-deployed group were computed according to the person-year method, based on rates for the general population in the Netherlands. Cancer and mortality data from 1993 to 2008 were provided by the Association of Comprehensive Cancer Centres and Statistics Netherlands, respectively.
Results: Final results will be presented at the ISEE. Results are strictly confidential until publication of the report in April 2011 (available at www.rivm.nl by that time, in English).
Conclusions: Similar studies have been performed in Denmark, Sweden and Italy, but this is the largest study with the longest period of follow-up.

EFFECTS OF MOTHER'S CONSUMPTION OF TRADITIONAL CHINESE HERBS AND LEAD AND CADMIUM CONCENTRATION IN MECONIUM IN TAIWAN

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Background and Aims: Traditional Chinese herbs have been used in Chinese society for thousands of years, and consequently family members would like to use herbal remedies to keep pregnant women in good health. Meconium is a matrix and is representative of a wide period of exposure in the fetus during gestation. The purposes of this study were to assess the relationship between mercury, lead, and cadmium concentration in meconium and the consumption of traditional Chinese herbs commonly used before and during pregnancy.
Methods: A total of 275 mother-infant pairs residing in Northern Taiwan were recruited for the study between January 2007 and March 2009. The parents were interviewed face-to-face by a trained interviewer after delivery in which information pertaining to the parents' and baby's demographic characteristics at birth were collected. Lead and cadmium concentrations in meconium were analyzed by ICP-MS.
Results: The geometric mean of lead and cadmium concentrations in all meconium samples (n = 275) was 117.2 ± 48.4 and 28.5 ± 4.0 ppb, respectively. The concentration of lead in the meconium of the consumption group (the mothers who consumed traditional Chinese herbs) was 491.9 ± 462.4 ppb, a level significantly higher than the level of 93.9 ± 52.1 ppb found in the control group (mothers who did not consume traditional Chinese herbs) before pregnancy. There was the same result during the pregnancy (923.4 ± 87.69 ppb vs.106.1 ± 49.5 ppb). The cadmium concentration in meconium was no significantly different between the two groups.
Conclusions: According to our findings, if the mother had consumed traditional Chinese herbs before or during pregnancy, it may be affect the body burden of lead in their fetus. The quality of raw material for traditional Chinese herbs may be affected by environmental contaminants and cultivated materials, so there should be frequent monitoring of purity.

CLIMATE CHANGE AND HEALTH IN THE DUTCH POLITICAL ARENA

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Background and aims: In 2008, a Dutch report about climate change and health concluded that more research was needed in this area. In response, the Netherlands Organization for Health Research and Development (in Dutch: ZonMw) initiated the development of a research proposal. However, until now, a draft proposal has not been supported by the Dutch ministries involved due to a lack of sense of urgency and budget constraints. In order to enhance political support, ZonMw asked RIVM to investigate possibilities to link the proposal to policy needs.
Methods: RIVM interviewed policy makers of four Dutch Ministries to investigate existing policy priorities with regard to the four main themes of the draft research proposal; 1) heat stress and air pollution 2) allergies 3) vector-borne diseases and 4) water- and food borne diseases.
Results: According to policy makers, it is difficult to assess the urgency for policy making due to the many uncertainties about the extent of climate change related health impacts. Therefore, political attention is minimal. An exception is the so-called 'Delta Program', which is set to prepare the Netherlands for future climate change. A subprogram of the Delta Program considering new buildings and renovation of cities aims to take health effects into account. For example, several strategies to decrease heat stress in cities are under development. However, quite a few climate change mitigation and adaptation measures have been implemented without the evaluation of potential health effects.
Conclusions: From a policy perspective, research with regard to the extent of climate change related health impacts is required to give the theme priority and move it higher on the Dutch political agenda. Several ministries recognized that knowledge on health effects is required. It would support the implementation of the Delta Program and the translation of international research findings into (local) Dutch policy-making.

ASSESSMENT OF EXPOSURE TO POTENTIAL LUNG CARCINOGENS IN XUANWEI AND FUYUAN, CHINA: PARTICULATE EXPOSURE FROM COOKING AND HEATING STOVES

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Backgrounds and aims: Residents in Xuanwei, China have the highest lung cancer incidence rates in China for both men and women. Several lines of research have provided strong support that the excess lung cancer rate in this region is caused primarily by emissions from smoky coal exposure. In order to develop individual estimates of exposure to known or suspected lung carcinogens for an ongoing case-control study, we designed a comprehensive exposure assessment study of 163 households in this region to evaluate exposure to PAHs, $PM_{2.5}$, silica, and other exposures from coal and wood burning.
Methods: Homes that used three main fuel types (i.e., smoky coal, smokeless coal and wood), and eight stove types [e.g., firepit, fixed or portable stove, with or without ventilation] were identified and households were sampled on two consecutive days. The female head of each household was asked to wear a 24-hour personal $PM_{2.5}$ air sampler at the same time that 24-hour area air sampling was employed in the main living area. We also collected information on potential factors that could influence exposure, such as house characteristics, stove type, fuel type and use and amount of time spent in each room.
Results: Initial analyses showed that people using wood burned in firepits were exposed to the highest levels of $PM_{2.5}$ measured in area (536.3±370.5 $\mu g/m^3$) and personal samples (419.8±283.3 $\mu g/m^3$). Burning smokeless coal in a high stove with a chimney was associated with the lowest exposure to $PM_{2.5}$ (62.2±34.1 $\mu g/m^3$, 62.5±29.9 $\mu g/m^3$ for area and personal samples, respectively).
Conclusions: These data show that there is a wide range of exposure to $PM_{2.5}$ in this population. These data and other exposure information from this study will be used in the future to model environmental exposures and risk of lung cancer in this special, high risk population.

ASSOCIATIONS BETWEEN BLOOD LEAD AND KIDNEY OUTCOMES IN ADOLESCENTS FROM A SMELTER COMMUNITY

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Background and Aims: Although environmental exposure to lead is common, few studies have examined its impact on kidney function in children. Analyses of associations between lead dose and glomerular filtration measures are especially scarce. Therefore, the extent of lead-related nephrotoxicity in children and adolescents remains uncertain.
Methods: Cross-sectional study of 512 adolescent (12-15 years of age) long term residents in Torreón, Mexico, who were chronically exposed to lead due to a large lead-zinc smelter located within city limits. Associations between blood lead and three kidney outcomes (serum creatinine and cystatin C, and urinary N-acetyl-β-D-glucosaminidase [NAG]) were examined using multiple linear regression.
Results: Median (5th – 95th percentiles) blood lead, serum creatinine and cystatin C, and urine NAG were 4.0 (1.7 – 9.8) µg/dl; 0.58 (0.45- 0.82) mg/dL; 0.76 (0.61 - 1.0) mg/L; and 220.5 (101.2 - 647.3) µmol/h/g creatinine, respectively. After adjustment for age, sex and body mass index, a doubling of blood lead was associated with increases of 0.02 mg/L (95% CI 0.01 to 0.03) in serum cystatin C, -0.01 mg/dL (95% CI -0.02 to 0.002) in serum creatinine, and 0.03 log(µmol/h/g creatinine) (95% CI 0.0002 to 0.06) in NAG.
Conclusions: These results provide support for nephrotoxicity due to environmental lead in chronically exposed children, but the lack of association with serum creatinine, a traditional measure of kidney function, deserves further investigation.

Background: Violence is a major public health problem, yet epidemiological studies on the occurrence of violence remains limited. We aimed at 1) estimating the scope of reported violence against older persons living in seven cities of seven countries, 2) assessing socio-demographic and economic factors correlated to reported VAO and 3) understanding between countries commonalities and differences in reported VAO.

Methods: To investigate the scope of VAO, we conducted a cross-sectional community study of N=4467 individuals in seven cities in Europe (Stuttgart, Germany; Athens, Greece; Ancona, Italy; Kaunas, Lithuania), Granada, Spain, Stockholm, Sweden) with inventories in local languages. The associations between socio-demographic and economic characteristics, health and mental health factors, and experiences of violence and perpetrators characteristics were assessed by calculating and comparing the VAO crude and adjusted Odds Ratios with the respective 95% confidence intervals (CI).

Findings: Mean response rate was 48.8%. Mean age was 70 years and 42.7% (N=1908) of the sample were male. The reported overall proportion of VOA was 12.7% (95% CI: 10.2-15.6) in Italy and 30.8% (95% CI: 27.2-34.6) in Sweden. The reported most common type of VAO was psychological violence 10.4% (95% CI: 8.1-13.0) in Italy and 29.7% (95% CI: 26.2-33.5) in Sweden followed by physical violence with 1.0% (95% CI: 0.4-2.1) in Italy and 4.0% (95%CI: 2.6-5.8) in Stockholm, Sweden. Reported prevalence rate of physical violence with injuries: 0.0% in Italy; 1.5% (95%CI: 0.7-2.8) in Lithuania. Reported prevalence rate of financial violence: 1.8% (95%CI: 0.9-3.2) in Sweden; 7.8% (95% CI: 5.8-10.1) in Portugal. Proportion of reported sexual violence: 0.3% in Lithuania and Spain (95% CI: 0.0-1.1); 1.5% (95%CI: 0.7-2.8) in Greece. The adjusted Odds ratio for psychological violence was for individuals from Germany 3.70 (95% CI 2.45-12.61), from Lithuania 2.60 (95% CI 1.83-3.70) from Porto, Portugal 1.91 (95% CI: 1.35-2.70) and for Sweden 3.70 (95% CI 2.61-5.23). Gender was associated with sexual and financial violence, not with psychological violence.

Interpretation: The present study suggested that older persons living in Stockholm, Sweden; Stuttgart, Germany, and in Kaunas, Lithuania report more often psychological

violence than people living in Ancona, Italy; Granada, Spain, Porto, Portugal. Disclosure of VAO is more likely in Northern urban centers than in Southern small cities. Further research on connections between social and cultural constructions of family, and different types of VAO risk, as well as on effective interventions for older persons, are urgently needed.

RELATIONSHIPS BETWEEN URINARY PHTHALATE METABOLITES AND POTENTIAL BIOMARKERS OF INFLAMMATION AND OXIDATIVE STRESS FROM NHANES 1999-2006

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Background and Aims: Phthalate exposure has been associated with a wide range of adverse health outcomes in epidemiologic studies, and one hypothesized mechanism is potentially through induction of inflammation and oxidative stress. We recently reported associations between urinary phthalate metabolites and levels of serum gamma glutamyltransferase (GGT), an indicator of oxidative stress, and C-reactive protein (CRP), a marker of inflammation. In this study we expanded our analysis to investigate associations with other potential markers of oxidative stress (bilirubin) and inflammation (alkaline phosphatase, absolute neutrophil count [ANC], ferritin, and fibrinogen). We hypothesized that higher phthalate metabolite concentrations would be associated with elevations in the inflammation markers and decreases in bilirubin, an indication of increased oxidative stress.
Methods: In this exploratory analysis, we combined data from the National Health and Nutrition Examination Survey (NHANES) collected between 1999 and 2006 and performed multivariable regression analyses.
Results: After adjustment for covariates we found ANC to be significantly and positively associated with the metabolites mono-n-butyl phthalate (MnBP), mono-benzyl phthalate (MBzP), mono-(3-carboxypropyl) phthalate (MCPP), mono-(2-ethyl-5-hydroxyhexyl) phthalate (MEHHP), mono-2-ethyl-5-carboxypentyl phthalate (MECPP), and a combined measure of the dibutyl phthalate metabolites ($p < 0.05$). We also observed significant positive associations between alkaline phosphatase levels and the metabolites MnBP, MBzP, MCPP, MEHHP, mono-(2-ethyl-5-oxohexyl) phthalate (MEOHP), mono-isobutyl phthalate (MiBP), mono-(carboxynonyl) phthalate (MCNP), and the aforementioned combination measure ($p < 0.05$). Lastly, bilirubin was significantly and inversely associated with the metabolites MnBP, mono-(2-ethyl)-hexyl phthalate (MEHP), MBzP, MCPP, MEHHP, MEOHP, MiBP, MECPP, and the combined DBP metabolites ($p < 0.0001$).
Conclusions: Concentrations of some urinary phthalate metabolites are associated with increases in ANC and alkaline phosphatase levels, as well as decreased bilirubin levels, which may be indicative of increased inflammation and oxidative stress. These markers may be useful in other studies of low-dose exposure to environmental contaminants in NHANES and other datasets.

ESTIMATING CANCER RISK AMONG RESIDENTS LIVING IN PROXIMITY TO PETROLEUM STORAGE TANKS: THE CASE OF KIRYAT HAIM, ISRAEL

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Background and Aims: Cancer is the leading cause of mortality in Israel (both in men and women) and cancer incidence rates are especially high in the Haifa district, which is the main industrial district of the country (Barchana et al 2007; ICBS 2008; IMEP 2008). Although several petroleum storage facilities located in the area may present a considerable health risk, no epidemiological studies have been carried out to date to investigate their potential health effects.
Methods: Both traditional zonal approaches and recently developed Double Kernel Density (DKD) tools were used to investigate relative risks of lung and NHL cancers attributed to residential proximity to the petroleum storage tanks in the Kiryat Hiam residential area.
Results: While traditional zonal approaches failed to detect any association between residential proximity to the petroleum storage tanks and the two types of cancer under study ($P>0.6$), the DKD approach indicates that the relative density of both lung and NHL cancers declines with distance from the storage tanks. The results are found to be especially significant among the elderly (lung: $t= -14.058$; $P <0.01$; NHL: $t= -4.638$; $P <0.01$), controlled for residential proximity to main roads, average income and smoking.
Conclusions: Living near petroleum storage tanks appears to represent a significant health risk that can be detected by sensitive analytical tools, such as the DKD approach, whereas it may remain undetected by traditional zonal approaches commonly used in epidemiological studies.
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SOCIAL INEQUALITIES IN THE HEALTH OF PREGNANT WOMEN IN THE INMA COHORT: EFFECTS IN HABITS AND SELF-CARE DURING PREGNANCY

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Background and aims: The INMA (Childhood and Environment Project) is a multi-centre prospective mother and child cohort study which aims to evaluate the impact of exposure to the most prevalent environmental pollutants on foetal growth and infant development This communication describes health inequalities on diet, health behaviours and self-caring during pregnancy among 2607 women.
Methods: Pregnant women were recruited at their first routine specialized antenatal care visit (10-13 weeks of gestation) to their health centre in four Spanish areas: Valencia, Sabadell (Catalonia), Asturias and Gipuzkoa (Basque Country). Information on maternal characteristics was collected through two questionnaires completed in the first and third trimester of pregnancy, including socio-demographic data, and variables describing monitoring and care received during pregnancy, as well as diet and life-style. Socioeconomic status (SES) was measured by means of occupation, coded using the four-digit Spanish Classification of Occupations (CNO94), closely related to the international ISCO88 coding system.
Results: The mean age of the women was 30.6 years old (range 15-43), 56.2% were primiparous, 98.9% were married and 8.5% were foreigners. A total of 33.5% had university level education and 47% were from a high occupational class. Women with highest SES reported significantly healthier lifestyle habits and had greater skills for self-care, monitoring and planning their pregnancy, and they had fewer pregnancy-related complications and fewer problems in previous pregnancies. Dietary habits were negatively correlated with maternal SES, with higher intake of protein, carbohydrates, fats and total calories in pregnant women with lower SES. On the other hand, we did not find any statistically significant differences in the intake of dietary supplements.**Conclusions**: Adequate care during pregnancy, apart from monitoring all the usual clinical variables, requires an understanding and consideration of the socioeconomic circumstances of the pregnant woman, which determine her behaviour, habits and self-care during this period.

DI (2-ETHYLHEXYL) PHTHALATE EXPOSURE DURING CATHETERIZATION

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Background and Aims: Diethylhexyl phthalate (DEHP) may produce potential toxicity in human bodies. Medical devices containing DEHP are widely used in patients undergoing catheterization, but data on catheterization exposures are limited. In this prospective study, we will investigate the difference of DEHP level before and after catheterization.

Methods: A total of 16 patients (M/F 12/4, mean age 15.7±10.4 years) with congenital heart disease who underwent catheterization were enrolled. Urine samples were collected on admission, pre-catheterization, post-catheterization, and discharge times for assessment of urinary DEHP. We measured mono-(2-ethylhexyl) phthalate (MEHP) and two oxidative DEHP metabolites, mono-(2-ethyl-5-oxohexyl) phthalate (MEOHP) and mono (2-ethyl-5-hydroxyhexyl) phthalate (MEHHP). Exposures to DEHP, such as plastic container, catheters, and intravenous tubing systems were recorded.

Results: Distribution of creatinine-adjusted phthalate metabolites is shown in Table 1. There were significant differences between admission and pre-catheterization times in terms of MEHP (p=0.01), MEHHP (p=0.005), and MEOHP (p=0.001). There were significant differences between pre-catheterization and post-catheterization times in terms of MEHP (p=0.004), MEHHP (p=0.003), and MEOHP (p=0.002). There were no significant differences between post-catheterization and discharge times in terms of MEHP, MEHHP, and MEOHP. There were significant differences between admission and discharge times in terms of MEHHP (p=0.01), and MEOHP (p=0.005) except MEHP. DEHP metabolites on four different times were not significantly associated with PVC-containing systems except MEHHP on discharge ($r=-0.564$, $p < 0.05$). After a multivariate logistic regression, MEHHP levels were associated with intravenous tubing systems (p=0.07).

Conclusions: Use of intravenous tubing systems in catheterization may result in higher exposure to DEHP as reflected by elevated urinary levels of MEHP.

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DITHIOCARBAMATE PESTICIDE EXPOSURES, ALDEHYDE DEHYDROGENASE INHIBITION, AND RISK OF PARKINSON'S DISEASE

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Background and Aims: Chronic exposure to pesticides has been associated with increased risk of sporadic PD in humans. A hallmark of PD is the selective degeneration of dopaminergic neurons in the substantia nigra. Several studies have suggested that 3,4-dihydroxyphenyl-acetaldehyde (DOPAL), the MAO-B product of dopamine metabolism, is toxic to dopaminergic neurons. We hypothesized that exposure to certain pesticides can potentiate this toxicity by inhibiting aldehyde dehydrogenase (ALDH) which would otherwise oxidize DOPAL to the less toxic DOPAC. Furthermore, human genetic variability in ALDH might influence susceptibility to PD in the presence of pesticide exposure.
Methods: To investigate this hypothesis we used both biochemical and epidemiologic approaches. Spectrophotometrically we determined the ALDH inhibiting activity of 30 pesticides in mitochondrial preparations containing rat hepatic ALDH and exposed primary neuronal cultures to these pesticides to determine the loss of dopaminergic neurons. In parallel, we performed genotyping of the ALDH2 gene on DNA samples from a case-control study of 363 incident PD patients and 427 population controls recruited in a region of California with extensive commercial agriculture. A geographical-information systems computer model we developed was used to assess each subject's exposure to commercial pesticides for the years 1974-1999, using state-mandated pesticide use reports, land use maps, and residential/occupational addresses.
Results: Age, gender, and smoking adjusted odds ratios of PD were estimated in logistic regression models including average lifetime exposure to specific pesticides, ALDH2 clade, and an interaction term. We found 50-200% increases in PD risk associated with exposure to fungicides identified in our biochemical screens (e.g. thiram, mancozeb, maneb) and observed a suggestive interaction between the ALDH2 clade and pesticide exposures.
Conclusions: Our results suggest that certain pesticides can impact ALDH function and may lead to increased PD risk. Furthermore, genetic variability in the ALDH2 gene appears to potentiate this effect.

WATER CONSUMPTION HABITS AND LEVELS OF NITRATE AND TRACE METALS IN MUNICIPAL WATER OF SPAIN. MULTI CASE CONTROL STUDY MCC- SPAIN

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Background and Aims: Several health effects including cancer have been linked to nitrate and metals in drinking water, although the evidence is not conclusive for many associations. Information about the type of water consumed in Spain and levels of these contaminants in drinking water is limited. The aim of this study is to describe levels of nitrate and metals in municipal water and drinking water habits among the controls of a multicase-control population-based study of cancer in Spain (MCC-Spain).
Methods: Study areas include Asturias, Barcelona, Cantabria, Guipúzcoa, Granada, Huelva, León, Madrid, Murcia, Navarra and Valencia. Individual information about water consumption in all residences since 18 years old was obtained in personal interviews. Here we describe water consumption in the current residence among controls (N=2340). Tap water samples were collected between March and June 2010 in 207 sampling points. Nitrate, arsenic, nickel, chromium, cadmium, lead, selenium and zinc were measured at Laboratory of Public Health in Guipúzcoa.
Results: Overall, 71%, 25% and 3% of subjects consumed, respectively, municipal, bottled and private well water in the current residence. Municipal water consumption was highest in Madrid (94%) and lowest in Murcia (65%). Correspondingly, bottled water consumption was highest in Murcia (65%) and lowest in Madrid (5%). Proportion of private well water consumption was highest in León (36%). Mean levels of nitrate ranged from 2.7 mg/l (Guipuzkoa) to 9.8 mg/l (Barcelona). Trace metals were mostly below the detection limit (on average, 94% of samples). Arsenic was detected in Barcelona, León and Madrid (maximum levels were 1.0, 3 and 4.0µg/l, respectively).
Conclusions: Considerable differences in water consumption are observed between regions. Levels of nitrate and metals were below the regulated limits in municipal water. It is necessary to assess these contaminants in bottled and private well water, given their high consumption in some areas.

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IN-UTERO ORGANOCHLORINE EXPOSURE, GENE EXPRESSION OF AROMATASE, AND ABNORMAL PAP SMEARS

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Background and Aims: We have previously demonstrated that prenatal exposure to organochlorines is associated with gene expression of aromatase, an enzyme in estrogen synthesis. It is also known that aromatase is overexpressed in HPV positive cervical cancer cells. Estrogen activates HPV in cervical carcinogenesis. The objective of this study is to determine the association between prenatal exposure to organochlorines and abnormal Pap smear, mediated by altered gene expression of aromatase.
Methods: Female offspring of the Michigan Fisheater's Cohort (recruited 1973-1991) were contacted in 2001/2 and 2006/7. Interview variables included age and reproductive history. Leukocyte gene expression was determined and standardized with RNA Polymerase II. Generalized estimation equations and path-analyses were used to investigate the link between prenatal organochlorine exposure, gene expression, and Pap smear results.
Results: 139 women birthed by 93 mothers were identified. Of 134 women with complete data, 22 reported abnormal Pap smears. The average age at interview was 40 years (20.2 – 52.8) and of menarche, 13 years (11.0-16.0). Ninety-eight were premenopausal, 11 perimenopausal, and 24 postmenopausal.

Mean values of gene expression for *CYP19* were higher (p=0.03) in women with abnormal Pap smears and marginally different for *ESR1,* (p=0.09), which codes for ERα. No difference was found for 17-α-hydroxylase or *ESR2.* The path analysis showed no direct effect between prenatal organochlorine exposure and abnormal Pap smears, but a significant indirect effect via higher expression of *CYP19*.
Conclusions: These results demonstrate an association between abnormal Pap smears and the gene expression of *CYP1* that is not directly related to in-utero organochlorine exposure. This may reflect an indirect effect via gene expression, initiated earlier in life or a true negative effect. If the former is the case, the association between the gene expression of *CYP19* and abnormal Pap smears will need an alternative explanation.

EXTREME AIR POLLUTION EVENTS FROM BUSHFIRES AND CARDIO-RESPIRATORY HOSPITAL ADMISSIONS IN SYDNEY, AUSTRALIA 1994-2007

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Background and aims: Extreme air pollution events due to bushfire smoke are expected to increase as a consequence of climate change, yet little has been published about their population health impacts. We examined the association between bushfire smoke pollution events and hospital admissions in Sydney from 1997-2004.
Methods: Events were defined as days for which smoke from bushfires caused the 24 hour city-wide average concentration of PM_{10} to exceed the 99^{th} percentile. We used a time-stratified case-crossover design with conditional logistic regression modeling adjusted for daily meteorology, flu epidemics and holidays. Odds ratios (OR) and 95% confidence intervals (CI) for admissions on event compared with non-event days were estimated. We assessed admissions for all cardiovascular conditions, ischaemic heart diseases, hypertensive diseases, cerebrovascular diseases, all respiratory conditions, asthma, chronic obstructive pulmonary disease (COPD), bronchitis and pneumonia.
Results: There were 52 days during the study period in which the extreme particulate pollution was attributable to bushfire smoke. On the day of the smoke events all respiratory hospital admissions increased by 7% (OR 1.071, 95%CI, 1.033,1.112). Admissions for COPD increased 16% (OR 1.168, 95%CI 1.080, 1.263) and asthma by 14% (OR 1.145, 95%CI 1.036, 1.265). Results were similar at a lag of one day. No associations were observed with other respiratory diagnoses or with cardiovascular admissions.
Conclusions: Bushfire smoke pollution events were associated with increases in admissions for respiratory, rather than cardiovascular conditions.

EXPOSURE TO PARTICULATE AIR POLLUTION AND COGNITIVE DECLINE IN OLDER WOMEN

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Background and Aims: Chronic exposure to particulate air pollution may accelerate cognitive decline in older adults. We examined long-term exposure to thoracic (PM_{10}) and fine ($PM_{2.5}$) particulate air pollution in relation to cognitive decline.
Methods: Our investigation included 17282 US women, aged 70-81 years, who were participants in the Nurses' Health Study. We used geographic information systems (GIS)-based spatio-temporal smoothing models to estimate recent (1 month) and long-term (6-13 years) exposures to PM_{10}, and $PM_{2.5}$ for women residing in the contiguous US. We evaluated the women's cognition using validated telephone assessments of cognition, administered 3 times at approximately 2-year intervals, including tests of general cognition, verbal memory, category fluency, and attention. We used generalized estimating equation regression to estimate differences in the rate of cognitive decline over 4 years, across levels of PM_{10} and $PM_{2.5}$ exposures preceding cognitive testing.
Results: Higher levels of long-term exposure to both PM_{10} and $PM_{2.5}$ were associated with significantly faster cognitive decline. Decline on a global score, combining results of all 6 tests, was 0.017 standard units worse per 10 $\mu g/m^3$ increment in PM_{10} exposure (95% confidence interval, -0.027 to -0.007) and and 0.036 units worse per 10 $\mu g/m^3$ increment in $PM_{2.5}$ exposure (95% confidence interval, -0.064 to -0.008). These differences in cognitive trajectory were similar to the differences in trajectories between women in our cohort who were 1.5 and three years apart in age, respectively, indicating that the long-term effects of particulate air pollution are cognitively equivalent to aging by up to three years. Recent exposures to PM_{10} and $PM_{2.5}$ were not significantly associated with cognitive decline.
Conclusions: Long-term exposure to PM_{10} and $PM_{2.5}$, at levels typically experienced by many persons in the US, is associated with significantly worse cognitive decline in older women.

ESTIMATED GLOBAL HUMAN MORTALITY FROM VEGETATION FIRE SMOKE

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Background and Aims: Vegetation fires annually release an average of approximately 2 petagrams of carbon to the atmosphere causing recurring episodes of severe regional air pollution and contributing to greenhouse gas emissions. We aimed to assess global mortality attributable to particulate matter in vegetation fire smoke (VFS).
Methods: We followed the methods of the WHO Global Burden of Disease, Comparative Risk Assessment studies (Ezzati *et al.* 2002). Ambient concentrations of particulate matter (1997-2006) were estimated at a resolution of 2 (lat) X 2.5 (long) degrees using satellite-based observations of fire activity, atmospheric aerosol loadings and a global atmospheric chemical transport model. We applied previously published exposure-response coefficients for VFS and acute all-cause mortality in WHO regions where smoke exposure was sporadic. In regions with chronic VFS exposure we used a conservative coefficient from studies of urban air pollution and all-cause mortality as studies of chronic VFS exposure are lacking. Coefficients were applied to population-weighted mortality rates to produce global and regional mortality estimates. We conducted sensitivity analyses to assess the influence of effect size coefficients, acute vs chronic exposure scenarios, and counterfactual VFS pollution estimates.
Results: We estimated that 480,000 deaths/yr were attributable to VFS. In sensitivity analyses the estimate ranged from 300,000 to 820,000 with the assumed counterfactual exposure having the greatest influence on results. Regions most severely affected were Sub-Saharan Africa and South East Asia.
Conclusions: Fire emissions are an important contributor to global mortality, although lower than that estimated for urban air pollution (800,000/yr) and indoor air pollution from cooking fires (1.6 million/yr) (Ezzati *et al.* 2002). Rapid improvements in health outcomes could be achieved through the cessation of deliberate burning of biomes that rarely naturally burn, such as tropical rainforests. The potential to reduce overall fire emissions from highly flammable biomes such as savannas, the primary source of firesmoke in sub-Saharan Africa, warrants further investigation.

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FROM SCIENCE TO POLICY: ADDRESSING HEALTH IMPACTS OF INSTITUTIONAL AND LARGE-SCALE WOODY BIOMASS BURNING

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Background and aims: Renewable energy credits, grants, and the low cost of wood have led to the proliferation of woody biomass electrical utility plants and institutional units to heat schools/universities and hospitals in the Northeast U.S. Potential health impacts of biomass burning are not systematically taken into account in energy policy decision-making. While "healthy renewable energy" is a goal shared by policy makers and the public, policy and practice changes are needed to achieve it. The objective of this project is to review the state of the science regarding health impacts from mid-sized biomass burning units as well policy gaps and opportunities for health-promoting energy policy decisions.
Methods: Literature reviews included a comprehensive search of the peer-reviewed literature, reviews of regulatory/permit policies and key informant interviews with air regulatory staff in nine Northeast U.S. states. Input and clarifying policy recommendations came from meetings with national health experts during Spring 2011. A policy symposium with leaders from energy, economic development, environment and public health agencies is scheduled later in the year to communicate key project findings and to begin a constructive dialog about policy solutions.
Results: Evidence of health risks to workers from the production of wood-chips, wood pellets and associated delivery, and community health impacts from diesel truck traffic and emissions from industrial and institutional wood-fired units will be presented. Preliminary policy opportunities identified include the adoption of health impact assessment during the permit process, and "Prevention through Design" policies that make available cleaner-burning technologies and safer workplaces. The case for stricter air permit regulations requiring emission controls on small institutional units will also be presented. Lessons-learned from meetings with experts and with policy leaders will be highlighted.
Conclusions: Health impacts of woody biomass burning have not been fully addressed to date. Scientific information can inform future policy decisions that will reduce public health risks.

Contribution of individual risk factors to the international variation in wheeze prevalence in children: a meta-analytic approach

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Background and Aims: We investigate how much international differences in individual risk factors assessed in our study contribute to the high international variation in the prevalence of wheeze using a meta-analytic approach.
Methods: In Phase Two of the International Study of Asthma and Allergies in Childhood, cross-sectional population-based studies of children (8-12yrs) were performed in 30 centres in 22 countries worldwide according to a standardized protocol. Asthma symptoms and a wide range of potential risk factors were assessed by parental questionnaires as well as atopic sensitization by skin prick testing.
For each centre we fitted a logistic regression. Based on the resulting centre-specific beta estimates, we predicted the expected centre prevalence of wheeze at the global average level of exposure to each of the risk factors (equivalent to direct standardization).
Between centre heterogeneity was quantified by a random effects meta-analysis on the predicted prevalences. After running bivariate models, the risk factors that reduced most markedly the heterogeneity were combined in a multivariate model.
Results: The observed prevalence of wheeze ranged from 0.8% to 25.6%.
The most prominent individual risk factors to reduce the variation were parental allergic disease, feather bedding, a smoking mother, damp housing and skin prick test reactivity. When accounting for these factors, the predicted prevalence for the centres ranged from 1.0% to 19.3%. The variance of the combined estimate of the prevalence after adjustment was 64% of the variance for the observed prevalence.
Conclusions: Only a limited proportion of the variation between the centres could be eliminated by adjusting for the investigated individual risk factors. Quantification proves difficult because heterogeneity measures from meta-analysis are susceptible to increases in the standard error after multivariate modeling. In the future we aim to explore multilevel modeling.

EARLY DRY COUGH AND DYSPNOEA AS MARKERS OF ALLERGIC AND INFECTIOUS BRONCHIAL OBSTRUCTIVE PHENOTYPES IN INFANCY: RESULTS FROM THE FOLLOW-UP OF THE PARIS BIRTH COHORT

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Background and Aims: Asthma diagnosis during infancy is difficult: wheezing is quite frequent, notably due to respiratory infections, but all wheezers will not develop asthma. Thus, identification of phenotypes based on different respiratory symptoms has become one of the current challenges. We previously identified two bronchial obstructive phenotypes during the first year of life in 2632 infants from the PARIS birth cohort, using an unsupervised statistical approach: G1, presenting dry night cough, and G2, suffering from nocturnal dyspnoea. The present study aims to follow the evolution of the G1 and G2 children between 1 and 3 years and to examine whether the identified bronchial obstructive phenotypes are stable and whether they differ with regard to comorbidity and associated environmental factors.
Methods: Data about children's health and their mode/environment of life were gathered by self-administered questionnaires parents filled in 5 times during the first year of life, and at 2 and 3 years. Risk factors associated to G1 and G2 phenotypes were studied using polytomous logistic regression in comparison to the asymptomatic group G0.
Results: G1 and G2 phenotypes were persistent at 3 years, and comorbidity was quite different between both groups. G1 infants suffered significantly more often from allergic diseases such as eczema, food reactions, and nose disorders associated with itchy-watery eyes, whereas the G2 group was dominated by upper/lower respiratory infections. The analysis of associated factors corroborated these two distinct profiles. Parental history of allergy and potential contact with allergens were associated to G1. Conversely, exposure to chemicals, through prenatal and postnatal ETS exposure, renovation of the child's bedroom or acquisition of particleboard furniture, was significantly more frequent in G2, suggesting a synergistic effect on infections.
Conclusions: Early dry cough and nocturnal dyspnoea appear as markers of two distinct stable profiles, respectively allergic (G1) phenotype and infectious (G2) phenotype.

GPS AND GIS FOR ASSESSMENT OF PHYSICAL ACTIVITY BEHAVIOUR OF CHILDREN WITHIN THE URBAN ENVIRONMENT

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Background and Aim: The built environment may have a role in preventing obesity by stimulating physical activity (PA) levels. Knowledge of which environmental factors affect PA, and how, is sparse. This study aims to gain insight into locations where children are physically active, using innovative GPS, accelerometer and GIS techniques, and to analyze the willingness to travel from home to school by active transport, as a function of the distance.

Methods: 88 school children (aged 5-11 years) in 5 cities in the Netherlands participated for a maximum of 7 days. The locations and intensity of their activities were recorded by GPS and accelerometer and linked with geographical information on 1) green areas, 2) surface water, 3) playgrounds, and 4) schoolyards. The actively travelled (i.e. walked or bicycled) distance between home and school was assessed using GPS and GIS data.

Results: On average children spent 1 hour and 49 minutes a day outdoors. During this time, children were often near green areas (27%) or water areas (11%). The highest PA levels were found at or around playgrounds and schoolyards.
Children walked or bicycled a mean distance of 4.5 km per day. The majority of the actively travelled trips between home and school were < 500 meters long. Up to a distance between home and school of 350 meters, the willingness to travel by means of active transport is nearly 100%. At distances beyond 400 meters, the willingness decreases rapidly.

Conclusions: These findings provide better insight into the question where within the urban environment do children spend their time, where they are physically active, and how far they are willing to travel by foot or bicycle. Urban planning may provide a means to stimulate physical activity levels and health. GPS technology, in conjunction with GIS, is an insightful and promising addition to this field of research.

MATERNAL RESIDENCE NEAR AGRICULTURAL PESTICIDE APPLICATIONS AND AUTISM: A FOLLOW-UP STUDY

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Background and Aims: Our previous work documented associations between maternal residence near organochlorine pesticide applications during the approximate period of brain embryogenesis (gestational days 21 through 49) and mid-infancy (months 4 through 6 of life) with the development of autism spectrum disorders (ASD). We sought to confirm these findings using a larger sample, to examine differences in associations for male and female children, and to consider other pesticides having toxicological mechanisms theorized as being relevant to autism in the literature.
Methods: We identified 2,553 males and 523 females with ASD born during 1996-2005 in California's Central Valley using the California Department of Developmental Services (DDS) electronic files. These were matched them by sex and maternal date of last menstrual period to 46,140 live-born, normal birthweight, term infants as a comparison group. We determined proximity (residence recorded at delivery within 500 meters) to applications of organochlorine, organophosphate, pyrethroid, and anilide pesticides using California Department of Pesticide Regulation records refined via Department of Water Resources land use polygons. Probability of ASD was analyzed using conditional logistic regression controlling for maternal age, educational attainment, race/ethnicity, and DDS Regional Center responsible for ASD classification.
Results: Proximity to organochlorine applications during brain embryogenesis was associated with ASD for males (OR for ten-pound increase 4.81 [95%-confidence interval 2.41-9.54]) but not for females (0.90 [0.29-2.84]). For applications occurring during mid-infancy, these ratios were 1.76 (1.37-2.26) and 1.18 (0.53-2.67), respectively.
Conclusions: Proximity to organochlorine pesticides during each time-period of interest was associated with ASD in a linear fashion among males but not females. We conduct further analysis to understand (a) the sensitivity of these findings to chosen definitions of time period for each pesticide class, and (b) the potential for spatial confounding.

MATERNAL EXPOSURE TO MAGNETIC FIELDS (MFS) DURING PREGNANCY IN RELATION TO THE RISK OF ASTHMA IN OFFSPRING

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Background and Aims: Asthma is the most common chronic disease in children, and the prevalence has been increasing for decades. Yet, its etiology is large unknown. This study examined a new potential etiological factor: whether maternal exposure to high MF level during pregnancy increases the risk of asthma in offspring.

Methods: A prospective cohort study was conducted among members of Kaiser Permanente Northern California. Participating pregnant women carried a meter measuring their MF levels during pregnancy and 626 of their children were followed up to 13 years for their clinical diagnosis of asthma.

Results: A higher maternal MF exposure level during pregnancy was associated with significantly higher prevalence of clinically diagnosed asthma in offspring. After adjustment for potential confounders, a statistically significant linear dose-response relationship was observed between increasing maternal median daily MF exposure level in pregnancy and an increased risk of asthma in offspring (adjusted hazard ratio (aHR)=1.26, 95% confidence interval (CI) 1.10-1.44). Using the categorical MF level (low, medium and high), the results showed a similar dose-response relationship: compared to those whose mothers had a low MF exposure during pregnancy, children whose mothers had a high MF level had more than 3.5 fold increased risk of developing asthma (aHR=3.52, 95%CI: 1.68-7.35), while children whose mothers had a medium MF level had a 74 percent increased risk of asthma (aHR=1.74, 95% CI: 0.93-3.25). There was also a statistically significant synergistic interaction between other asthma risk factors, maternal history of asthma and birth order (first-born), and the MF effect on the asthma risk.

Conclusions: Our finding provides the new epidemiologic evidence that high maternal MF exposure in pregnancy may be associated with the risk of asthma in offspring.

METHODOLOGICAL APPROACHES AND CHALLENGES IN PROJECTING HEALTH IMPACTS ASSOCIATED WITH AIR POLLUTION AND CLIMATE CHANGE

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Background and Aims: Quantifying the health impacts of climate change has been an active area of research in recent years. Different methods have been developed to estimate the magnitude of a number of diseases potentially modified by climate change. The focus of this review is on methodological approaches and challenges in projecting future health impacts associated with air pollution under a changing climate.
Methods: The review is limited to studies published between 2000 and 2010. In addition to examining approaches and challenges in projecting the effects of climate change on health outcomes related to air quality, we also compared them with projections of potential health effects attributable to climate change such as temperature-related deaths and food-borne disease.
Results: Approximately 90% of the published articles used epidemiological approaches where reference dose-response functions of pollutants were linked with projected air quality concentrations generated from climate-air pollution modelling systems. Recently a study proposed a combination of synoptic weather typing and statistical downscaling as an alternative approach. Factors other than climate change, for example, emissions of ozone precursors, population growth, age structure, and disease incidence, were mostly held constant to reduce uncertainty in the model predictions. Such simplified future scenario has been commonly found in estimating various disease outcomes under a changing climate. Challenges identified in the past studies include correlation of multiple air pollutants, interrelated air pollution-temperature health burdens, application of air pollution health thresholds, future demographic characteristics, and adaptive actions.
Conclusions: Developing models and realistic scenarios to minimise bias and uncertainty in predictions are the key challenges for future research. Similar to approaches in studying future impacts of climate change of heat on mortality, incorporating insights gained from historical air pollution episodes during extreme weather events can potentially help improve estimating future health effects of air pollution and climate change.

AN INTERACTIVE DISCUSSION OF THE NEWLY-REVISED DRAFT ISEE ETHICS GUIDELINES: KEY PRINCIPLES, CASE STUDIES, AND APPROACHES TO ETHICAL CHALLENGES

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Background and Aims: The opportunity to positively contribute to the health and well-being of humans is a fundamental tenet of the field of epidemiology. Environmental epidemiologists are responsible for identifying environmental health threats which may have far-reaching implications, including multi-generational effects and global impacts. In order to meet the challenge of protecting public health, it is essential that funders, institutions, and researchers be committed to the pursuit of objective epidemiological evidence in protecting public health, and recognizing forces that subvert or undermine such work. However, there has been a growing threat to the impact and the legitimacy of our research due to increasing pressures and control from political and economic interests. These forces work to shape the research agenda, methodology, reported outcomes, and policy. The ensuing ethics issues add to the spectrum of other ethics challenges posed by research on humans.

Methods: In this presentation, I will discuss the newly-updated ISEE Ethics Guidelines, highlighting modifications that were deemed to reflect issues in the current research climate. One important addition is an invitation to ISEE members to contribute case studies. The Guidelines are organized according to four major areas:

- Obligations to Individuals and Communities Subjected to Research
- Obligations to Society
- Obligations Regarding Funders/Sponsors and Employers
- Obligations to Colleagues

Results: The new draft Guidelines reflect growing concern about conflicting interests; funding of heretofore independent institutions by private industry; political influence on the research agenda; restrictions on the flow of information; informed consent (including international differences regarding authority over decision-making); the fate of bio-specimens; editorial bias; and the implications of improper ("junk") science for public health policy.

Conclusions: The true value of the Ethics Guidelines will rest upon their active incorporation into professional practice, and into the dialogue among all stakeholders.

MATERNAL CONSUMPTION OF COFFEE AND TEA DURING PREGNANCY AND RISK OF CHILDHOOD ALL: RESULTS FROM AN AUSTRALIAN CASE-CONTROL STUDY

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Background: Little is known about the origins of childhood acute lymphoblastic leukaemia (ALL). Several studies have reported an increased risk of childhood acute leukaemia with higher levels of maternal coffee consumption during pregnancy, while others have reported no association. One positive study also examined maternal tea consumption and found no effect. Both coffee and tea contain naturally occurring topoisomerase II inhibitors, which have been associated with chromosomal damage of the type seen in infant leukaemia The aim of this study was to investigate whether maternal coffee and/or tea consumption during the last six months of pregnancy was associated with risk of childhood ALL.
Methods: Data on coffee and tea drinking during pregnancy from 337 case mothers and 697 control mothers were analyzed using unconditional multivariable logistic regression. A meta-analysis of our findings with those of previous studies was also conducted.
Results: There was little evidence of an overall association between maternal coffee consumption and risk of ALL: OR 0.89 (95% CI 0.61, 1.30), although there was some suggestion that higher levels of intake might increase risk in children of non-smoking mothers: OR for 2+ cups/day = 1.44 (95% CI 0.85, 2.42); this was supported by our meta-analysis. Risk was also elevated among cases with chromosomal translocations. The overall OR for maternal tea consumption was 0.82 (95% CI 0.56, 1.18), although the OR for T-cell ALL was 0.21 (95% CI 0.08, 0.51). Among ALL cases with translocations, the ORs for tea consumption tended to be elevated: OR=1.70 (95% CI 0.79-3.68) for 2+ cups/day.
Conclusions: The observed increased risk associated with coffee and tea consumption may be confined to ALL with translocations. These associations should be explored further in large international consortia.

AN INTERACTIVE DISCUSSION OF THE NEWLY-REVISED DRAFT ISEE ETHICS GUIDELINES: KEY PRINCIPLES, CASE STUDIES, AND APPROACHES TO ETHICAL CHALLENGES

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Background and Aims: The final thirty minutes of the Symposium will be a moderated, interactive discussion of the draft of the revised ISEE Ethics Guidelines.
Methods: The discussion will reflect on the five presentations and the case studies presented, and how they are relevant to the mission of the ISEE and environmental epidemiologists. Feedback will be elicited from attendees on the content of the Guidelines; the value of case studies in illustrating the relevance of the Guidelines in actual practice; and on developing solutions for preventing and managing ethical conflicts.
Results: A paper will emerge from these proceedings for wider dissemination among environmental epidemiologists, with a view towards the ISEE's eventual adoption of the revised Ethics Guidelines.
Conclusions: It is our goal to increase awareness of the ISEE Ethics Guidelines, and to engage members of our profession in a positive dialogue about ethics issues that are so vital to the positive impacts of our work.

LOCAL NEIGHBORHOOD DEPRIVATION: NEW METHODS TO DEFINE NEIGHBORHOODS AND MEASURE DETERMINANTS OF POVERTY IN THE FRESNO ASTHMATIC CHILDREN'S ENVIRONMENT STUDY (FACES)

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Background and Aims: Previous studies have demonstrated an association between neighborhood deprivation (often measured by the US Census), exposure to air pollution and asthma outcomes. However, what constitutes a neighborhood and how best to characterize local environments is subjective and evolving. A neighborhood is defined by a geographic boundary and thus, the appropriate scale and aggregation units must be considered in epidemiologic analyses. We aim to create individual neighborhoods based on walking distances from children's residences in the Fresno Asthmatic Children's Environment Study (FACES) and to describe quantitatively neighborhood deprivation at the individual level.
Methods: This study uses a geographic information system (GIS) to define neighborhoods and measure local, area-level deprivation in Fresno, CA from 2000-2008. Markers of deprivation in FACES include low grocery store availability, high density of alcohol outlets and cigarette sales permits, lack of schools and parks, inadequate public transit, lack of daycares, and eight census-derived variables. We use item response theory (IRT) with maximum likelihood estimation to develop a deprivation scale for study subjects' neighborhoods (n=518) where geographic attributes are converted to positive and negative neighborhood influences.
Results: The median IRT score for FACES participants is 0.16 (where scores range from -5 to 5 for low to high deprivation). The scores are correlated positively with census defined poverty (Spearman correlation rho=0.2) and may give a more complete picture of area-level deprivation than the census.
Conclusions: IRT helps summarize multiple GIS inputs and describe more precisely local deprivation with a composite score. The advantage of using individual neighborhoods defined by walking distances versus census defined boundaries is that the individual neighborhoods partly solve the problem of non-identifiabilty, an issue of insufficient covariate overlap that plagues neighborhood research. Our future research will employ the IRT scores to determine if there is a relation between neighborhood deprivation and exposure to traffic and lung function among asthmatics in FACES.

RELATIONSHIP BETWEEN BLOOD LEAD LEVELS AND PULMONARY FUNCTION

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Background and Aims: Lead is an environmental and public health hazard of global proportions. In case of lead, respiratory intake is a major route of exposure. But there are few studies on the relation between respiratory health and blood lead level. This study was performed to examine the influence of lead on the pulmonary function of local residents.
Methods: For this study, 800 local residents (353 men, 447 women) near an industrial complex were surveyed from July to August in 2008. All of the subjects completed the interview questionnaire and performed PFT (pulmonary function test) and blood lead tests.
Results: The mean blood lead level was 1.32±0.5ug/dl. The blood lead levels of men were higher than that of women. The results of %FVC, %FEV_1, FEV_1/FVC% in PFT were 94.9±13.1, 93.7±13.0, 84.3±8.5. Smoking, Income and traffic intensity was environmental factors of pulmonary function. There was a significantly negative correlation between PFT results and blood lead levels. For children under the age of nine, the pulmonary function significantly decreased as the blood lead levels rose, despite adjusting the factors age, sex, height, weight, smoking, and traffic intensity.
Conclusions: This study suggests that pulmonary function may be related to blood lead level, especially for children under nine years of age. This means that exposure to lead might decrease the function of respiratory system. Further study will be needed to indentify more association between blood lead levels and pulmonary function.
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CORRELATION BETWEEN MAXIMUM TEMPERATURES AND ACUTE RESPIRATORY INFECTIONS IN THE METROPOLITAN AREA OF GUADALAJARA, MEXICO

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Background/Aims: It is recognized worldwide that there is a link between increases in temperature and heat waves, and respiratory morbidity and mortality rates. In Guadalajara's Metropolitan Area (GMA) temperatures have increased and Acute Respiratory Infections (ARIs) ranks first in morbidity rates. The relationship between maximum observed temperatures and ARIs in the GMA between1996 and 2009 is analyzed.
Methods: Observational, retrospective, longitudinal and comparative study undertaken from 1996-2009. Variables analyzed were maximum observed daily temperature, heat waves and their duration and morbidity due to ARIs.
Maximum temperatures during the period from 1996 to 2009 were identified with respect to those observed from 1960-1980 considered as the baseline, in order to identify the highest levels of ARIs cases.
Heat waves was defined as observing a daily maximum temperature equal or above 32 °C for three consecutive days.
Correlation analyses were conducted between the maximum observed temperature and the total ARIs cases each week.
Results: The highest temperatures in the GMA from 1996-2009 are registered from April to June; the greatest increases with respect to the baseline occurred from November to February. The greatest frequency and duration of heat waves occurred in April and May; 2009 was atypical with respect to maximum temperatures and equally for ARIs, which showed an unusual increase in cases from April to June. The correlation between these two variables was found to be 0.49.
Conclusions: The maximum observed daily temperatures in 2009 are found to have increased within GMA with respect to those registered during the period from 1960 to 1990. 24% of the increase in ARIs in 2009 is determined by the increase in temperature.
The increase in ARIs during the periods of greater heat is a tendency recently observed in 2009, which makes it of great relevance, in the face of climate change scenarios, to maintain monitoring activities which provide daily data.
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RELATIONSHIP BETWEEN BLOOD MANGANESE AND BLOOD PRESSURE IN THE KOREAN GENERAL POPULATION ACCORDING TO KNHANES 2008

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Background and Aims: Human studies on the relationship between blood pressure and Mn overload are limited or conflicting, and those studies have been performed on a small scale. We present data on the association of manganese (Mn) level with hypertension in a representative sample of the adult Korean population who participated in the Korean National Health and Nutrition Examination Survey (KNHANES) 2008.

Methods: This study was based on data obtained by KNHANES 2008, which was conducted for three years (2007–2009) using a rolling sampling design involving a complex, stratified, multistage, probability-cluster survey of a representative sample of the noninstitutionalized civilian population of South Korea.

Results: Multiple regression analysis after controlling for covariates, including gender, age, regional area, education level, smoking, drinking status, hemoglobin, and serum creatinine, showed that the beta coefficients of log blood Mn were 3.514, 1.878, and 2.517 for diastolic blood pressure, and 3.593, 2.449, and 2.440 for systolic blood pressure in female, male, and all participants, respectively. Multiple regression analysis including three other blood metals, lead, mercury, and cadmium, revealed no significant effects of the three metals on blood pressure and showed no effect on the association between blood Mn and blood pressure. In addition, doubling the blood Mn increased the risk of hypertension 1.828, 1.573, and 1.567 fold in women, men, and all participants, respectively, after adjustment for covariates. The addition of blood lead, mercury, and cadmium as covariates did not affect the association between blood Mn and the prevalence of hypertension.

Conclusion: Blood Mn level was associated with an increased risk of hypertension in a representative sample of the Korean adult population.

MOSQUITO-OVITRAP INDEX AND DENGUE FEVER EPIDEMICS IN GUANGDONG PROVINCE, CHINA: A SPATIOTEMPORAL ANALYSIS

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Background and Aims: This study aims to use spatiotemporal analysis methods to describe the spatial distribution and clustering of dengue fever (DF) cases and explore the possibility of developing a time series forecast model of DF based on an index on Aedes larval density in Guangdong Province, China.
Methods: We obtained a data set containing numbers of notified monthly DF cases in Guangdong Province, China for the period of January 2005 – December 2010 from Chinese Center for Disease Control and Prevention. Monthly data on the mosquito-ovitrap index (MOI) on Aedes larval density and population data were obtained from the National DF Surveillance Sites in Guangdong province and China CDC, respectively. Geographical information system (GIS) and Kulldorff's spatial scan statistic were used to uncover spatial clustering of DF at prefecture level. Time series regression model was used to estimate independent contribution of MOI on incidence of DF in this study.
Results: There were 1658 DF cases (locally-acquired: 1599 (94.03%); overseas-acquired cases: 99 (5.97%)) in Guangdong between 2005 and 2010. The incidence rates of DF in spring, summer, autumn and winter were 0.0018, 0.0647, 0.2259 and 0.0023/100,000, respectively. High incidence clusters of DF were concentrated in Zhuhai (1.6178/100,000), Guangzhou (1.3524/100,000) and Shantou (0.5723/100,000), China, which have humid subtropical climate and the large amount of foreign tourism. Our results showed that there appeared to be an upward trend of geographic range of DF transmission in Guangdong, China. Monthly MOI at lag of 1 – 2 months may trigger DF outbreak in high incidence clusters of DF.
Conclusions: The geographic range of notified DF cases seems to be expanded in Guangdong, China over recent years. MOI warrant further investigation as a mediator/predictor of the DF cycles. The findings suggested the surveillances of vector should be taken at early stage. However, more research is needed to explore the possibility of developing early warning system for DF.

IS THE ASSOCIATION OF AIR POLLUTION WITH INCIDENT CORONARY HEART DISEASE OR ALL CAUSE MORTALITY MODIFIED BY A HEALTHY LIFESTYLE?

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Background and Aims: Chronic exposures to particulate matter (PM) have been associated with increased morbidity and mortality. Few studies, however, have been able to examine the impacts of a healthy lifestyle on these associations.
Methods: Monthly PM_{10} levels 1988-2006 were assigned to the residential address history of 101,307 members of the all-female Nurses' Health Study and were used to calculate time-varying average exposure in the previous 12 months. Information on confounders and diet and physical activity was available from mailed questionnaires. Effect modification of the association of PM_{10} with risk of incident coronary heart disease (CHD) and all-cause mortality by diet, alcohol consumption, and physical activity was assessed in stratified Cox proportional hazards models. All models were adjusted for calendar month, season, current age, region, family history, high cholesterol or high blood pressure, BMI, diabetes, cigarette smoking, median census tract income and home value.
.**Results:** Each 10 $\mu g/m^3$ increase in 12 month average PM_{10} was associated with an all-cause hazard ratio (HR) of 1.07 (95%CI: 1.04-1.11) and an incident CHD HR=1.04 (95%CI: 0.97-1.12). We observed suggestions of effect modification of the all-cause mortality associations by total antioxidant intake and physical activity. Similar patterns were seen for incident CHD with additional effect modification by the prudent diet pattern, fruit consumption, and alcohol consumption. Overall, increasing consumption of healthy foods was associated with a lower risk per unit increase of PM_{10}, while increasing physical activity levels were associated with higher risks.
Conclusions: These results suggest that individuals with moderate alcohol consumption and increased consumption of healthy foods may be at a lower risk of incident CHD and all-cause mortality per 10 $\mu g/m^3$ increase in PM_{10}. Individuals with higher levels of physical activity may be at a higher risk, possibly due to additional time outdoors.

PLASMA FLUORESCENT OXIDATION PRODUCTS AND SHORT-TERM AMBIENT AND OCCUPATIONAL PARTICULATE EXPOSURES

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Background and Aims: Experimental evidence suggests that exposure to fine particulate air pollution results in oxidative induced tissue damage. To assess whether ambient and occupational particulate exposure in humans results in systemic oxidative stress, we used a novel fluorescent oxidation products (FLOx) assay measured in plasma samples.
Methods: Blood samples were collected from a total of 236 nonsmoking, Caucasian, male trucking industry workers either before, during, or after their work shifts. FLOx was measured as relative fluorescent intensity (FI) units per milliliter (FI/ml) of plasma. County-level ambient $PM_{2.5}$ exposures on the day of blood draw and the proceeding two days were determined based on US EPA monitors. Occupational exposures to $PM_{2.5}$ were based on job-specific area-level sampling, weighted by time worked prior to blood draw. Generalized linear models were used to determine associations between FLOP levels and the ambient and occupational exposures, adjusted for each other and age, alcohol consumption, aspirin, and cholesterol medications.
Results: Participants were 51.0 (SD=8.8) years old on average, had mean FLOx levels of 265.9 FI/ml (SD=96.0), and spent an average of 5 hours (range 0 to 17 hours) working prior to blood draw. Ambient $PM_{2.5}$ levels on the day of blood draw varied from 3.6 to 18.8$\mu g/m^3$ (mean=10.2$\mu g/m^3$) and occupational $PM_{2.5}$ levels varied from 0 to 87.0$\mu g/m^3$ (mean=16.4$\mu g/m^3$). Only 40 of the workers came in before work (occupational $PM_{2.5}$=0$\mu g/m^3$). In fully adjusted models, FLOx was positively associated with average ambient $PM_{2.5}$ levels on the day of blood draw, increasing 3.1 FI/ml (95%CI:0.6, 5.5) for each 1$\mu g/m^3$ increase in $PM_{2.5}$. No associations were observed between FLOx and occupational $PM_{2.5}$ levels.
Conclusions: Our results suggest a small, but positive association of recent ambient exposure to $PM_{2.5}$ with this novel marker of systemic oxidative stress. However, we did not observe the same relationship with occupational $PM_{2.5}$ exposures.

THE ASSOCIATION BETWEEN AGRICULTURAL ORGANOPHOSPHATE PESTICIDE EXPOSURE AND AUTISM SPECTRUM DISORDERS IN THE CHARGE STUDY

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Background and Aims: Prenatal organophosphate (OP) exposure has been associated with an increased risk of cognitive and behavioural abnormalities in children. In California, two studies have reported an association between organophosphate exposure and autism spectrum disorders (ASDs).
Aim 1: Evaluate the association between ASD and organophosphate pesticide application within township sections 500m of the birth residence of CHARGE study participants.
Aim2: Evaluate the relationship between timing of exposure and the odds of having a child with an ASD.
Methods: The study population includes participants from the Childhood Autism Risks from Genes and Environment (CHARGE) study, a population-based case-control study. Using pesticide use report data from the California Department of Pesticide Regulation, agriculturally applied organophosphate exposure was summed in the 500m radius of each residence. Non-zero quartiles of exposure were calculated for residences where at least one trimester of pregnancy occurred during the application year. Multivariate logistic regression models were constructed to assess the relationship between living within the two highest quartiles of exposure and ASD.
Results: Children with ASDs were more likely to live in close proximity to the two highest non-zero quartiles of OP pesticide application. 7.9% of cases were in the 3rd and 4th quartiles of exposure compared to 1.54% of non-cases. In logistic regression modelling, the unadjusted odds ratio (OR) was 1.28 (95% confidence interval (CI) 0.81-2.04). After adjustment for potential confounders (regional center, gender, age of the mother, education level of the mother), the OR was approximately the same aOR=1.34 (95%CI 0.79-2.25).
Conclusions: These results suggest families of ASD children may live in closer proximity to agriculturally applied organophosphates, but a larger sample size will be analyzed prior to deriving meaningful results with regard to timing of exposure. Because only two of twelve years of CHARGE study participants (2000 and 2001) have been analyzed, these results should be considered strictly preliminary.

RESIDENTIAL PROXIMITY TO AGRICULTURE AND GOLF-COURSES IN THE CHARGE STUDY

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Background and Aims: Autism spectrum disorders (ASD) have been diagnosed with increasing frequency throughout the US. Despite changes to diagnostic criteria and younger age at diagnosis, causes for the rise are unexplained. In California, two studies have suggested a positive association between gestational pesticide exposure and ASD's.
Aim 1: Evaluate the association between ASD and developmental delay (DD) and residential proximity to agriculture and golf courses.
Aim 2: Validate self-reported proximity to within ¼ mile of an agricultural field or golf course using land use reports comparing ASD and DD groups o typically developed (TD) children.
Methods: Utilizing data from the population-based case-control study of Childhood Autism Risks from Genes and Environment (CHARGE), birth addresses were geo-coded and mapped to land use report data. Self-reported residential proximity was spatially evaluated for validity. Discordant responses were evaluated for differential recall in logistic regression. Kappa statistics were calculated to evaluate agreement between self-report and spatial validation.
Results: TD children were more likely to live near agriculture or golf courses than case children. 34.9% of parents of children with ASDs reported proximity with ¼ mile, while only 23.17% did live within ¼ mile of agriculture or golf courses. Similarly 36.2% TDs reported proximity compared with the 27.6% that were spatially validated. 30.6% of parents of children with developmental delay (DD) reported proximity, and 18.9% were spatially validated. Parents of ASD and DD cases more often incorrectly reported proximity (OR=1.38 95% confidence interval (CI) 0.88-2.17) (OR=1.35 (95% CI 0.79-2.33) than parents of TD children. Kappa statistics were 0.47 (95% CI 0.36-0.58) for TD children, 0.33 (95%CI 0.234-0.43) for ASD's and 0.30 (95% CI 0.13-0.48) for DD.
Conclusions: Inaccurate recall of self-reported proximity to pesticide application sites was higher in the case groups than noncase group. Agreement between the variables was fair, indicating a moderate reliability of self-reported residential proximity.

ASSOCIATIONS OF SOURCE-RESOLVED PARTICULATE AIR POLLUTION MIXTURES AND CARDIORESPIRATORY EMERGENCY DEPARTMENT VISITS IN ST. LOUIS, MO-IL

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Background and Aims: Substantial evidence supports an association between broad measures of particulate matter (PM) and cardiorespiratory illnesses, but less is known regarding specific PM sources, components and mixtures that contribute to this association. We used source-indicative tracer and source apportionment analyses in a time-series investigation of emergency department (ED) visits in St. Louis, MO-IL to more fully examine the role of PM mixtures on acute health response.
Methods: Daily speciated $PM_{2.5}$ data were obtained from the St. Louis - Midwest Supersite for a 2-year period, and were used in an 11-factor positive matrix factorization analysis to obtain daily source contribution estimates. We selected a subset of elemental and organic molecular marker species as source tracers. Gaseous pollutant data were obtained from the adjacent U.S. Environmental Protection Agency site. Individual-level ED visit data were obtained from 36 acute-care hospitals in the study area. We used Poisson generalized linear models, controlling for long-term trends and meteorology, to examine associations between air quality parameters and ED outcomes.
Results: Asthma ED visits were strongly associated with ozone, nitrogen dioxide, and PM_{25}. In models using $PM_{2.5}$ species and source factors, we observed non-significant positive associations with elemental carbon (EC), organic carbon (OC), and sulfate, and strong positive associations with diesel, biomass, and carbon-rich sulfate source factors. For cardiovascular outcomes, associations with EC and OC were observed, particularly for congestive heart failure (CHF). Further CHF analyses indicated non-significant associations with diesel and gasoline factors and strong warm-season associations with mobile-source related organic markers, including benzo(a)pyrene.
Conclusions: Our analyses suggest that pollutant mixtures associated with both mobile-source emissions and regional sulfate production are associated with cardiorespiratory morbidity in St. Louis. Our approach of investigating pollutant sources is one of several methods for modeling complex pollutant mixtures in epidemiologic settings.

IMPORTANCE OF THE INTERINSTITUTIONAL DIALOGUE IN THE PREVENTION AND THE EPIDEMIOLOGICAL SURVEILLANCE OF DISEASES RELATED TO ENVIRONMENTAL ISSUES: REPORT OF ACTIVITIES OF THE DIVISION OF DISEASES OCCASIONED BY THE ENVIRONMENT OF THE CENTER OF EPIDEMIOLOGICAL MONITORING - SES/SP – BRAZIL

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Introduction: The degradation of the environment around the planet is closely tied to increased demand for natural resources by human society. The increasing and rapid process of urbanization in developing countries especially in Brazil has helped the impacts of the processes associated with industrialization. Since ancient times were found specific sites of environmental contamination, but currently these areas occupy almost the entire planet.

The main risks to human health generated by these degradations relate to exposure to substances present in the effluents of large urban areas from organic matter and those caused by pollutants from industry, motor vehicles, mining, etc. These changes are now factors changes in various environments including soil, air, water, strengthening the need for new forms of considerations in prevention and health promotion.

Discussion : Established in 80 years, the Division of Disease Caused by Environmental - DOMA has among its tasks to coordinate epidemiological surveillance activities in environmental health at the SP state, involving population exposure to environmental contaminants and chemical and physical properties in water, air and solo. Has an multidisciplinary team of Doctors Health experts, labor, sanitary engineer, architect.

The coordination and conduct of epidemiological studies, preparation of protocols, guiding activities of several municipalities are the focus of activity in this Division which has as its main strategy the dialogue of epidemiological surveillance in environmental health numerous other institutions (environment, transportation, water, etc.) and areas of health.

Conclusion: This research initiatives developed by the Division focused on health impacts of population, highlighting the actions institutions facing the recent situations such as mercury metallic poisoning 100 people living in the municipality; accident with chemical spill after accident on highway and biomass burning by approximately 32 consecutive days after accident, reveal the importance of inter-institutional dialogue to action in environmental health.

BIOLOGY AND ENVIRONMENTAL HEALTH, REPORTS OF DISCUSSIONS EARLY AND SURVEYS BIBLIOGRAPHIC IN THE STATE OF SP - BRAZIL AND MISSOURI / USA

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Intoductions: The discussion about environmental health, indicate knowledge of indicators. Several have been studied. It is necessary to have an indication of the health indicators related to environmental damages. This study addresses survey bibliographic performed by 3 students, and a doctor sanitary.
Objectives: The main objective **is** identify studies comprising environmental markers like plants that may contribute to the approach of environmental impacts and health of the population of more than 40 million people who live state SP .The secondary are:
1. know and identify environmental markers - Plants impctos related to environmental and health
2. Identify markers in Brazil and in USA
Methodology: The study includes literature review by students of two universities in Brazil and USA. Two students of the University Biology course of Campinas - Unicamp, located in SP / Brazil and one student of the Missouri Valley College, located in Marshall – Missouri/ USA, under the supervision of the of division of diseases due to the environment department of health state of Sao Paulo.
The survey was conducted sources of considering several countries, and existence of studies reveals that may serve as a markers.
Conclusions : Surveys indicated the presence of more than 50 environmental markers that can be used in health studies, revealing preventive impacts on human health and diseases caused by alterations of environmental air, soil and water

ASSOCIATION BETWEEN OZONE EXPOSURE AND PREVALENCE OF ASTHMA RHINITIS AND RESPIRATORY SYMPTOMS IN URBAN ELEMENTARY SCHOOL CHILDREN IN TORREÓN COAHUILA MÉXICO.

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Backgorund/Aims: The aim of this study was to determine the prevalence of asthma, rhinitis and respiratory symptoms and relationship between high ozone levels and low ozone levels in urban elementary school children aged 6 - 12 years. **Methods:** A cross sectional study of the history of asthma, rhinitis and respiratory symptoms and ozone exposure among children was conducted using the ISAAC (the International Study of Asthma and Allergies in Childhood) questionnaires which were completed by the parents. A total of 2780 children aged 6 – 12 years in 2006 (response rate: 94.2%) were included in the study. To associate ozone exposure, models was calculated using 8 and 24 hours concentration. Children with high exposure were school located in zones with 80 – 160 ppb ozone concentrations (Typical Children) and low exposure school in zones with 20 – 50 ppb ozone concentrations (Atypical Children).
Results: Total Prevalence of Asthma, Rhinitis, Sibilance, Snot and Tearing was 8.0 (95% CI 6.7 – 9.4), 7.6 (95% CI 6.7 – 9.4), 23.3 (95% CI 21.3 – 25.4), 37.0 (95% CI 34.9 – 39.0) respectively. To Atypical Children Prevalence Rate (8 hours ozone exposure): Asthma 7.1 (95% CI 5.36 – 8.4), Rhinitis 6.9 (95% CI 5.2 – 7.8), Sibilance 21.9 (95% CI 16.1 – 24.4), Snot and Tearing 34 (95% CI 23.4 – 36.7). To Typical Children Prevalence (8 hours ozone exposure): 3.9 (95% CI 2.66 – 4.3), 5.5 (95% CI 5.1 – 7.2), 12.4 (95% CI 9.16 – 14.4 95%CI), 29.6 (95% CI 20.0 – 33.4) respectively.
Conclusion: This study showed that the Prevalence in Atypical Children are modified to ozone exposure compared with Prevalence in Typical Children affected and air quality could be reason to shoot respiratory pathologies.

THE BIOLOGICAL EFFECTS OF AMBIENT FINE PARTICLES ON CARDIOVASCULAR RISK IN CITY RESIDENTS

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Background and Aims: Several studies have found that long-term exposure to particulate matter is an important environmental risk factor for cardiopulmonary disease morbidity and mortality, especially for particles with aerodynamic diameters under 2.5 micron fine particles. It is a challenge to elucidate the underlying pathophysiological mechanisms linking specific characteristics of fine particles and cardiovascular toxicity. The study aims to explore the association between long-term exposure to traffic-related fine particles air pollution and biological effects in cardiovascular system.

Methods: The participants included 420 men and women aged from 45-75. The distances between participants' residences and major roads were categorized as • 50 m, 51–100 m, 101–200, and > 200 m. Concentration of fine particles were measured using SIDEPAKTM AM510 (TSI, USA) in 2010. Personal exposure to traffic particle was measured using AM510. Aortic augmentation index (AI) and heart rate variability (HRV) were determined using Model SKY-A4 Bioelectric Signals Processing System. Meanwhile, heart rate and blood pressure were measured. The association between long-term exposure to fine particles and AI, HRV, heart rate and blood pressure were analyzed with sex-stratified multiple linear regression analyses.

Results: The results showed that the concentrations of fine particles were 125, 94, 57 and 67• g/m^3 in January, April, July and October, respectively. Meanwhile, fine particles concentrations were correlated with residential proximity to major road. The concentrations were 108, 99, 71 and 64 • g/m^3, respectively. In the adjusted analysis, fine particle exposure was associated with the decrease of HRV and increase of AI and blood pressure.

Conclusions: Traffic-related fine particles air pollution was associated with the cardiovascular risk. These results added to the evidence that long-term exposure to ambient fine particles associated with increased cardiovascular injury.

A STUDY ON THE RISK FACTORS OF THE PIPELINE DIRECT DRINKING WATER QUALITY IN A DISTRICT OF SHANGHAI

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Background and Aims: To explore the risk factors of pipeline direct drinking water quality.
Methods: The system of pipeline direct drinking water in a district of Shanghai was sampled and the water quality was detected in August and December of 2008. Multiple linear stepwise regression models were fitted to the measured values of specific indices and the evaluation value of comprehensive index with various potential risk factors as the independent variables.
Conclusions: The whole water quality of pipeline direct drinking water could be influenced significantly by use of time, opening rate and disinfection process. The comprehensive value decreased 0.044 corresponding to an increment of 1 year of use of time,0.202 corresponding to an increase of 1 household with access to this direct drinking system, and 0.229 corresponding to a switch of disinfection process form, a combination of micro-electrolysis and UV disinfection to single ozone. Except manganese and zinc, the measured values of various specific indicators were all significantly correlated with the corresponding risk factors.
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POLYCHLORINATED BIPHENYLS AND ORGANOCHLORINE PESTICIDES PREDICT DEVELOPMENT OF TYPE 2 DIABETES IN THE ELDERLY: THE PROSPECTIVE INVESTIGATION OF THE VASCULATURE IN UPPSALA SENIORS (PIVUS) STUDY

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Background and Aims: Persistent Organic Pollutants (POPs), lipophilic chemicals that accumulate mainly in adipose tissue, has recently been linked to type 2 diabetes. However, evidence from prospective studies is sparse. This study was performed to evaluate prospective associations of type 2 diabetes with plasma concentrations of selected POPs among the elderly.
Methods: Twenty POPs (including 15 polychlorinated biphenyl (PCB) congeners, 3 organochlorine (OC) pesticides, 1 brominated diphenyl ether (BDE), and 1 dioxin) were measured in plasma collected at baseline in 725 participants aged 70 years of the Prospective Investigation of the Vasculature in Uppsala Seniors (PIVUS).
Results: After adjusting for known risk factors of type 2 diabetes including obesity, odds ratios (ORs) for incident type 2 diabetes (n=36) according to quintiles of a summary measure of plasma concentrations of PCBs (vs. the lowest quintile) were 4.5, 5.1, 8.8 (95% CI: 1.8-42.7), and 7.5 (1.4-38.8) (P_{trend} <0.01). Among 3 OC pesticides, adjusted ORs across concentrations of trans-nonachlor showed P for trend=0.03. Adjusted ORs across quintiles of the sum of 3 OC pesticides were 1.1, 1.6, 1.5, and 3.4 (1.0-11.7) (P_{trend} =0.03). Neither BDE47 nor dioxin was significantly associated with incident diabetes. The strength of prediction of incident diabetes was stronger for the sum of PCBs than it was for BMI or waist circumference. The sum of PCBs improved reclassification significantly when added to traditional risk factors for diabetes.
Conclusions: This study found that environmental exposure to some POPs substantially increased risk of future type 2 diabetes in an elderly population.

ASSOCIATIONS BETWEEN CADMIUM AND COGNITIVE FUNCTION IN THE ELDERLY

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Background and Aims: We conducted this study to investigate on the relationship between blood concentration of cadmium and cognitive function in elderly Koreans.
Methods: This study is a part of the Korean Elderly Environmental Panel study (KEEPS). We enrolled the subjects from August 2008 through August 2010 and total 403 subjects were analyzed. Information such as demographic factors, medical history, dietary habits, smoking and alcohol consumption was obtained by a questionnaire. We measured blood concentration of cadmium and conducted Mini-Mental State Examination(MMSE) with Functional Activities Questionnaire(FAQ) for each subject. For statistical analysis, linear multiple regression models were used to estimate the effects of cadmium on the cognitive function parameters (MMSE) and functional scale(FAQ), controlling for age, gender, level of education, smoking and drinking habits. Because the distributions of biomarker concentrations were right skewed, we used log-transformed data for blood concentration of cadmium in the models.
Results: The mean age of subjects was about 70.67 (SD 5.18, n=403). 72% of them were female. Mean blood cadmium level was 1.22 • g/dl (SD 0.56), mean MMSE score 25.12 out of 30 and mean FAQ score 2.03 out of 30. At first we conducted linear regression analysis between blood cadmium concentration and MMSE or FAQ. We observed significant relationship between log transformed values of blood cadmium levels with MMSE scores ($p<0.002$) and FAQ score ($p=0.005$). After adjusting age, sex, level of education, drinking and smoking habits, the relationship f blood cadmium concentration with MMSE scores and FAQ score are still statistically significant. ($p=0.033$ and 0.029 respectively)
Conclusions: These results suggest that blood concentration of cadmium is strongly associated with cognitive function and the functional activity of the elderly.

COGNITIVE IMPAIRMENT FOLLOWING CHILDHOOD EXPOSURE TO MODERATE DOSES OF IONIZING RADIATION

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Background and Aims: Exposure to high doses of ionizing radiation results in a spectrum of cognitive deficits but the impact of lower doses is much less clear. The aim of this study was to investigate the effect of childhood exposure of the head to a mean dose of 1.5 Gy on reported memory problems and attention deficit after about 50 years.
Methods: The study population included a subsample of individuals derived from the tinea capitis cohort, of which 253 irradiated and 162 non-irradiated subjects were interviewed (compliance rate 79.1% and 48.2% respectively, among those who could be located). Subjects completed a questionnaire covering socio-demographic and health topics. A section concerning memory problems and attention deficit (including details on symptoms, severity, and treatments) was incorporated using closed and free-text fields. To assess the effect of radiation on cognitive problems, multivariate Poisson regression models were performed.
Results: About half of the study population was females and most individuals (73%) were aged between 55-64 years at interview. The mean age at irradiation was 7.4 years (range 1-15) and the average follow-up period was 52 years (range 44-63). More irradiated subjects than non-irradiated subjects reported memory problems (55.7% vs 35.8%, p<.001) and attention deficit (33.2% vs. 14.8%, p<.001). Controlling for age, gender, and SES level, irradiated subjects had a higher risk of having moderate-high severe memory problems (RR=2.00, 95%CI: 1.19-3.26) and moderate-high severe attention deficit (RR=3.48, 95%CI: 1.77-6.85) compared to the non-irradiated. Female gender and low SES level were found to be independent risk factors for memory problems.
Conclusions: This study suggests that cognitive impairment may be a health outcome of exposure to moderate ionizing radiation in childhood. The long term effects of this exposure continue to be a public health concern considering the growing use of diagnostic modalities involving this exposure (primarily CT).

THE EFFECTS OF PFOS AND PFOA IN MATERNAL SERUM ON MATERNAL AND INFANT THYROID HORMONES

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Background and Aims: Perfluorooctanesulfonate (PFOS) and Perfluorooctanoate (PFOA) are widely used in variety of industrial products and have been alleged persistent organic pollutants due to the chemical stability. However, there was no epidemiological report addressing the effects of these compounds on human thyroid hormones among mothers and their infants. The aim of this study was to examine the association of the concentrations of PFOS and PFOA in maternal serum with thyroid hormones, TSH and FT4, in maternal and infant serum.
Methods: 514 women who took prenatal health care at the Toho hospital (Sapporo, Hokkaido, Japan) were selected to participate in this study. We obtained the perinatal information from the questionnaire and medical records. PFOS and PFOA concentrations in maternal serum were measured after the second trimester of pregnancy or after delivery by LC/MS/MS, and TSH and FT4 in maternal and infant serum were measured by ELISA. The univariate and multiple linear regression analyses were performed to investigate the relationships between PFOS and PFOA levels and thyroid hormones.
Results: The concentration levels of PFOS and PFOA in maternal serum after delivery decreased compared to those before delivery. The thyroid hormone levels of infants were approximately twice as much as those of mothers. In the analyses of the correlations of PFOS and PFOA and thyroid hormones, there were significant association between PFOS and TSH of mothers and only male infants. No association between PFOS and FT4 in maternal serum was seen. PFOA had no effect on even maternal thyroid hormones.
Conclusions: This study showed that there was significant association between PFOS and TSH in maternal serum at low level exposure. PFOS also had an effect on infants' TSH. These results also indicate the possibility that PFOS and PFOA may have the ability of placental transfer.

MODELLING AND FORECASTING DENGUE FEVER INCIDENCE IN MALAYSIA BY INTERPOLATING ENVIRONMENTAL DATA

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Background and Aims: In the literature on dengue fever in Southeast Asia, a variety of relationships between disease incidence and environmental factors have been suggested. Environmental factors and climatic conditions are known to strongly influence vector biology, its survival and the transmission of dengue. By linking spatial epidemiological data on disease incidence to environmental data on rainfall, temperature and humidity, this study describes the spatial and temporal patterns of dengue cases in relation to the environment factors and explores methods to predict future dengue outbreaks.
Methods: Monthly rainfall, mean temperature and relative humidity data collected at 26 locations in Peninsular Malaysia from 2005-2010 were interpolated to the surface data using the Inverse Distance Weighted (IDW) method in a geographical information system. The interpolated environmental data were then overlayed with dengue incidence data based on districts in Peninsular Malaysia that experiences the two different monsoon patterns. Monthly dengue incidence data and interpolated environmental variables were modelled using the Seasonal Autoregressive Integrated Moving Average (SARIMA) models. The best fit SARIMA models for 2005-2009 were applied to predict and validate dengue incidence in 2010.
Results: SARIMA models for different districts were found to have different patterns, with monthly rainfall identified as the only significant predictor of dengue incidence (β=0.009, t=0.104, p=0.038). The model identified were SARIMA$(1,1,0)(0,0,0)_{12}$ with the Ljung-Box test (Q18=15.205 and p=0.58). There was no significant seasonality pattern identified for the study period.
Conclusions: The IDW method is useful in interpolating environmental factors for large areas when climate information is not readily available. The SARIMA model is a valuable tool to model and forecast dengue fever incidence using environmental factors and to assist in developing effective disease prevention strategies.

RESPIRATORY HOSPITALIZATIONS OF CHILDREN AND RESIDENTIAL EXPOSURE TO TRAFFIC AIR POLLUTION IN JERUSALEM

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Background and Aims: Although previous research on adverse health effects related to outdoor air pollution in Israel has focused on coastal areas adjacent to power stations, Jerusalem, an inland city, reports violations of air quality standards due to traffic occurring on more than 5% of the days. This case-control study examined whether pediatric hospitalization for respiratory diseases in Jerusalem is related to long-term exposure to traffic-related air pollution.
Methods: Cases (N=4844) were Jerusalem residents aged 0-14 years hospitalised for respiratory illnesses between 2000 and 2006. These were compared to children admitted electively (N=2161) or urgently (N=3085) for nonrespiratory conditions. Using Geographic Information Systems, subjects' addresses were linked to traffic data obtained from municipal records. Individual exposures were based on the total length of main roads, traffic volume, and bus load within three buffers around each address (radii of 50, 150, and 300 meters). The association between hospitalisation and exposure to transport pollution was examined by logistic regressions controlling for gender, age (0-4, 5-14) and socio-economic status (SES, high-low).
Results: Children hospitalised for respiratory diseases were more likely to have any bus traffic passing within 50m of their home (odds ratio (OR): 1.15 and 1.13; 95% confidence intervals: 1.01-1.30 and 1.01-1.25 for the elective and emergency controls, respectively). Other models indicated statistically significant interactions between age, SES and exposure (p-values <0.03 for road length and bus load models), and significant gender-age-exposure terms. For example, associations of total road length within 150 meters of residence with respiratory hospitalisations were highest among younger girls of lower SES (ORs: 1.07, 1.11).
Conclusions: Findings suggest exposure to bus traffic within 50 m of residence contributes to childhood respiratory hospitalisation and increased risk of respiratory hospitalisation for younger girls of low SES living near main roads. Further research into varying risks among different subpopulations is needed.

PLASMA AND EXHALED BREATH CONDENSATE NITRITE/NITRATE LEVEL IN RELATION TO ENVIRONMENTAL EXPOSURES IN ADULTS. THE EGEA STUDY

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Background and Aims: Nitrites and nitrates, stable end products of NO synthesis, are generated from endogenous and environmental sources but the association with environmental exposures has been poorly investigated in epidemiology. The aim was to evaluate the associations between tobacco smoke, diet, air pollution, occupational and domestic exposures to chlorine agents with total nitrite/nitrate level (NO_2-/NO_3-) in plasma and exhaled breath condensate (EBC) among adults from the French Epidemiological case-control and family-based study on Genetics and Environment of Asthma (EGEA).
Methods: Total NO_2-/NO_3- level was measured using the Griess Reaction in 956 subjects (48.4% men, 43 yrs, 45% asthmatics) both in plasma and EBC. Smoking and dietary habits were assessed using standardized questionnaires, exposure to ambient air pollutants was estimated by using geostatistical models and occupational exposure was assessed with a job exposure matrix. All the estimates were obtained through generalized estimating equations (GEE) for linear regression models to account for family dependence.
Results: Geometric means (Interquartile Range) of NO_2-/NO_3- level were 35.6 µM (25.6, 51.1) in plasma and 1.9 µmol/mg (0.9, 3.9) in EBC. Total plasma NO_2-/NO_3- level was positively associated with age in women (b=0.12, p<0.001) and with a high consumption of leafy vegetables (b=0.05, p=0.02), while it was negatively associated with smoking status (b=-0.07, p=0.004). In EBC, negative associations were found with smoking (b=-0.11, p=0.01) and with ambient annual ozone concentrations (b=-0.16, p<.001). Multivariate analyses confirmed these results.
Conclusions: Besides smoking, the effect of environmental exposures was not similar in plasma and EBC. Environmental exposures probably activate different mechanisms at the systemic and lung level, and they should be taken into account in future epidemiological studies.

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THE EFFECT OF ORGANOCHLORINE PESTICIDES (OCPs) POLLUTION ON THE ANTIBIOTIC RESISTANCE OF *BACILLUS ANTRACIS*

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Background and Aims: An increasing rate of microbial resistance is generally associated with the misuse and over use of antibiotics, yet the effect of environmental factors on antibiotic resistance of soil - zoonotic - anthropogenic microbes, primarily, the effect of organochlorine pesticides (OCPs) remains unstudied. Objective: To study the effect of OCPs pollution on antibiotic resistance of *Bacillus anthracis.*
Materials and methods: 137 strains of *Bacillus anthracis* isolated from biological media (carbuncle and the blood samples of patients) and 32 samples isolated from the soil were subjected to analysis. Of them, 36 samples of biomedia were taken from urban area, 86 – from "pesticide" zone and 15 – from ecologically clean area and 9, 19, 4 soil samples, respectively.
Antibiotic response of microbes to 12 antibiotics (gentamycin, Biseptol, ampicillin, chloramphenicol, streptomycin, penicillin, rifampin, ciprofloxacin, doxycycline, cephalexin, Amoksiklav and ophloxin) was evaluated by disco-diffusion method.
Results: *Bacillus anthracis* was found to be resistant to gentamycin: in urban area - 33.3%, pesticide zone - 36% and 18.75% - ecologically claen area; Biseptol - 30.6%, 34.9 and 6.25%, respectively; ampicillin – 50%, 50% and 12,5%; chloramphenicol-36,1%, 29,1% and 18,75%; streptomycin- 13,9%, 9,3% and 12,5%; penicillin- 19.4%, 16.3% and 6.25%; rifampin - 8.3%, 4.6%, and 6.25%; ciprofloxacin - 8,3%, 4,6% and 6,25%; doxycycline - 8,3%, 1,1%, and 0%. At the same time, low resistance was found in 11,1%, 8,1% and 12,5% to cephalexin; in 8,3%, 4,7% and 12,5% to Amoksiklav and in 5,6% 5,8% and 12,5% to ophloxin. As for soil samples, *Bacillus anthracis* isolated from the soil contaminated by organochlorine pesticides was found to be resistant to doxycycline, cephalexin, Amoksiklav and ophloxin in 5%-15.8%.
Conclusions: Thus, organochlorine pesticides are thought to be one of the major causes of high antibiotic resistance of soil - zoonotic - anthropogenic microbes and *Bacillus anthracis*.

INFLUENCE OF DEMOGRAPHIC CHARACTERISTICS AND PLACE OF RESIDENCE ON CANCER PATIENTS SURVIVAL INEQUALITIES IN LITHUANIA

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Background and Aims: Health disparities exist according to an individual's place of residence and demographic characteristics. We evaluated the influence of demographic characteristics and place of residence on cancer patient's survival in Lithuania.
Methods: In the study group were used individual cancer registry records of patients who were diagnosed with stomach, colorectal, lung, breast and prostate cancers in the period 1998-2002. Survival rates were obtained through the Kaplan-Meier estimation method and compared using the log-rank test. Adverse influences on survival were investigated using Cox proportional hazards models.
Results: Survival outcomes of patients with cancer in Lithuania were associated with demographic characteristics and place of residence. Better survival was associated with female sex, younger age of patients and urban residence. Highest mortality risk was found for rural residents and for patients 65 years and older.
Conclusions: The findings suggest that patients who live in rural areas and are elderly have poorer chances of survival from stomach, colorectal, lung, breast or prostate cancer. High-risk patients from rural areas and elderly patients may benefit from better coordination of care.

SPATIAL ANALYSIS OF DRINKING GROUNDWATER AND BLADDER CANCER RISK IN SOUTHWESTERN TAIWAN: APPLICATION OF GENERALIZED ADDITIVE MODELS TO CASE-CONTROL DATA

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Background and Aims: According to a governmental survey, more than half a million residents in Taiwan had drank water containing arsenic levels higher than 0.05 ppm, and therefore health effects of arsenic in drinking water are important public health issues especially in southwestern Taiwan. We conducted a study to evaluate the association between arsenic exposure in groundwater and bladder cancer risk geographically in southwestern Taiwan with application of generalized additive models to case-control data.

Methods: We conducted a hospital-based case-control study and recruited participants through two teaching hospitals in southwestern Taiwan. We interviewed the participants using a standard questionnaire to collect data on demographic characteristics, smoking habits, drinking water history, and potential confounders. Arsenic levels were assessed using the data from a governmental nationwide census survey of wells. We applied generalized additive models (GAMs), statistical models that combine smoothing Kriging with the ability to analyze binary outcome data and adjust for covariates, to analyze the data. We converted outcome data from log odds to adjusted odds ratios (ORs) and then located participants' residences and continuous ORs into WGS84 map using the GSLIB to identify the "hot spot."

Results: A total of 78 bladder cancer patients and 201 controls without any cancers participated in the study. We found that old age, male gender, low educational level, and cigarette smoking were associated with the risk of bladder cancer. In addition, we found that drinking groundwater over 15 years (as a latency period) and a history of drinking water with high arsenic concentration were also risk factors of bladder cancer. We also observed a high correlation between "hot spots" of bladder cancer and high arsenic levels in drinking water exposure.

Conclusions: Our results observed the association between arsenic exposure and bladder cancer and demonstrated the application of the GAM to analyzing data at an individual level.

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EPIGENETIC PROGRAMMING OF ASTHMA BY IN UTERO EXPOSURE TO p,p'-DDE

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Background and Aims: Environmental epigenetic is emerging in asthma. Early-life exposure to dichlorodiphenyldichloroethylene (p,p'-DDE) impacts the immune system development and the risk of asthma by unknown mechanisms. We investigated if prenatal exposure to p,p'-DDE induces epigenetic reprogramming involving aberrant DNA methylation of specific genes mechanistically related to asthma.
Methods: Data came from 404 children of a population-based birth cohort of the INMA Project. p,p'-DDE was measured in cord blood. Wheezing phenotype at age 6 years was defined according to parental report of wheezing episodes on each interviewer-led annual questionnaire. The coding variant Ile105Val from *GSTP1* was genotyped. In a subset (n=128), gene-specific methylation was screened along 1505 genomic CpG loci using Illumina GoldenGate panel in DNA from peripheral blood cells collected at age 4 years. Subsequently, a pyrosequencing assay was used to validate the results from the Illumina screening.
Results: Higher levels of p,p'-DDE were associated with higher risk of persistent wheeze among *GSTP1* Val carriers (OR for an interquantile range increase in p,p'-DDE=1.77; 95% CI 1.17-2.68), but not among the Ile homozygotes (OR=1.05; 95% CI 0.80-1.39; p for interaction=0.069). Higher levels of p,p'-DDE were associated with a decrease in methylation of a CpG site in arachidonate 12-lipoxygenase (*ALOX-12*) (beta(sd) for an interquantile range increase in p,p'-DDE =-1.7(0.6), p=0.060). The decrease in methylation was accounted for *GSTP1* Val carriers compared with the Ile homozygotes (beta(sd)=-4.1(0.8) vs. -0.8(0.8); p for interaction=0.007). Higher levels of methylation in *ALOX-12* at age 4 years were associated with a lower probability of being classified as persistent wheezing at age 6 years (OR=0.94; 95% CI 0.90-0.98).
Conclusions: Epigenetic changes in *ALOX-12*, a gene involved in the immune response of the airway, could mediate the lifelong effect of in utero exposure to p,p'-DDE on the risk of asthma in childhood.

RADON AIR POLLUTION IN URANIUM BIOGEOCHEMICAL AREAS OF THE TOWN OF MAILUU-SUU, KYRGYZ REPUBLIC

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Background and Aims: To study the radon air pollution in uranium biogeochemical area and to search for possible ways to reduce air pollution.
Materials and methods: The present study was carried out in the town of Mailuu-Suu, Kyrgyzstan. There was an ore mining and processing enterprise in Mailuu-Suu that mined uranium between 1946 and 1966. Charcoal traps were used to detect radon concentration in the air.
Results: A total of 120 premises were examined. An increased radon concentration (>200 Bq/m^3) was revealed in 112 cases (85%). The results of examination of radon air concentration in the town of Mailuu-Suu were as follows: M = 511.23 Bq/m^3, max -3704.0 Bq/m^3, min-92.50 Bq/m^3, • -917.19 Bq/m^3, m-290.04 Bq/m^3, P< 0,00 and p Ci/I values: • = 12.23; •••- 28.20; • in-4.6; • -7.44 • -2.35, • < 0.001.
To reduce radon air pollution level in this area the following activities were suggested to local population: arrangement of green spaces (planting of trees and shrubs) in the area, use of sprinkler installation for garden watering, removal of uranium-containing boulders from the area, regular cleaning and ventilation of premises. On completion of the activities proposed the radon air concentration values were as follows: M = 704,39, max -2714,0, min-126,9 Bq/m^3, • -717,19 Bq/m^3, m-260.04 Bq/m^3, P< 0,00 and p Ci/I values: • = 10,23; •••- 25.20; • in- 3.6; • -6.44 • -2.05, • < 0.001.
Conclusions: Thus, arrangement of green spaces (planting of trees and shrubs) in the area, use of sprinkler installation for garden watering, removal of uranium-containing boulders from the dumps, regular cleaning and ventilation of premises are of great help in reducing radon air pollution level under the conditions of the town of Mailuu-Suu.

TIME-LOCATION PATTERN, HOUSEHOLD ENVIRONMENTAL TOBACCO SMOKE EXPOSURE AND URINARY COTININE IN NON-SMOKING CHILDREN

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Background and Aims: Environmental tobacco smoke (ETS) is an important exposure of indoor air, and may increase the risk of respiratory disease in children. The level of household ETS exposure may be associated with the time-location pattern for children. In this study, we will explore the association between the indoor time, household ETS exposure and urinary cotinine level in non-smoking children.

Methods : Total of 429 children were recruited in Genetic and Biomarker for Childhood Asthma (GBCA). We will utilize parental report method to measure household ETS exposure in children using structure questionnaires. Indoor and outdoor time for non-smoking children was administrated by the time-location pattern questionnaires. The urinary cotinine level was measured using a sensitive high-performance liquid chromatographic (HPLC) technique and the level of household ETS exposure will be assessed using the cotinine/creatinine ratio (CCR).

Results: Children exposed to ETS in household had higher cotinine level and CCR when compared with those children expose to ETS in outdoor environment. The CCR also showed a significant trend when children exposed to different amount of ETS in household. When the time-location pattern were considered in our analysis, we have found a significant trend of average CCR increased with indoor time for children in the groups of currently household ETS exposure, amount of household ETS exposure per day and number of smokers at home.

Conclusions: We found a dose-response relationship between urinary cotinine level and indoor time for non-smoking children. Our study suggested that the major source of ETS exposure for Taiwanese children was from family members in the household.

ORGANOCHLORINE EXPOSURE DURING PREGNANCY AND NEURODEVELOPMENT IN PRESCHOOL CHILDREN

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Background and Aims: Persistent organochlorine compounds (POCs) were widely used until they were banned in the nineteen-seventies. Published findings on POCs exposure and neurodevelopment in children are inconsistent. The aim of this study was to assess the effects of prenatal organochlorine exposure on neurodevelopment.
Methods: A total of 2250 mother and 14-month-old child pairs from the cohorts of Valencia, Sabadell and Gipuzkoa of the INMA project (www.proyectoinma.org) participated in this study. Data were collected during pregnancy, birth and at 14 months of age. Socio-demographic data including residency and information concerning lifestyle, medical and reproductive history, and diet were collected using standardised questionnaires, while cognitive and psychomotor development of the children was assessed using the Bayley Scales of Infant Development. The concentrations of polychlorinated biphenyls (PCBs), and organochlorine pesticides (HCB, • -HCH, • -HCH, p,p'-DDE and p,p'-DDT) were measured in serum samples collected in the first visit (weeks 10-12 of gestation). General additive models were used to explore the shape of the relationship between log-transformed POCs and infant neurodevelopment, and, subsequently, multivariable linear regression models were developed to further assess this relationship.
Results: A total of 632 mother and infant pairs were excluded from the analysis, due to missing data on POCs or Bayley scales, or because preterm delivery , so overall 1518 cases were analysed. We found a significant relationship between level of PCBs (sum of PCB 138+153+180) and psychomotor development • (95%Confidence Interval): -2.19 (95%CI -3.87,-0.51)). However, for the other POCs we did not find any significant association with neurodevelopment.
Conclusions: Prenatal exposure to PCBs may play a negative influence on psychomotor development at early stages in children. In line with this, we believe that it is important to analyse the influence of this type of factor at older ages, as it would be possible to assess more complex cognitive functions using more accurate and reliable instruments.

THE EFFECT OF PESTICIDE POLLUTION LOAD ON THE PREVALENCE OF BREAST CANCER IN OSH REGION (KYRGYZ REPUBLIC)

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Background and Aims: To study the effect of pesticide pollution load on the prevalence of breast cancer (BC).
Materials and Methods: A total of 826 patients with breast cancer, 330 breast milk and 90 tumor tissue specimens were subjected to analysis. To determine the concentration of OCPs in breast milk and tumor tissues the authors employed gas chromatography. According to the OCPs pollution concentration all patients were allocated to 4 groups. Group I consisted of women living in urban areas, where people consume vegetables, melons, legumes grown in areas contaminated by OCPs, Group II comprised women from cotton-growing areas, where pesticides dab been used but residents of these areas cultivated vegetables, melons and legumes on ecologically clean fields Group III was made of women living in ecologically clean areas and Group IV consisted of women living near the pesticides warehouses with OCPs residues
Results: In group I the incidence of breast cancer per 100 thousand of the female population was 26.8. In Group II - 11.9, Group III – 7.3 and in Group IV- 20.2 cases (90 % were pluripara). To determine the effect of OCPs on the development of breast cancer the authors studied the concentration of OCPs in breast milk (BM). In Group I, concentration of OCPs in breast milk was detected in 58.65% of patients, in Group II - 37%, Group III - 21%, Group IV - 100%. Concentration of OCPs in tumor tissues specimen were found in 84%, 100%, 50% and 100% of patients, respectively.
Conclusion: Thus, organochlorine pesticides are thought to be one of the main causes in the prevalence of breast cancer in Osh region.

LONG-TERM EXPOSURE TO TRAFFIC-RELATED AIR POLLUTION, BLOOD PRESSURE AND RISK FOR SELF-REPORTED HYPERTENSION

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Background and aims: Previous studies have indicated that few days' exposure to air pollution might be associated with changes in blood pressure (BP) and the frequency of emergency hospital visits for hypertension. Little is known about the effects of long-term exposure to traffic-related air pollution on BP and risk for development of hypertension. The aims were to study whether long-term exposure to air pollution affected BP and risk for hypertension.
Methods: In 1993-1997, 57 053 participants aged 50-64 year were enrolled in the Danish population-based cohort study, Diet, Cancer and Health. At enrolment, systolic and diastolic BP were measured. Incident hypertension during a mean follow-up of 5.3 years was assessed by questionnaire. Residential long-term NO_x, a marker of traffic-related air pollution, was estimated for the 1- and 5-year periods prior enrolment and prior a diagnosis of hypertension with AirGIS, a validated dispersion model. We conducted a cross-sectional analysis of associations between air pollution and BP at enrolment with linear regression in participants without anti-hypertensive medication (N=44,436), adjusting for traffic noise, measured short-term NO_x, meteorology and potential lifestyle confounders. Incident hypertension was analyzed with Cox regression, adjusting for traffic noise and potential lifestyle confounders.
Results: We found that a doubling in NO_x exposure during the one and five year periods preceding the enrolment was associated with a -0.55 (95% CI: -0.89; -0.20) and a -0.52 mm Hg (95% CI: -0.85; -0.18) lower systolic BP, respectively. Long-term exposure to NO_x was not associated with risk for development of hypertension; however living close to a major road increased the risk by 13% (95% CI: -3; 32%).
Conclusions: Long-term exposure to traffic-related air pollution was associated with a slightly lower BP, whereas it did not affect the risk for self-reported hypertension. More studies are warranted before any conclusions can be made.

TEMPERATURE EFFECTS ON THE TRANSPORT-RELATED INJURIES IN KOREA

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Background and Aims: Several studies reported that the occurrence of injury has seasonality. Although climate change may be associated with the increased risk of traffic-related injuries, there have been little studies investigating temperature effect on the type of transportation. The aim of this study is to evaluate the association between outdoor temperature and transport-related injury.
Methods: Data on injury were derived from emergency ambulance delivery database of the National Emergency Management Agent in Korea from 2006 to 2007. We counted daily ambulance delivery in major seven cities and Gyeonggi Province according to sub-categories of transport injury, such as motor vehicle drivers, motor cyclists, and pedal cyclists. Generalized additive models (GAM) were used to examine the association between transport injury and mean temperature, adjusting for relative humidity, effect of holidays, and long-term trends in seven cities. Then city-specific estimates were combined using a meta-analysis. In addition, the analysis only for injury of pedal cyclists in metropolitan area was performed to evaluate temperature effect on injury by the deprivation index grouped into three levels that was calculated by using 2005 Census in Korea.
Results: Daily injuries of motor and pedal cyclists showed seasonality, higher in summer and lower in winter, but motor vehicle drivers were relatively steady across season. City-combined change in injuries of motor and pedal cyclists associated with a 1 • increase in mean temperature were 1.23% (95% CI 1.01, 1.46) and 2.89% (95% CI 2.13, 3.65), respectively, while the estimate for motor vehicle drivers was -1.19% (95% CI -1.73, -0.66). For the analysis by deprivation index, the temperature effect on injury of pedal cyclists during high temperature (above about 23 •) was positive in more deprived areas while the effect was negative in less deprived areas.
Conclusions: The occurrence of transport-related injury attributable to outdoor temperature depends on the type of transportation and area-level deprivation.
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ELIMINATION OF ORGANOCHLORINE PESTICIDES FROM THE BODY BY USING HERBAL MEDICINES

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Backgrounds and Aims: The aim of the present study was to evaluate the efficacy of herbal medicinal products obtained from the local herbs and fruits for neutralization and elimination of OCPs from the body.
Materials and methods: A total of twenty two patients were studied. All patients were allocated to 2 groups. Group I consisted of 11 nursing mothers (OCPs were detected in breast milk), Group II comprised 11 men with male infertility (OCPs were detected in testicular fluid). The authors employed gas chromatography for detection of OCPs (DDT, DDE, DDD, GCCG) in breast milk and testicular fluid before and after the treatment.
Results: For neutralization and elimination of OCPs from the body the authors suggested administration of herbal medical products, obtained from the herbs and fruits grown in Kyrgyzstan which are rich in vitamins, biologically active substances, pectins and microelements, having sorbent, choleretic and diuretic actions.
Herbal medicines were administered as a tea and food additives during 10-12 days in group I and during a month in Group II.
Before the treatment, concentration of GCCG in breast milk was 0,006238±0,0042 mg/l, after the treatment they were found in 10 patients (0,0031 ± 0,0006), DDE 0,0278 ± 0,0004 and detected in 8 (0,0135 ± 0,006) P<0,05.
Concentration of DDE in testicular fluid was 0,00257 ± 0,0006, GCCG 0,026744 ± 0,009934 mg/l P <0,05 before the treatment
After the treatment with the suggested medicines DDE were not detected, GCCG was found in 1 patient.
Conclusions: Thus, the herbal medicines obtained from local herbs and fruits grown in the Kyrgyz Republic were proved to be efficient in neutralization and elimination of OCPs from the body. But this field is an open way to further research.

HEALTH EFFECT OF FINE PARTICULATE MATTER ON DAILY EMERGENCY ROOM VISITS OF CARDIOVASCULAR DISEASE: A TIME-SERIES STUDY

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Background and Aims: Beijing, as the host of Olympics 2008, is developing quickly in economic and social areas. The air pollution pattern has been changing from the traditional coal burning pollution to complex pollution with vehicle exhaust, biomass combustion, dust from nature and construction, energy power and others. To evaluate the association between air particulate matter and daily hospital emergency room visits (HERVs) of cardiovascular disease, we performed a time-series analysis on health effects of air pollution. in Beijing.

Methods: A Poisson regression for the association of the daily air pollutants with daily HERVs for cardiovascular disease in Beijing from 2007.1.1-2008.12.31 was performed using generalized additive model. The effects of time trend, seasonal variations, temperature and humidity were adjusted by smooth functions. Daily mean concentration of SO_2, NO_2, PM_{10} and $PM_{2.5}$ were introduced into the core model. Relative risks (RR) of cardiovascular disease (per10ug/m3 increase in air pollutant concentration) were calculated. Lagged effects of air pollutants and multi-pollutant model were concerned as well.

Results: The results showed consistent correlation between air pollutants and daily HERVs. The increase of daily number of HERVs for cardiovascular disease for a 10ug/m3 increase in SO_2, NO_2, PM_{10}, $PM_{2.5}$ were: 0.36% (0.29%~1.01%), 1.02% (0.00%~1.74%), 0.32% (0.09%~0.55%), and 0.41%(0.19%~0.90%), respectively. The relative risks for daily HERVs in sub-categories and elderly were slightly higher. The multi-pollutants models showed the effects of SO_2 were the most stable, while the $PM_{2.5}$ had small increase when the gases were introduced into model. This study also found lagged effect of particulate matter on daily HERVs for cardiovascular disease.

Conclusions: The current air pollution in Beijing has a harm effects on daily cardiovascular emergency room visits. The effects of particulate matter were more considering, while the elder population is the most sensitive.

SUITABLE METHODS FOR COLLECTING HOUSE DUST SAMPLES FOR MEASUREMENT OF HOUSE DUST MITE ANTIGENS

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Background and Aims: Genetic and environmental factors are known to be involved in the development of allergic diseases and/or allergic sensitization. In particular, the daily exposure level to airborne antigens is critically important. However, precise and convenient methods for accurately measuring airborne antigens in a large cohort study have yet to be identified. To remedy this, we compared 3 different methods of collecting house dust samples for measurement of house dust mite antigens.

Methods: We collected house dust samples from 7 different homes by vacuuming futons using 3 different methods: 1) We visited each home and used the same vacuum cleaner; 2) We sent dust collection packs and asked the householders to use them with their own vacuum cleaners; and 3) We sent the same handy vacuum cleaners and asked the householders to use them. The levels of major Japanese indoor allergens, i.e., house dust mite Der p1 and Der f1, were measured with specific ELISA kits. The data were analyzed using Spearman's correlation test.

Results: The total weights of house dust samples did not differ among the three collection methods. The amounts of both Der p1 ($p=0.037$) and Der f1 ($p<0.001$) showed significant correlations between home-visit vacuuming (Method 1) and sending the same vacuum cleaners (Method 3). In contrast, the results using the householders' own vacuum cleaners (Method 2) did not correlate with the results of the other two methods.

Conclusions: Home-visit vacuuming and sending the same vacuum cleaners are likely to be suitable methods for collecting house dust samples. For a large epidemiological study, sending handy vacuum cleaners can be a feasible method for accurately assessing the exposure levels to mite antigens in homes.

TRANSPORTATION, AIR POLLUTION AND PHYSICAL ACTIVITIES (TAPAS), A 6-CITY INTEGRATED HEALTH RISK ASSESSMENT PROGRAM OF ACTIVE TRAVEL POLICIES: THE BASEL CASE STUDY

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On behalf of the TAPAS consortium

Background and Aims: Within the TAPAS research program, quantitative assessments are developed for six case study cities in Europe, linking determinants of active travel to potential co-benefits and co-risks of modal shifts from motorized to non-motorized modes of travel. We describe here the Basel, Switzerland case study.
Methods: We identified local sources of information from government agencies describing active travel and environmental conditions. We aimed at selecting policies of local and international interest, with quantifiable or demonstrated effectiveness. We reviewed local and regional governmental policy documents. We are also conducting experimental work generating new data to help fill research gaps in current framework.
Results: The city of Basel has about 170'000 inhabitants. Since the 1980s, Basel has actively promoted sustainable forms of transportation. Especially the improvement of public transport (low-priced regional pass, expansion of network, customer convenience), reduction of car use (restriction of parking space, promotion of car-sharing), and the promotion of active transport (safe and coherent bicycle and pedestrian networks) are major themes of traffic policy. Almost 50% of the households are non-car owning and public transportation is the main travel to work mode of trips within the city (30.5%). The proportion of active transport on the total distance of trips to work is higher in Basel (12.4%) than the Swiss average (4.8%). Annual average concentrations of PM_{10} and NO_2 have been stable in the last decade (PM_{10}: 22$\mu g/m^3$, NO_2: 30$\mu g/m^3$). However, street levels for NO_2 still exceed Swiss federal standards. As a special contribution to the overall project, we develop a multi-modal commute model which is able to simulate both travel patterns and commute exposure to traffic-related air pollution in the region of Basel.
Conclusions: With its long tradition of active transport promotion, Basel is an interesting case while addressing challenging environmental conditions to mitigate risks.

EXPOSURE TO LOW DOSES OF BENZENE AND ALTERATIONS IN MITOCHONDRIAL DNA COPY NUMBER: A MULTI-CENTER STUDY

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Background and Aims: Benzene is a widespread environmental chemical that has been associated with increased risk of leukemia. Though potential carcinogenic mechanisms are still unknown, recent evidences suggest that high benzene exposures might be associated with increased mitochondrial DNA copy number (mtDNAcn), possibly due to benzene-induced oxidative DNA damage. Whether benzene determines mtDNAcn alterations even at low doses remains uncertain.
Methods: The study enrolled 519 participants from three Italian cities (Genoa, Milan, Cagliari), including 341 individuals with low-level benzene exposures (bus drivers [BD], police officers [PO], gas-station attendants [GSA], petrochemical plant workers [PPW]), and 178 referents. Blood samples and lifestyle information were collected at enrollment. We measured individual exposure to benzene with personal passive samplers during the work shift, and blood relative mtDNAcn by real-time PCR. For the Milan participants, DNA methylation information were also available. We fitted linear regression models, adjusted for age, sex, smoking habit, and number of cigarettes/day, to investigate association between benzene and mtDNAcn.
Results: In each city, mtDNAcn was significantly higher in benzene-exposed subjects than in referents: 0.90 relative units in Genoa BD and 0.75 in referents ($p=0.019$); 0.90 in Milan GSA, 1.10 in PO, 0.75 in referents (p-trend=0.008); 1.63 in Cagliari PPW, 1.25 in referents close to the plant, 0.90 in farther referents (p-trend=0.046). In multivariate analyses an interquartile range (IQR) increase in personal airborne benzene exposure was associated with a mtDNAcn increase of 10.3% in all subjects combined ($p<0.001$), 10.5% in Genoa ($p=0.014$), 8.2% in Milan ($p=0.008$), 7.5% in Cagliari ($p=0.223$). In Milan, an IQR increase in mtDNAcn was associated with LINE-1 hypomethylation (-2.41%, $p=0.007$) and p15 hypermethylation (+15.95%, $p=0.008$).
Conclusions: Our study shows a mtDNAcn increase with low-level exposure to benzene and mtDNAcn-related variations in DNA methylation markers associated with leukemogenesis; it thus indicates potential toxicity of benzene even at low doses.

DOES TEMPERATURE MODIFY THE MORTALITY EFFECTS OF AMBIENT PARTICLE POLLUTION IN GUANGZHOU CITY, CHINA

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Background and Aims: Adverse health effects of PM_{10} and high temperature on mortality are widely accepted. However, only a few studies have focused on evaluating the temperature medication effects on the association of PM_{10} and mortality in Asia. The aim of this study was to explore the modification effects of temperature on the association between PM_{10} and cause-specific mortality for cardiovascualr, respiratory, cardiopulmonary, stroke, as well as non-accidental mortality in Guangzhou from 2008 to 2009.

Methods: This present study used a generalized additive model to analyse PM_{10}, mortality and covariate data. The estimates of temperature modification on PM_{10} effects on mortality were obtained from the main effects and PM_{10}-temperature interaction models.

Results: The PM_{10} effects were strongest on extremely high temperature days, less strong on extremely low-temperature days, and weakest on normal-temperature days.The interactions between PM_{10} and high temperature were found statistically significancent on daily non-accidental, cardiovascular, cardiopulmonary mortalities. The effect estimates of the mean percentage of change in daily mortality per 10-ug/m3 increase in PM_{10}concentrations at the average of lags 0 and 1 day in hot temperature level were 3.01%(95% CI:0.93-5.14) for non-accidental, 4.26%(0.92-7.70) for cardiovascular, 5.26%(1.14-9.55) for respiratory, 4.67%(1.90-7.52) for cardiopulmonary, 5.35%(-0.04-11.04) for stroke mortalities.

Conclusions: This suggests that extreme temperature can modify the effects of particulate matter on mortaliy, and it is important to control and reduce the emission of air particles in Guangzhou, particularly in extremely high/low temperature days.

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EFFECT OF POLY-AROMATIC HYDROCARBONS ON CARDIOVASCULAR AND OXIDATIVE STRESS MARKERS IN ELDERLY KOREANS

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Background and Aims: Some researches have shown the effect of PAHs exposure on cardiovascular and oxidative stress markers in occupational settings. We aimed to evaluate this relationship among elderly in community exposure levels in a panel study.
Methods: Repeated measurements of blood pressure, SDNN, urinary 1-hydroxypyrene, 2-naphthol and malondealdehyde(MDA) were taken from 509 Korean individuals over 60 years old residing in Seongbuk-gu, Seoul, from August 2008 to August 2010.
Mixed model analysis was used to investigate the relationship between log-transformed urinary 1-hydroxypyrene, 2-naphthol levels with systolic and diastolic blood pressure, SDNN, urinary MDA levels. Selected adjustment variables were age, sex, body mass index and cotinine levels (model 1) or all the variables in model 1 plus temperature, humidity and amount of sunshine in Seongbuk area on the day each subject visited for measurements.
Results: Mean values of log-transformed 1-hydroxypyrene and 2-naphthol levels were -2.315±1.2674μg/g crt and 1.817±1.1266 μg/g crt, and mean levels of systolic and diastolic blood pressure were 127.8±16.47mmHg and 71.9±100.04mmHg. Mean SDNN was 3.2±0.54ms2, and mean urinary MDA level was 0.47±0.492μg/g crt.
Significant associations were found between urinary 1-hydroxypyrene levels with systolic blood pressure(model 1: estimate=0.8207, p-value=0.0011; model 2: estimate=0.5373, p-value=0.0313), diastolic blood pressure(model 1: estimate=0.8345, p-value<0.0001; model 2: estimate=0.6262, p-value<0.0001), SDNN(model 1: estimate=-0.7302, p-value=0.033; model 2: estimate=-0.749, p-value=0.0304) and MDA levels(model 1: estimate=0.0535, p-value<0.0001; model 2: estimate=0.05249, p-value<0.0001). Urinary 2-naphthol also showed significant associations with systolic blood pressure(model 1: estimate=0.7677, p-value=0.0133; model 2: estimate=0.5938, p-value=0.0513), diastolic blood pressure(model 1: estimate=0.5167, p-value=0.0072; model 2: estimate=0.3989, p-value=0.0337) and MDA levels(model 1: estimate=0.07543, p-value<0.001; model 2: estimate=0.07555, p-value<0.001), but not with SDNN(model 1: estimate=0.2096, p-value=0.6167; model 2: estimate=0.1972, p-value=0.6389).
Conclusions: Urinary 1-hydroxypyrene and 2-naphthol levels are significantly associated with cardiovascular and oxidative stress markers, systolic and diastolic blood pressures, SDNN and urinary MDA levels in elderly Koreans.
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COMMUTE BEHAVIOR ASSESSMENT, SIMULATION OF COMMUTE PATTERNS AND EXPOSURE TO AIR POLLUTION IN THE REGION OF BASEL, SWITZERLAND

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Background and Aims: Our aim is to develop a multi-modal commute model which is able to simulate both travel patterns and commute exposure to traffic-related air pollution in the region of Basel. This study is part of the project "Transportation, Air Pollution, and Physical Activities (TAPAS)"; a 6-city integrated health risk assessment program of active travel policies.
Methods: Firstly, travel patterns are simulated by means of a Geographic Information System (GIS) model using extensive information from the Swiss 2005 Microcensus database, which provides temporally and spatially resolved data on travel behavior. Secondly, environmental parameters of the built environment and personal factors that may influence adults' choice of active and passive transportation modes are investigated on a route scale. Finally, exposure to air pollution is estimated by combining the commute patterns with predictions from air pollution models. Exposure in different commute modes and microenvironments are validated with personal measurements of $PM_{2.5}$ and ultrafine particles (UFP) (10-300nm) in three different seasons for typical commute routes. Simulating variations of commute patterns will allow us to test scenarios of change in commute behavior on exposure distribution.
Results: The proportion of active transport on the total distance of trips to work within the study area is 29.2%. Our first results of 24-hours personal $PM_{2.5}$ measurements reveal significantly higher exposures during commuting than outdoor urban background exposure levels. Average commute exposure to $PM_{2.5}$ (59.7±35.0 µg/m^3) was about three-fold higher than average daily $PM_{2.5}$ exposure (21.3±18.6 µg/m^3). UFP measurements similarly show higher exposures during commuting as well as indoor cooking events.
Conclusions: Preliminary results indicate significantly higher air pollution exposures during commuting in Basel. Results will be further examined and commuter exposure will be quantified. Thus, the study will contribute to a better understanding of population's commute behavior and exposure to harmful air pollutants during daily commuting.

EXPOSURE ASSESSMENT TO AIR POLLUTION IN FOUR SPANISH AREAS. LAND USE REGRESSION APPLICATION

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Background and Aims:

Geographical Information Systems (GIS) are powerful tools to assess air pollution exposure in epidemiological studies. The aim is to describe the methodology used to assign levels of exposure to outdoor air pollution (NO_2 and benzene) in pregnant women from four cohorts of the Spanish INMA (Environment and Childhood) study.

Methods:

A total of 2644 pregnant women were recruited between November 2003 and February 2008. Air pollution concentrations were obtained for 302 locations in the four study areas by using passive samplers that were placed during several periods of 7 days. Land use regression (LUR) models were used to predict air pollution levels in the study areas. A GIS was established based on the data: land use, road traffic (traffic intensity and distances), altitude, and distance to industry. Seasonality was assigned to the pregnancy period of each woman by using daily levels of air pollution from the routine monitoring networks.

Results:

Predictor variables were different among cohorts and pollutants. In all the cohorts, models included traffic variables and land use (urban, industrial or agricultural). Other predictor variables were: topography, population density, and distance to industry. Within each cohort, urban levels were higher than rural ones. Exposure estimates by trimester of pregnancy presented medium to high correlations (Spearman rho 0.4-0.8). Residential NO_2 levels throughout the entire pregnancy period correlated well with benzene levels in Gipuzkoa, Sabadell, and Valencia (rho≈0.7) whereas in Asturias, the correlation was moderate (rho: 0.3).

Conclusions:

This work illustrates the possibilities offered by methods that combine spatial modeling and temporal correction in the identification of spatial and temporal patterns of air pollution levels. Assessment of individual air pollution exposure during pregnancy will allow analyzing its effects on health, e.g., fetal growth, neurodevelopment and respiratory problems.

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EXPOSURE TO FORMALDEHYDE INCREASES THE INCIDENCE OF LOWER RESPIRATORY INFECTIONS IN INFANTS – FINDINGS FROM THE PARIS BIRTH COHORT

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Background and Aims: Lower respiratory tract infections (LRI) are common in infants, and are mainly induced by viral exposure. Association between exposure to certain chemical pollutants and LRI has been previously described. Although formaldehyde is ubiquitous indoors, its impact on infant health is uncertain. The aim of this study was to determine the impact of formaldehyde exposure on the incidence of LRI during the first year of life of babies from the PARIS *(Pollution and Asthma Risk: an Infant study)* cohort.

Methods: The PARIS cohort enrolled 3840 healthy newborns. Formaldehyde exposure was assessed by modeling in an environmental investigation including formaldehyde repetitive measurements into a random sample of 196 infants'homes from the cohort (at 1, 6, 9, 12 months) and data about potential formaldehyde level determinants (particleboard, varnished parquet floor, wall coating), home characteristics (number of inhabitants, construction date), aeration (mechanical ventilation, length of window opening). Health data were collected by regular self-administered questionnaires (at 1, 3, 6, 9 and 12 months). Multinomial logistic regression model was used to examine relations between formaldehyde exposure and the occurrence of (wheezy) LRI adjusting for potential confounders/risk factors.

Results: Around 40% of infants were exposed all the first year of life to formaldehyde levels above 19.5µg/m^3.

Well-known risk factors associated with LRI were confirmed in our study (child gender, parental history of asthma, presence of older siblings, day-care attendance, signs of humidity, prenatal/postnatal exposure to environmental tobacco smoke, and the protective effect of breastfeeding and furry pets). After adjustment for these risk factors, an interquartile increase of FA levels (P_{25}-P_{75}: 14.4-26.8µg/m^3) was associated with a 32% increase in risk of LRI (adjusted OR[95%CI]=1.32[1.11-1.55], *p=0.001*), and the strength of the association was slightly higher for wheezy LRI (aOR=1.41[1.14-1.74], *p=0.002*).

Conclusion: Infants exposed to formaldehyde are more likely to have an increased incidence of LRI.

TRENDS OF NOISE EXPOSURE IN BRATISLAVA AGGLOMERATION AT DIFFERENT TIME INTERVALS (10, 15, 20 YEARS)

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Background and aims: Noise is currently one of the most widespread environmental and occupational pollutants. It has become a serious problem in recent years, with significant development of industry and transport. The aim of the study is to objectively and subjectively evaluate and to follow the time trends of noise load of selected population groups in Bratislava agglomeration at different time intervals (10, 15, 20 years).
Methods: We used the validated methodology for the subjective assessment of "annoyance" and psychosocial well-being, as well as the objectification of noise levels by direct measurement method using sound analyzer with a module for frequency analysis. Statistical and epidemiological elaborations have been based on bivariate, stratified and multivariate analyses (multiple logistic regression).
Results: Based on the results of measurements of noise exposure in internal and external environments in the exposed and control site, we found a continuous increase in traffic noise burden in the exposed area at intervals of 10, 15 and 20 years beyond the health risk zone. Subjectively, we observed an increase of value risks causing road traffic noise annoyance and interference with several activities in the exposed group of university students over 20 years (OR=2.56 (95 % CI=1.93-3.42) vs 5.41 (95 % CI=4.28-7.25). In addition to road traffic noise we observed an increase in noise annoyance and disturbance from neighboring apartments (OR=1.71 (95 % CI=1.29-2.27) vs 2.48 (95 % CI=1.99-3.19), the entertainment facilities (OR=1.51 (95 % CI=0.90-2.52) vs 3.60 (95 % CI=2.85-4.90), from home construction sources, railway and industrial noise.
Conclusions: The contribution of our work is in the analysis of noise burden population trends and the elaboration of methods for environmental noise exposure assessing risk and the possibility of using this methodology for other physical factors such as suitable methodology in the practice of public health authorities.

CHILDHOOD LEAD POISONING SCREENING ACTIVITY IN FRANCE: A FIFTEEN-YEAR EXPERIENCE (1995-2009)

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Background and Aims: Lead poisoning is responsible for neurodevelopmental damage in children. In 1995, a Nationwide Monitoring System began in France recording blood lead levels (BLL) and characteristics of children who had blood lead (BL) tests. This study provides an overview of children screening for lead poisoning and a description of children's characteristics and risk factors.
Methods: Were included in the study, all the children under 18 who had one or more BL tests (within a screening framework) performed in France between 1995 and 2009.
Results: More than 83 600 children had at least one test during the study period. A peak of annual activity was observed in 2004 (10 060 children). From 1995 to 2001, the screening activity was stable: each year around 3 000 children had a first BL test. From 2004 to 2009 a stabilization of the activity was observed around 7 000 tested children per year. Most of the children were under 7 (80-90%). Most of them were screened because they lived in old housing (79.1% in 2005-2007). More than 60% of the children lived in the Greater Paris area even though the children population in this area was less than 20% of the French children population.
In 1995, 24.3% of screened children had a BLL ≥ 100µgL. They were 3.3% in 2009. From 1995 to 2009, the BLL geometric mean decreased from 59.2µg/L to 22.4µg/L in screened children.
Conclusions: The incidence of lead poisoning in screened children decreased regularly since 1995. The policies of old housing improvement, the leaded gasoline phase-out and the implementation of local prevention actions have taken part in this decrease. However the screening activity remained exceedingly area-dependant; so some children, exposed to lead, are not screened. The future evolution of the screening strategy and therefore of the surveillance system are currently being discussed.

USING THE NATIONAL HEALTH INSURANCE RESEARCH DATABASE TO ANALYZE THE RISK OF OCCUPATIONAL INJURIES/ DISEASES IN REGISTERED NURSES

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Background and Aims: As indicated by the National Occupational Hazard Survey conducted in the United States, registered nurses (RN) are of a high risk group for occupational injuries and illnesses, incurring an annual incidence rate as high as 10.9%. A complete investigative report on the occupational injuries and illnesses in RNs is yet lacking. Moreover, previous studies have mostly been based on questionnaire surveys whose results were very much influenced by recall bias of studied subjects. This may disallow interventions to be implemented within an accurate and proper timeframe. Hence, the National Health Insurance Research Database (NHIRD) was used in this study to comprehensively examine RNs for occupational injuries, and to infer the time frame of initial occupational injuries.
Methods: This study used a retrospective prospective study, using the NHIRD of National Health Research Institutes, including registry for medical personnel (PER), and ambulatory care expenditures by visits (CD) files. The data provided by the National Health Research Institutes in Taiwan, the International Classification of Diseases, 9th revision, clinical modification (ICD-9-CM) code of the disease diagnosed from 2002 to 2008.
The ID numbers in the PER file were linked to the CD file. In Taiwan, there were 156,881 RNs in 2008 according the PER file. The subjects served as nurses from 2002 to 2008 were selected in this study.
Results: There were 23,898 subjects. From 2002 to 2008, three thousand six hundred eighty (15.4%) of 23,898 suffered occupational injuries/diseases. The RNs had a higher cumulative incidence in the following systems: there were 2,671 (11.2%) in injury and poisoning (ICD-9-CM code: 800-999, E800-E999); three hundred and three in diseases of the musculoskeletal system and connective tissue (ICD-9-CM code: 710-739), two hundred twenty-four in infectious and parasitic diseases and late effects of infectious and parasitic diseases (ICD-9-CM code: 001-139, 7713, 320-322), one hundred seventy-six in diseases of the digestive system (ICD-9-CM code: 530-579).
Conclusions: The occupational injuries/diseases in registered nurses are a matter worthy of note.

DIFFERENTIAL EXPRESSION OF MICRORNAS IN SUBJECTS EXPOSED TO METAL RICH PARTICULATE MATTER

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Background and Aims: Altered patterns of gene expression mediate the effects of particulate matter (PM) on human health, but mechanisms through which PM modifies gene expression are largely undetermined. MicroRNAs (miRNAs) are highly conserved, noncoding small RNAs that regulate the expression of broad gene networks at the posttranscriptional level. We evaluated the potential effects of exposure to PM and PM metal components on microRNAs expression in 10 workers at an electric-furnace steel plant in Brescia, Italy.
Methods: We measured expression in blood leukocyte RNA on the first day of a workweek (baseline, after two days off work) and after 3 days of work (postexposure). All subjects in the study were no smokers with a means age of 46y and a characterized exposure to metal rich PM (about 3 times greater than environmental levels in the same area). Gene expression was profiled at baseline (n=10) and postexposure (n=10) using an Affymetrix GeneChip miRNA Array. Differential expression of miRNAs was determined with Limma (R-based Bioconductor package), which employs an empirical Bayes approach to calculate a moderated t-statistic. miRNAs with $p < 0.05$ and the absolute value of FC >2 were considered as differential miRNAs (DEMs). Predicted miRNA targets were determined using the miRanda algorithm, DEMs were subjected to pathway exploration using the Ingenuity Pathway Analysis (IPA) software.
Results: Four miRNAs – hsa-miR-421, hsa-miR-29, hsa-miR-146, hsa-let-7g – were found to be up-regulated. Bioinformatics analysis on these selected miRNAs showed as top ranked network RNA Post-Transcriptional Modification and Cell Morphology whereas the main diseases and disorders involved were Genetic Disorder, Cardiovascular Disease and Neurological Disease.
Conclusions: Changes in miRNAs expression may represent a novel mechanism mediating responses to PM and its metal components.

EFFECTS OF ENVIRONMENTAL FACTORS ON INFLUENZA SEASONALITY IN THE SUBTROPICS

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Background and Aims: Environmental factors have been identified as an important driving force for influenza seasonality. But the results from previous studies were neither consistent nor conclusive. Almost all the studies were conducted in the temperature regions, which can barely apply to the subtropical and tropical regions with a distinct seasonal pattern of influenza. In this study, we assessed the dose-response relationship between environmental factors and influenza seasonality in two subtropical cities: Guangzhou and Hong Kong.
Methods: Influenza seasonality was measured by proportions of specimens positive for influenza from the surveillance networks of these two cities (termed influenza virus activity). We adopted a generalized additive model with variables for temperature, relative humidity and influenza virus activity, which allowed quantification of both linear and nonlinear relationships between these variables. The interaction between temperature and humidity on their effects on influenza virus activity was measured by a nonparametric bivariate response model.
Results: We did not find significant interaction between temperature and relative humidity in both cities. Influenza virus activity increased as temperature decreased and this linear relationship was consistent between these two cities. A positive linear relationship between relative humidity and influenza activity was found in Hong Kong, whereas a curvelinear relationship was found in Guangzhou with a turning point at 50%.
Conclusions: This study confirmed that seasonal environmental factors played an important role in determining influenza seasonality and for the first time revealed the dose-response relationship between environmental factors and influenza virus activity. Our findings provide key evidence for a future forecast model on influenza seasonality.

GREEN SPACE AND PHYSICAL ACTIVITY: RELATIONSHIPS IN SCOTLAND

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Background and Aims: Epidemiological studies suggest that levels of green space in a neighbourhood are negatively associated with residents' mortality and morbidity rates. One mechanism proposed for this association is that green space is a venue for, and therefore encourages, physical activity. Few studies, however, have examined whether neighbourhood levels of green space are associated with physical activity actually in green space. New data have become available in Scotland, which permit this analysis.
Methods: A cross sectional study of 4167 adults (16+) living within an urban setting in Scotland. Logistic regression analysis established the association between respondents' green space exposure and their use of green space for physical activity (hereafter, green physical activity), controlling for relevant confounders, including age, sex, economic activity status and area level socio-economic deprivation. Green space was modelled as a categorical variable, with sensitivity analysis determining the impact of categorisation.
Results: Respondents with high levels of green space in their area of residence were 2.39 (95% CI, 1.11-5.11) times more likely to participate in green physical activity than those with very low levels of green space in their area. However, there was no evidence of a dose-response effect and results were highly sensitive to the definition of 'very low levels' of green space. Relatively high levels of green space in a neighbourhood held no real advantage over modest levels, for participation in green physical activity. The relationship between green space exposure and green physical activity did not differ by area level socio-economic deprivation.
Conclusion: Whilst green physical activity rates are very low among those who live in neighbourhoods where levels of green space are low, there is little difference in green physical activity rates between those residents' in areas with modest or high levels of green space.

ENVIRONMENTAL FACTORS AND MORTALITY RISKS ASSOCIATED INFLUENZA

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Background and Aims: The subtropical and tropical regions exhibit a distinct seasonality of influenza incidence from the temperate regions, and the mechanism behind it remains unclear. Environmental factors have been related to the transmission and survival of influenza viruses but no studies have ever explored the role of environmental factors on regulating severity of influenza infection.
Methods: We applied a Poisson regression model to the mortality data of two Asian metropolitan cities located at the subtropical zone, Guangzhou and Hong Kong. Interaction between environmental factors (temperature, relative and absolute humidity) and influenza virus activity on their effects on mortality was assessed by Poisson regression models with product terms of environmental factors and influenza variables. The influenza associated excess mortality risks were also calculated for each period with different levels of temperature and humidity.
Results: Significant interactions ($p<0.05$) between absolute humidity and influenza were consistently found for mortality risks of all-cause and cardiorespiratory in both cites, with an increasing trend from low to high absolute humidity periods, but no significant interaction was found for pneumonia and influenza deaths. An increasing trend was also observed over strata of relative humidity, but the interaction between relative humidity and influenza was significant only in a few outcomes. The results for temperature were less consistent between two cities, and the interaction between temperature and influenza was only significant for cardiorespiratory mortality in Hong Kong.
Conclusions: The results suggest that environmental factors not only affect transmission of influenza viruses but also could be involved in pathogenesis of virus infections. The higher relative risks of influenza associated cardiorespiratory deaths in the hot and humid days highlight a need for people with chronic conditions to take extra caution against influenza in the subtropics.

PREDICTORS OF ENVIRONMENTAL EXPOSURE TO POLYCYCLIC AROMATIC HYDROCARBONS AMONG PREGNANT WOMEN

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Background and Aims: Polycyclic aromatic hydrocarbons (PAH) are a group of compounds, comprising two or more fused aromatic rings, that are formed as a result of incomplete combustion of organic matter. Sources of environmental contamination can be both industrial and nonindustrial, the most common sources being cigarette smoke, grilled and smoked food processes, coal-fired utilities, steel plants, coke-oven plants, graphite electrode manufacturing plants, vehicle exhaust, wood-burning ovens and fireplaces. The aim of the study was to characterize the PAH exposure level based on 1-hydroxypyrene (1-HP) in urine of Polish pregnant women.
Methods: The study population consisted of 449 pregnant women who had been the subjects of the prospective Polish Mother and Child Cohort study performed in 8 regions of Poland. The women were interviewed three times during pregnancy (once in each trimester). 1–HP concentration in urine was chosen as the biomarker of exposure to PAH. The urine sample was analysed using high performance liquid chromatography (HPLC). The active and passive smoking exposure was verified by saliva cotinine, analysed by high performance liquid chromatography coupled with tandem mass spectrometry/positive electrospray ionisation (LC-ESI^{+}MS/MS) and isotope dilution method.
Results: 1-HP concentration in urine ranged from 0.02 to 10.2 • g/g creatinine with the geometric mean (GM) 0.4 • g/g creatinine. The significantly higher concentration of urinary 1-HP in pregnant women was observed for summer collection (GM ratio 1.1; $p = 0.01$), among smokers (GM ratio 1.7; $p < 0.001$) and for the women living in big cities (GM ratio 1.3; $p = 0.001$).
Conclusions: The significantly higher concentration of urinary 1-HP in pregnant women was observed for summer collection, among smokers and those living in big cities.

HEALTH OF MOTHERS IN RELATION TO HOUSEHOLD SMOKING EXPOSURE IN SLOVAKIA

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Background and Aims: According to the WHO, there are over 700 million children worldwide exposed to secondhand smoke and there is also a significant population of pregnant women and young women exposed to passive smoking in the world. Only a few studies specifically examine the association of living with smokers and maternal physical and mental health. The aim was to assess the physical and mental health of non-smoking mothers in relation to household smoking in Slovakia similar to a previous study we conducted using data from the USA.
Methods: A sample of 230 mothers with at least one child was surveyed at the OB/Gyn Department of Comenius University Faculty of Medicine. The Medical Outcomes Short Form-12 (SF-12) and its Mental Component (MCS) and Physical Component (PCS) Scale, were used to assess the mental and physical health of mothers. Bivariable and multivariable statistical analyses were performed (multiple linear regression).
Results: The average age of mothers was 30.75 ± 5 years (range of 14 - 46 years), 22 % of mothers were pregnant, 66 % were never-smokers, 29 % were ex-smokers, 5 % were smokers (95 % non-smokers); 47.35 % of non-smoking mothers live in households with at least one adult smoker. The presence of an adult smoker in a household was significantly negatively associated with the mother's MCS score in bivariable analysis. Adjusting for age, education, occupation and marital status in multiple linear regression analysis, the presence of a smoking partner in the household is independently associated with decreases of MCS, i.e. worse mental health (β= - 3.13; p=0.02). The association with PCS score was not significant.
Conclusions: Living with smokers had a negative influence especially on the mental health of non-smoking mothers in our sample. Future goals are to complete the sample and to enroll more pregnant women into the study.

DEVELOPMENT OF A QUALITY ASSESSMENT TOOL FOR 'DOORSTEP' GREEN SPACE IN DEPRIVED URBAN COMMUNITIES

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Background and Aims: Green space is a fundamental aspect of health-promoting neighbourhood environments. Despite evidence that the potential health benefits of green space are greatest for those in deprived and urban areas, in the UK, the most accessible local or 'doorstep' green space in these communities tends to be neglected and underused. As quality is a necessary precursor to use (and associated health benefits), it is important to understand relevant quality characteristics. We describe the development of a green space audit tool for use in 'doorstep' green space in deprived urban areas.
Methods: An existing tool (Foster et al. 2006) was adapted in two phases. A pilot phase in a deprived neighbourhood in Stoke-on-Trent, UK, used focus groups (35 adults; 23 children) and a postal survey (n=170) to capture key facilitators and barriers to using green space. The original items and scoring protocols were adapted and piloted in nine green spaces in deprived neighbourhoods (recreation areas; ≥2 hectares; unrestricted public access) to test protocols, utility and scoring. The second phase (ongoing) involved onsite user surveys to finalise items and appropriate domain weights to reflect the relative importance of different green space characteristics.
Results: Pilot work indicated that antisocial behaviour (and associated markers/'incivilities') and inadequate facilities were the greatest barriers to use. The piloted tool comprised six domains weighted on the basis of preliminary analysis: Access (10%), Recreation facilities (25%), Amenities (15%), Incivilities (25%), Usage (10%) and Overall impression (15%). Ongoing surveys and re-analysis of pilot data will verify these domain weights, with subsequent testing in further deprived urban areas (n~20 sites) to test feasibility, content validity, and inter-rater reliability.
Conclusions: The final audit tool and development process will be presented and made available for further testing in other areas of the UK and Europe.

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EUROPEAN BIRTH COHORTS WITH ENVIRONMENTAL EXPOSURE DATA: THE ENRIECO INVENTORY AND RECOMMENDATIONS

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Background and Aims: Many birth cohorts in Europe study the effects of early-life environmental exposures on pregnancy and child health, but data are often of fragmented nature and no overview of existing studies and their results is available. Therefore, the EU funded ENRIECO (Environmental Health Risks in European Birth Cohorts) to inventorize and synthesize birth cohort research in this area.
Methods*:* ENRIECO has created a detailed inventory of birth cohorts in Europe with data on environmental exposures, which can be searched on www.birthcohortsenrieco.net. Further, ENRIECO working groups in specific exposure and outcome topics have evaluated available data and methods used in the cohorts and developed recommendations. Lastly, case studies have examined areas in which pooling of data across cohorts may be feasible.
*Results***:** 36 birth cohorts in 19 European countries are studying a total of more than 350,000 mother-child pairs. The sizes of the cohorts vary considerably. Most of the cohorts are still young, with children under the age of 10 years. All cohorts have collected biological specimens of children and/or parents. Passive smoking, maternal occupation, outdoor air pollution, and allergens/biological organisms are assessed in many cohorts (>26). Fewer cohorts (12 to 16) collected information on water contamination, ionizing or non-ionizing radiations, noise, metals, persistent organic pollutants, or other, emerging, pollutants. Common and continuously measured health outcomes are well covered: birth weight, childhood growth, asthma and allergies, and child neurodevelopment. Methods and protocols differ considerably, but combined studies have proven feasible already for certain topics (e.g. PCBs and birth weight, and passive smoking and respiratory outcomes).
Conclusions: Combining forces in this field will yield more efficient and conclusive studies and ultimately improve causal inference. The impressive resource of existing birth cohort data should form the basis for a long-term infra-structure for cohort research on environmental exposures and child health.

* ENRIECO partners: Jens Peter Bonde, Sylvaine Cordier, Ulrike Gehring, Joachim Heinrich, Thomas Keil , Manolis Kogevinas, Remy Slama, Magnus Wickman, and representatives from all ENRIECO cohorts.

SPATIAL DISTRIBUTION OF ULTRAFINE PARTICLES IN GIRONA, SPAIN: A LAND USE REGRESSION MODEL

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Background and aims: Ultrafine particles (UFP) are studied recently with increasing concern because of their toxic and pathogenic effects. A stronger association of cardiovascular and respiratory outcomes and UFP as compared to $PM_{2.5}$ has been reported. However, the epidemiological evidence is still insufficient and studies on the long term effects of UFP are needed. Given the high spatial variation of UFP, the assignment of exposure levels in epidemiological studies requires a fine spatial scale.

Methods: We measured UFP during 15min on the sidewalk of 652 participants' homes in 12 towns of Girona Province (Spain). The measurements were done during non-rush traffic hours 9:15-12:45 and 15:15-16:45 in 32 days during June 15–July 3, 2009. In parallel, we counted the number of vehicles driving in both directions. Potential predictor variables like building density, distance to bus lines and land uses were collected in GIS format. We adjusted for temporal variation using NO_X measurements at a central monitor. The model with highest adjusted R^2 was derived by supervised forward linear regression. Performance of other methods (GAM, regression trees, random forests) was tested.

Results: Individual models for groups of neighboring towns performed better than a general model for the study area. Adjusted R^2 varied from 0.16 to 0.76 across groups of towns. The most frequent determinants were traffic, traffic load (product of traffic and road length in a given radius) and household density. Other regression techniques improved the fit of the linear regression only marginally. Adjusted R^2 at a subset of sites in Girona city improved from 0.46 to 0.76 when the average of two repeated measurements was used.

Conclusions: Land use regression models of UFP for 12 towns in Girona were successfully developed using short-term data from a high density monitoring network. These are the first LUR models of the spatial variation of UFP in the Mediterranean area.

WHICH ASPECTS OF THE PERCEIVED URBAN ENVIRONMENT ARE ASSOCIATED WITH SELF-RATED HEALTH AND PHYSICAL ACTIVITY IN THE CITY OF GRAZ (AUSTRIA)?

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Background and aims: Neighborhood characteristics have been shown to be associated with health and health-promoting behavior. The aim of our study was to identify perceptions of the urban residential environment and their association with physical activity for specific purposes and with self-rated general health.
Methods: A cross-sectional survey of inhabitants of Graz (a mid-sized Austrian city) aged 15–60 years was conducted in 2005. Self-reported data were obtained by means of computer-assisted telephone interviews. Participants (n=997) completed structured interviews including Likert-type scaled questions on neighborhood conditions, physical activity for specific purposes and self-rated general health. The questions concerning the neighborhood were factor-analyzed in order to generate primary measures of perceived neighborhood characteristics.
Results: We found that a perceived high socio-economic quality of the residential environment is associated with higher levels of self-rated health and leisure time physical activity. The better self-rated health among individuals who were more satisfied with their quarter is not due to increased levels of sport and exercise. Both, sport and satisfaction with environmental quality are independently linked with self-rated health.
Conclusions: Our results suggest that a high level of satisfaction with the individual's local infrastructure may urge the residents to engage in higher levels of physical activity for transportation, whereas the preferred mode of transportation may be gender-specific: men tend to use the bicycle while women walk. We found no clear relationship between satisfaction with the individual's social cohesion in his quarter and his/her physical activity. The results of our study may serve as a basis for devising structural preventive measures in urban environments (urban planning and design).

ASSESSMENT OF SPATIOTEMPORAL EXPOSURE ESTIMATES IN SMALL AREA EXPOSURE STUDIES

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Background and Aims: Exposure to air pollutants is often estimated based on location. Either ambient pollutant concentrations measured at the nearest monitoring station or modelled concentrations are, thereby, assigned to a specific location such as residential address. Mobility and time spent in locations away from home, however, greatly influence people's exposure. Ignoring this spatiotemporal element can result in inaccurate exposure estimates, but the magnitude and spatial distribution of the expected exposure error is largely unknown.
Methods: An urban simulation environment was used to compare a location-based exposure proxy to personal exposure. Exposure misclassification due to the use of ambient PM_{10} concentration measurements nearest to the home instead of personal exposure was quantitatively and spatially assessed for a cohort of 500 children. Personal exposure was modelled by predicting daily activity patterns using a probabilistic time-activity model and overlaying the visited locations and trips between locations with hourly PM_{10} concentration surfaces. Indoor particle concentrations were modelled using a stochastic mass-balance model.
Results: Personal exposure varied greatly between weekdays and the weekend due to a shift in the outdoor/indoor activity ratio, although that variation disappeared when averaging personal exposure over a two-week period. Using a location-based exposure proxy over-predicted exposures for those children with the lowest and highest exposures and the accuracy of the location-based proxy strongly depended on the activity patterns of individuals.
Conclusions: The spatial patterns of personal exposure showed that children are exposed to much higher levels of particles when away from home. A location-based proxy offers a reasonable estimate of exposure for children living in inner city areas, however, for children living in suburban areas, where ambient concentrations vary greatly, a single location will introduce spatially biased exposure error. There is a need to characterise this error in future exposure studies and analyses should include spatiotemporal detailed exposure information.

USING HEALTH INDICATORS IN A HEAT WARNING SYSTEM

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Background and Aims: Since 2004, France operates a National Heat Wave Plan to reduce heat-related impacts. Preventive actions are implemented during summer and are reinforced in case of a heat wave warning. A monitoring of the health situation in the impacted regions can provide useful elements for the decision-makers to select the measures to be activated in priority. However, due to the short time available during a warning, the nature and the use of the health indicators must be clearly defined.
Methods: Based on a literature review and an expert consultation, we selected a limited number of morbidity and mortality indicators, taking into account their reactivity and data availability and quality. They were analyzed using two statistical methods to detect health impacts of heat waves: historical mean if at least two years of data are available and a control chart method if there is less than two years of data available.
Results: We initially identified 20 morbidity and mortality indicators, and restricted this list to one mortality indicator and five morbidity indicators: total mortality; total emergency admissions, for all ages and >75 years-old (which are the most vulnerable group); emergency admissions for heat-related diseases; number of calls to "*SOS médecins*", a 24-hour medical service; and number of calls to the emergency medical service centre. All are available on a daily basis, with a lag of 1 to 7 days.
Conclusions: Health indicators used during the warning must be able to rapidly identify a possible impact, in order to orientate preventive actions. They must be considered as tools for decision-makers and do not substitute to further epidemiological studies, which are necessary to better understand the vulnerability to heat, the dynamics of the health impact of heat waves, and to optimize the long-term response.

ASSOCIATION BETWEEN A URINARY BIOMARKER OF PRENATAL EXPOSURE TO DISINFECTION BY-PRODUCTS AND ADVERSE PREGNANCY OUTCOMES

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Background and aims: The microbiological control of drinking water through chlorinated disinfectants produces a large number of disinfection by-products (DBPs) suspected to have adverse reproductive effects. Most epidemiological investigations of the effect of prenatal exposure to DBPs on pregnancy outcomes used indirect measures of exposure combining estimated residential levels of trihalomethanes (THM) or haloacetid acids (HAAs) in tap water and eventually personal uses of water. Urinary trichloroacetic acid (TCAA) (one of the HAAs) has been validated as a biomarker of chronic exposure to DBPs via ingestion of chlorinated drinking water. We used it to study the association of DBP exposure with fetal growth and duration of gestation.
Methods: The PELAGIE birth cohort included 3,421 pregnant women in early pregnancy (<19 weeks of gestation) between 2002 and 2006. At inclusion, women were asked to complete a self-administered questionnaire and to provide a urine sample. Maternal urinary levels of trichloroacetic acid (TCAA) were assessed in a nested case-control study comparing 174 cases of fetal growth restriction, 114 preterm births, and 399 controls. Odds ratios were estimated with logistic models adjusted for high blood pressure, tobacco, alcohol, and coffee consumption, marital and employment status.
Results: TCAA was detected in 7% of the 611 maternal urine samples tested. The limit of detection was 0.01 mg/L. Women with detected TCAA in their urine had a significantly higher risk than others of fetal growth restriction (adjusted odds ratio=2.07; 95% confidence interval (CI): 1.00, 4.26). No association was found with preterm birth.
Conclusions: Prenatal exposure to DBPs as measured by detected urinary TCAA seems to affect fetal growth. This biomarker should however be considered as a marker of the whole mixture of DBPs and the causal agent(s), if any, remain to be identified.

OUTDOOR EXPOSURE TO FORMALDEHYDE (CH2O) IS ASSOCIATED WITH AN INCREASED RISK OF HOSPITALIZATION FOR RESPIRATORY DISEASES IN CHILDREN

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Background and aims: Children living near wood industries have an increased risk of developing respiratory diseases.
We aimed at assessing if residential outdoor exposure to NO2 and CH2O was associated with the risk of hospitalization for respiratory diseases in children.
Methods: In 2006, all the children (3-14 years) living in the Viadana district (the largest wood manufacturing areas in Northern Italy) were surveyed through a parental questionnaire (n=3854) and their home addresses were geocoded. Their history of hospitalization for respiratory diseases (ICD-IX: 460-519) was assessed from January 2007 to December 2009, using discharge records obtained from the local Health Unit. To assess the outdoor exposure to NO2 and CH2O, 63 passive samplers were installed in the area using a Partitioning Around Medoids (PAM) algorithm. Pollutants were monitored twice, both in winter and in summer 2010. Kriging interpolation was used to attribute the average annual concentration of pollutants to each child. Poisson regression models were used to assess the association between the hospitalization rates (HR) and the average concentration of pollutants.
Results: By December 2010, 3798 (98.5%) children had been traced. During the 3 years of follow-up, 121 hospital admissions, caused by respiratory diseases, occurred (annual HR = 10.8/1000/year). The HR for respiratory diseases slightly increased with increasing outdoor exposure to NO2 ($\mu g/m^3$) (RR:1.02; 95%CI: 0.95-1.10), while they were strongly associated to CH2O outdoor concentration ($\mu g/m^3$) (RR:2.41; 95%CI: 1.07-5.43).
Conclusions: Emissions from wood industries apparently have a serious impact on children's health.

EXTRACELLULAR HISTONES AFFECT BLOOD COAGULATION IN SUBJECTS EXPOSED TO METAL-RICH AIR PARTICLES

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Background and Aims: Epidemiological findings suggest an association between particulate matter (PM) exposure and hypercoagulability and thrombosis. The underlying mechanism for PM-related procoagulative effects is still unknown, but recently, elevated levels of extracellular histones have been indicated as possible mediators in inflammatory conditions. In 63 steel workers, we evaluated the effects of exposure to PM and PM metal components on two extracellular histone modifications (histone H3 lysine 4 trimethylation: H3K4me3; histone H3 lysine 9 acetylation: H3K9ac), and the association between both H3K4me3 and H3K9ac and coagulation markers.
Methods:H3K4me3 and H3K9ac were determined in plasma samples through ELISA (enzyme-linked immunosorbent assay). Prothrombin time (PT), activated partial thromboplastin time (APTT), endogenous thrombin potentials (ETPs) with/without exogenous triggers and with/without soluble thrombomodulin, tissue-type plasminogen activator (t-PA) antigen, D-dimer, C-reactive protein (CRP) were measured as coagulation markers. Exposure to inhalable metal components (aluminum, manganese, nickel, zinc, arsenic, lead, iron), and to particle mass (PM with aerodynamic diameters <10µm [PM10], <1µm [PM1] and coarse PM [PM10- PM1]) was estimated for each study subject.
Results: Both H3K4me3 and H3K9ac were increased in association with PM1(β[H3K4me3]=0.34, P=0.01; β[H3K9ac]=0.27, P=0.02). H3K4me3 was increased in association with air levels of zinc (β=0.25, P=0.04) and iron (β=0.38, P=0.01). H3K9ac showed borderline positive association with air level of zinc (β=0.18, P=0.07). Histone modifications also showed significant association with ETP TM+ (β[H3K4me3]=355.27, P=0.05; β[H3K9ac]=389.03, P=0.05), and borderline association with t-PA antigen (β[H3K4me3]=-3.42, P=0.06; β[H3K9ac]=-3.23, P=0.06).
Conclusions: Our results indicate a potential role of extracellular histones in hypercoagulability induced by PM exposure.
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INTERNATIONAL EXPERIENCE IN REGIONS WHERE THERE IS NO REQUIREMENT FOR AN IRB (RESEARCH ETHICS BOARD), AND HOW UNETHICAL RESEARCH MAY ENSUE

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Research activities are sparse in resource-poor settings and developing countries such as Nigeria and other parts of sub-Saharan Africa. Reasons include not only lack of funding, but also the practical difficulties of conducting research in an uncertain political and economic context, and conditions of poor literacy, lack of infrastructure (including reliable electricity supply) and administrative obstacles. Universities are not adequately funded to carry out meaningful research. Education is generally in a deplorable state in many instances. The practice of environmental epidemiology is in its infancy. Very few studies are from donor agencies or part of international collaboration or postgraduate theses. Some local universities constitute Grants and Ethics committees for such. However, there are reports that the committees may not be effective. Private consultants often carry out environmental studies for the industry without the need for ethics approval.

Application of ethics principles from the Western developed countries to the least developed countries that has different values and priorities and in the absence of Institutional Review Boards is challenging. For example, informed consent as an underlying principle of ethical research implies the individual research participant's ability to understand and make a decision autonomously. However, the reality is that in many low SES regions, the literacy levels are low and the family structure/community norms are complex. It may be the prerogative of a community leader or a male head of household to make decisions for others in some regions. The concept of individual consent may be seen as challenging an established structure in customs where the head of the extended family takes decisions for widows and orphans.

This presentation will use published examples to review the importance of applying key elements of the newly revised international ethics guidelines and the process by which the guidelines can be implemented by Institutional Review Boards.

GENOMIC DNA METHYLATION ALTERATIONS DUE TO METAL-RICH AIR PARTICLE EXPOSURE: POTENTIAL LINKS WITH INFLAMMATION AND COAGULATION MARKERS

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Background and Aims: DNA methylation alterations have been proposed as a novel molecular mechanisms linking inhalable particular matter (PM) exposure to cardiovascular effects. However, data showing relations among PM exposure, DNA methylation and cardiovascular-related outcomes, such as inflammation and blood coagulation, are limited. We investigated global DNA methylation, inflammation and coagulation markers in foundry workers with well-characterized exposure to a wide range of metal-rich PM.
Methods: We recruited 63 male workers (mean age 44 years) in an electric-steel plant in Italy. Individual exposure to PM with diameter<10 µm (PM10) and its metal components was estimated using work-area measurements and time spent in each area. DNA methylation analysis of Alu and LINE-1 was performed trough bisulfite-pyrosequencing on blood DNA obtained on two different work days. We measured PT, aPTT, t-PA antigen, D-dimer, and CRP. Endogenous thrombin potentials (ETPs) were assessed with (TM+) or without (TM-) soluble thrombomodulin, but without exogenous triggers. Covariate-adjusted linear mixed-effect regression was used to evaluate associations between PM or metal exposure and methylation; and between methylation and coagulation/inflammation markers.
Results: Workers were exposed to a wide range of PM10 (between 73-1220 • g/m3) and metal components (PM10 metal content between 2%-94%). PM10 showed a negative association with Alu (• =-0.18, p=0.05) and LINE-1 (• =-0.37, p=0.04) methylation. Zinc had a marginal negative association with Alu methylation (• =-0.17, p=0.06). Aluminum was negatively associated with LINE-1 methylation (• =-0.19, p=0.04). Lower Alu methylation was associated with activated coagulation and inflammation, as indicated by shorter PT (• =-0.18, p=0.02), and increased ETP TM+ (• =87.17, p=0.03), ETP TM- (• =144.82, p=0.02), and CRP (• =0.58, p=0.01). No associations were found with other markers.
Conclusions: We found novel associations of coagulation markers with Alu repetitive element methylation. DNA methylation was associated with specific metal components, suggesting a possible common path linking PM exposure, methylation, and blood coagulation.

SEROPREVALENCE OF TOXOPLASMA GONDII ANTIBODIES AMONG VETERINARY STAFF FROM A VETERINARY DEPARTMENT IN TRANSYLVANIA

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Background and Aims : Toxoplasmosis is an infectious disease caused by a parasite Toxoplasma gondii that spreads from animals to humans, veterinarians being at high risk for this zoonotic disease. The risk is more dangerous for women because this infection is embryotoxic.
Methods : A cross-sectional survey was carried out among 59 veterinary doctors (40 males and 19 women), age average 42,9 $\pm$ 10.4 years , in order to assess their risk through occupational exposure to Toxoplasma gondii. A special medical questionnaire was individualy applied regarding occupational and medical history, past and actual animal exposure, work-related symptoms and diseases. Clinical examination was performed and Toxoplasma gondii IgG and IgM antibodies were determined using ELISA method.
Results : No symptoms and signes suggesting an actual or past toxoplasmosis were found, in medical history no diagnosis of toxoplasmosis was mentioned.
Seroprevalence of IgG antibodies was 45,8% and of IgM antibodies was 1,7% among all analized samples. IgM titres exceeding 250 UI/ml in 29,6% of the Ig G positive samples were found.
Males doctors had a higher seropositivity prevalence (50%) as compare to women doctors (36,8%). The group aged up 40 years had a higher seroprevalence (56,25%) as compare to the group aged under 40 years (33,3%).
Conclusions : This findings suggest that veterinary doctors are at high risk of exposure to toxoplasmosis during their occupational activity, the degree of risk being related with increase of age, length of activity and in male doctors.

LONG TERM EFFECTS OF IN-UTERO EXPOSURE TO PERFLUORINATED CHEMICALS ON FEMALE REPRODUCTION

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Background and Aims: The perfluorinated chemical perfluorooctanoate (PFOA) is detected in human blood worldwide. Limited data exist on the possible effect of PFOA on human female reproduction and particularly on the implications of in-utero exposure. There are potential adverse effects on the development of the foetus since PFOA crosses the placental barrier and may act as endocrine disruptor.
The aim of this population-based study was to investigate the effects of in-utero exposure to PFOA on female reproduction.
Methods: The participants were female offspring from a Danish pregnancy cohort established in 1988-89. Maternal serum concentrations of PFOA during pregnancy were related to reproductive parameters of the adult daughters: menstrual cycle characteristics, levels of reproductive hormones and ultrasonographic appearance of the ovaries.
Results: The 246 participants had a median (range) age of 20.1 (19.5-20.8) years. Median (range) PFOA concentration in the mother's serum was 3.7 (0.1-19.8) ng/ml. The cohort was divided into three groups according to PFOA levels (n=82 in each group). When comparing to the reference group of low exposure, the group of medium exposure had a higher median level of sex hormone-binding globulin (110 vs. 147 nmol/l, p=0.01), and a lower median value of free androgen index (1.2 vs. 0.7, p=0.02), of anti-müllerian hormone (2.8 vs. 2.4 ng/ml, p=0.03), and number of follicles/ovary (13.5 vs. 11.5, p=0.03). Compared to the reference group, the high exposure group had a higher median level of sex hormone-binding globulin (110 vs. 150 nmol/l, p=0.04) and a later mean (SD) age at menarche (12.7 (1.2) vs. 13.1 (1.2) years, p=0.03).
Conclusions: Preliminary results showed possible effects of PFOA on levels of reproductive hormones, number of ovarian follicles and age at menarche. Future analyses including control for confounders will provide more information on whether in-utero exposure to PFOA may have adverse long-term effects on female reproduction.

APPLICATION OF A NEW METHOD FOR TRICHLORAMINE DETERMINATION IN AMBIENT AIR OF INDOOR SWIMMING POOLS

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Background and Aims: Trichloramine (NCl_3) is a volatile disinfection by-product (DBP) which is formed when chlorine in water reacts with nitrogen-containing compounds. NCl_3 is a strong mucous membrane irritant and it has been recently linked with respiratory symptoms and asthma in swimmers, mainly in children, and in pool attendants. However, there are some issues to clarify about NCl_3 exposure in indoor swimming pools and one of them deals with the analytical determination of NCl_3 in ambient air. The aim of this study was to investigate the feasibility of a new modified DPD/KI colorimetric method, recently proposed in literature, for the analysis of airborne NCl_3 in indoor swimming pools. The relationships between NCl_3 ambient air levels and some other DBPs in these environments were also evaluated.
Methods: Airborne NCl_3 levels were investigated in 20 indoor swimming pools. Technical characteristics and disinfection treatments were collected together with physical and chemical parameters in water. Trihalomethanes (THMs) levels in water and air were also investigated.
Results: The airborne NCl_3 levels ranged from 204 to 1020 $\mu g/m^3$ and the mean value was 648.7 ± 201.4 $\mu g/m^3$. High levels of combined chlorine in water were observed: only 25% of the investigated swimming pools showed levels ≤ 0,4 mg/l, which is the Italian limit value. The average and highest THMs levels in water were 41.4 and 134 µg/l, respectively. Mean ambient air THMs value was 86.0 ± 47.9 $\mu g/m^3$ and 187 $\mu g/m^3$ was the maximum value. Airborne NCl_3 levels were found associated only with combined chlorine ($r= 0.441$; $p < 0.05$) and with THMs levels in ambient air ($r= 0.554$; $p < 0.05$).
Conclusions: Airborne NCl_3 levels are in line with other studies in literature. However more than 50% of the investigated indoor swimming pools showed NCl_3 levels higher than the recommend provisional value of 500 $\mu g/m^3$, as suggested in WHO guidelines.

ANALYSIS OF HOSPITAL DISCHARGE DATA TO DESCRIBE HEALTH STATUS OF RESIDENTS IN ITALIAN POLLUTED SITES

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Background and Aims: This study derives from SENTIERI Project, aimed at implementing a multi-disciplinary and multi-phase process leading to a full epidemiological characterization of Italian Polluted Sites (IPSs). SENTIERI Project analyzed mortality of residents in 44 IPSs for 63 causes of death, for which the epidemiologic evidence indicated a potential association with pollution in IPSs. The aim of the present study is to analyze hospital discharge data of residents in IPSs, with special focus on causes already studied in SENTIERI Project.
Methods: Hospital Discharge Record (HDR) is a synthesis of the patient's medical record and it is mandatory for both in-patients and out-patients and contains, for each hospital discharge in Italy, social and demographic data of the patient (i.e. age, gender, place of birth, place of residence) and clinical data ("main" diagnosis and up to 5 other diagnoses, procedures, outcomes). Diagnoses and procedures are coded using the International Classification of Diseases, 9th revision, Clinical Modification (ICD-9 CM). HDR data referring to year 2008 were analyzed calculating standardized hospitalization rates and relative risks (RR) using as reference the Region where the IPS is situated.
Results: As an example, Gela area (South of Italy), where a large chemical/petrochemical complex is located, shows significantly increased risks of hospitalization for all causes (RR=1.29, 95%CI 1.26-1.31), all tumors (RR 1.10, 95%CI 1.04-1.18), circulatory (RR=1.25, 95% CI 1.20-1.30) and respiratory diseases (RR=1.24, 95% CI 1.17-1.31), as also found for the mortality analysis.
Conclusions: In order to characterize the health status of IPSs residents, besides mortality data, HDR have to be analyzed. HDR have been created for administrative purposes and thus not necessarily contain complete clinical data but they do have potentials, such as the international system of codification used and the routinely and exhaustive collection, with no additional resources necessary.

PRENATAL EXPOSURE TO PERSISTENT ORGANOCHLORINE POLLUTANTS AND DEVELOPMENETAL MILESTONES IN GREENLANDIC YOUNG CHILDREN

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Background and aim: Polychlorinated biphenyls (PCB) and dichlorodiphenyldichloroethylene (DDE) are ubiquitous lipophilic environmental compounds that bio-accumulate through the food chain via consumption of contaminated sea mammals. Inuit populations are among the populations with the highest exposure to these compounds. Small-scale studies have shown an association between PCB and DDE and delays in childhood motor skills. This paper will present the results of a large-scale follow-up study of the association between prenatal exposure to PCB and DDE and motor developmental milestones like crawling, standing and walking in early childhood.
Methods: A total of 572 pregnant women from Greenland were enrolled in a cohort within the INUENDO study in 2002-2004. The follow-up, CLEAR, was conducted in 2010-2011. PCB and DDE were measured in maternal blood samples drawn when the women were on average 24 weeks pregnant. Developmental milestones were reported by mothers in a structured interview-based questionnaire when the child was 6-9 years old.
Results: The collection of field data is ongoing and is expected to be completed during the summer of 2011. Results will be presented on the poster.
Conclusions: The paper will be the first of its kind to present robust data owing to inclusion of a large study population living in an environment with high exposure to lipophilic environmental compounds.The study expects to provide strong evidence for or against the hypothesis of delayed developmental milestones after in utero exposure to PCB and DDE.

PROMOTING FOOD SAFETY IN THE KYRGYZ REPUBLIC

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Background and Aims: The Kyrgyz Republic is reforming the system on technical regulations and standards in the area of food safety. To promote the reform the European Commission has established the project "Support to Implementation of the Partnership and Cooperation Agreement – Phase III" (PSA). One of the main objectives of the project is to provide food safety along the chain of the food product turnover. The aim of this study was the informing of the population of the Kyrgyz Republic on the " PSA – Phase III" project to create preconditions for adopting and implementing international standards on food safety.
Methods: Population survey was conducted twice - at the beginning and at the end of the study. A total sample of 1000 households across the republic were surveyed. Booklets, posters and placards and mass media materials were developed for the campaign.
Results: The study was carried out in 3 stages. First, a baseline questionnaire on food safety was conducted which showed poor knowledge of the population on food safety measures. Then a large scale informational campaign was conducted with the involvement of mass media and with the use of the developed promotion materials. The campaign informed the population about international standards on food quality and safety, principles of national legislation on technical regulation, the main food poisoning prevention measures, requirements on biological additives and gene engineering products, foodstuff safety in agriculture. The second survey allowed assessment of the efficiency of the campaign.
Conclusions: The informational campaign led to an increase in the food safety awareness of the population and knowledge of respondents about food safety measures implemented by the Government of the republic and the international community.

STABILITY OF LAND USE REGRESSION MODELS AND MEASURED SPATIAL PATTERNS FOR NO2, PM2.5 AND PM2.5 ABSORBANCE

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Background and Aims: Within the ESCAPE project outdoor air pollution concentrations are being estimated using harmonized Land Use Regression (LUR) models in 37 study areas in Europe. LUR models are being developed for concentrations measured in 2008-2011, but the cohort studies started much earlier. The aim is therefore to evaluate the stability of measured spatial patterns and LUR models using data and models from a European study conducted in 1999 (TRAPCA).
Methods: In each ESCAPE study area, 20 to 40 locations were monitored in the period October 2008 – April 2011. We also re-sampled sites used in the 1999 TRAPCA study in Munich, Stockholm and The Netherlands. For both TRAPCA and ESCAPE NO_2, $PM_{2.5}$ and $PM_{2.5}$ absorbance were measured, and LUR models were developed.
Results: The measured concentrations at the same locations in both periods correlated generally well, with Pearson correlations 0.98, 0.81 and 0.99 for the Netherlands (N=15), and 0.89, 0.46 and 0.75 for Stockholm (N=25) for NO_2, $PM_{2.5}$ and $PM_{2.5}$ absorbance, respectively. In both areas, concentrations decreased with largest decrease for $PM_{2.5}$ absorbance. In the Netherlands, the ESCAPE LUR models explained 89% (NO_2), 70% ($PM_{2.5}$) and 91% ($PM_{2.5}$ absorbance) of the spatial variance in measured concentrations in 2008-2011, and explained 94% (NO_2), 59% ($PM_{2.5}$) and 93% ($PM_{2.5}$ absorbance) of the spatial variance in concentrations measured in 1999. LUR model development is ongoing and results for other areas will also be shown.
Conclusions: The correlations between the measured spatial contrasts for $PM_{2.5}$ and especially NO_2 and $PM_{2.5}$ absorbance in 1999 and 2008-2011 were high. The ESCAPE models predicted the measured spatial contrast in 1999 well especially for NO_2 and $PM_{2.5}$ absorbance in The Netherlands. If corroborated by the analyses for the other study areas, this supports that the ESCAPE LUR models can be used to represent historical concentration contrasts.

SPATIO-TEMPORAL VARIATION OF PARTICLE NUMBER CONCENTRATIONS IN A SWISS URBAN CITY

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Background and Aims: This study is part of the Swiss Cohort Study on Air Pollution and Lung and Heart Diseases in Adults (SAPALDIA), a nearly 20-year old cohort study spread in 8 geographically diverse areas in Switzerland. Innovative exposure modeling has been conducted in SAPALDIA earlier for PM_{10} and NO_2, however, exposure to specific traffic related pollutants such as ultrafine particles and PM constituents has not been assessed. The overarching aim is to provide the estimates of individual long-term outdoor traffic-related air pollution exposures of the cohort participants. This paper focuses on the spatial and temporal variation of home outdoor particle number concentration (PN) in one of the SAPALDIA area, Basel.
Methods: The PN measurements will be conducted at 20 residences each in four of the eight areas in three seasons over a period of 2 years, 2011-2012. Indoors and outdoors monitoring will be conducted biweekly for $PM_{2.5}$, PM_{10}, NO_2 and weekly for PN. Particle counts are measured using a particle counting device, miniDiSC (miniature diffusion size classifier). It is a portable device and measures nanometer sized (10-300nm) particles with a resolution of one second.
Results: Mean weekly averaged PN levels are observed 14529±3296, 13659±1878 and 11545 particles/cm^3 at street, urban and regional background locations respectively. Median correlation coefficient for all sites is 0.70 (range 0.36-0.91) and 0.83 (range 0.39-0.99) for hourly and daily PN respectively. Median coefficient of divergence, a measure of spatial heterogeneity, for all site pairs is 0.15 (range 0.05-0.27), showing a low to mid spatial heterogeneity in daily PN in Basel. These winter season observations will be compared across seasons and further with concurrent $PM_{2.5}$, PM_{10} and NO_2 measurements.
Conclusions: Our first results show significant differences in PN levels in home outdoor locations and document the differential impact of traffic on PN levels in the city.

PRENATAL EXPOSURE TO ORGANOCHLORINE COMPOUNDS (OCs) IN RELATION TO BIRTHWEIGHT AND DURATION OF GESTATION: THE SPANISH INMA PROJECT

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Background and aims: To evaluate associations between prenatal organochlorine compounds (OC) exposure and birthweight and duration of gestation in a population with low exposure levels.
Methods: The analysis included 1527 mother-child pairs from three sub-cohorts of the INMA project (www.proyectoinma.org) recruited during pregnancy between 2003-2008. Polychlorinated biphenyls (PCBs 138, 153, 180 and the total), p,p´-dichlorodiphenyldichloroethylene (p,p'-DDE), hexachlorobenzene (HCB) and • -hexachlorocyclohexane were measured in maternal serum obtained in weeks 10-13 of gestation. Multivariable linear regression was used to assess the association between the exposure to these compounds and birthweight and gestation duration adjusting for potential confounders.
Results: The mean (sd) gestational age was 39.7 (1.6) weeks and mean birthweight 3254.8 (465.7) grams. After multivariate adjustment including other OCs, the increase levels of p,p'-DDE were significantly negatively associated with gestation duration among male infants (• =-0.129; 95%CI: -0.251 to -0.007), but not among females. Among infants of both sexes whose mothers smoked during pregnancy (31,7% of the sample), p,p'-DDE was also associated with shorter gestation duration after multivariable adjustment (• =-0.192; 95%CI: -0.356 to -0.028) and PCBs were associated with significant reductions in birthweight among infants (• =-50.474; 95%CI: -99.442 to -1.506); these associations were marginally non-significant after adjusting for other OCs. When OCs were categorized in quartiles, the main differences were found betwen the first and the fourth quartile (p,p'-DDE: • 0.43 vs. >0.16 • g/L; • PCBs: • 0.43 vs. >0.91 • g/L).
Conclusions: Results suggest infants of women who smoke during pregnancy may be vulnerable to adverse effects of low-level p,p'-DDE exposure on the duration of gestation and to effects of PCB exposure on birthweight. Overall, boys also appeared to be more susceptible than girls to negative effects of p,p'-DDE on the duration of gestation.

OUTDOOR NO_2 EXPOSURE IS ASSOCIATED WITH PERSISTENT COUGH DURING THE FIRST YEAR OF LIFE

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Background and Aims: Because children's lungs and immune system are not completely developed they are more susceptible to respiratory disease as well as more vulnerable to ambient pollution. We assessed the relation between prenatal and postnatal NO_2 levels and the development of Lower Respiratory Tract Infections (LRTI), wheezing and persistent cough during the first year of life.
Methods: Study population were 352 children from a birth cohort in Valencia, Spain. Prenatal exposure to NO_2 was measured at 93 sampling sites spread over the study area during four different sampling periods of 7 days each. It was modelled for each residential address through land use regression using the empirical measurements and geographic information systems data. Postnatal exposures were measured indoor and outdoor the residence with passive samplers during 14 days once in each home. Outcomes studied were any episode of LRTI during the child's first year of life diagnosed by a doctor (bronchitis, bronchiolitis or pneumonia), wheezing (defined as whistling sounds coming from the chest), and persistent cough (more than three consecutive weeks). Outcomes and potential confounders were obtained from structured questionnaires. Multiple logistic regression was used to explore associations.
Results*:* Cumulative incidence (CI) was 30.40% for LRTI (23.01% bronchiolitis, 11.93% bronchitis and 1.42% pneumonia), 26.14% for wheezing and 6.25% for persistent cough. Adjusted odds ratio (95% confidence interval) per 10 $\mu g/m^3$ increment in postnatal outdoor NO_2 concentration was for persistent cough 1.40 (1.02-1.92). We also found evidence of an association with bronchiolitis, bronchitis and persistent cough in different prenatal periods, although it was not statistically significant.
Conclusions: Our results support that exposure to outdoor NO_2 during first year increase the risk of persistent cough.
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BUILT ENVIRONMENT AND HEALTH: ANALYSIS OF NEIGHBOURHOOD ENVIRONMENT WITHIN 5- AND 10-MINUTE WALKING DISTANCE OF THE HOME

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Background and Aims: Recent research has highlighted the potential importance of the individual-neighbourhood interaction in determining population health and physical activity. Environment has often been considered on a relatively large scale, but there is increasing interest in the influence of 'neighbourhood' environment. This is often defined as the area within walking distance of people's homes, but inconsistency in how this is defined (Smith et al. 2010) has implications for environmental measurement and possible relationships with health.
Methods: A representative random adult sample from 10 neighbourhoods in Stoke-on-Trent, UK, participated in a computer-assisted personal interview, including health (SF12) and physical activity (IPAQ) outcomes. Geographical Information Systems were used to: geocode participants' homes and create two network buffers around each to represent 5- and 10-minute walking distances (400m and 800m respectively): create individual-level environmental indices for each participant (e.g., connectivity; land use mix; transport; traffic; safety and crime) for each buffer size. Multiple linear regression and multi-level analysis will be used to examine the effects of using the different neighbourhood definitions on relationships between health and neighbourhood environment.
Results: Productive interviews were obtained from 761 adults (49% response; 16+ years; 55% women). Most were overweight (65%), of low educational attainment (72%), and on modest income, consistent with much of the city. Self-reported health data were comparable with available normative data for England and were linked to perceived environment (Gidlow et al. 2010). Proposed analysis will explore the relative importance of individual-level environmental indices that capture GIS-defined environment indictors within 5- and 10-minute walking distances of individuals' homes.
Conclusions: Findings from novel analyses exploring differences in the relationships with health of a range of environmental indicators calculated using two commonly used neighbourhood definitions will be presented.

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CORRELATION BETWEEN SHORT-TERM MEASURES OF TRAFFIC NOISE AND PARTICLE NUMBER CONCENTRATION IN A SWISS URBAN CITY

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Background and Aims: This study is part of the Projet Tri-national Trafic, Air, Bruit et Santé (TRITABS), a tri-national study on traffic-related air pollution, noise and cardiovascular health. Disentangling cardiovascular effects of road traffic noise and air pollution require city-specific analyses, as their spatial distribution varies between cities. Moreover, traffic-specific air pollution and noise exposure models use similar traffic and land-use predictors, which may impede identification of the true relationship between the two. Our primary aim is to compare and contrast the spatial characteristics of traffic related air pollution and noise in Basel (CH), Grenoble (FR) and Girona (ES). This paper focuses on the spatial distribution of measured road traffic noise and particle number concentration (PN) in Basel.
Methods: Synchronized 15-minute measurements are being conducted at 60 locations in Basel for traffic volume, road traffic noise and PN. Measurements are done during non-rush traffic hours (9:30-16:00h) and repeated at least once at each of the locations. PN are measured using a miniDiSC (miniature diffusion size classifier), a portable device measuring nanometer sized (10-300nm) particles. Traffic-related noise is measured using a class 1 sound level meter, Pulsar 30. Detailed records of all non-traffic events during the measurements are made and excluded in the subsequent analysis.
Results: Mean PN and road traffic noise levels (as LAeq) are 24,180±13,949 particle/cm^3 (range, 5,232-51,387) and 57.2±8.6 dBA (range, 43.3-71.6) respectively. The observed PN-noise correlation is 0.73. Comparison of these short-term measurements to existing noise maps and concurrent weekly PN levels in Basel is underway. Local determinants of the spatial correlations will be further investigated, and compared within and across Basel, Girona and Grenoble.
Conclusions: Our first results show a high correlation between measured PN levels and road traffic noise in Basel, however, the validity of the same for longer time-windows is yet to be investigated.

METAL-RICH PARTICULATE MATTER INFLUENCE EPSTEIN-BARR VIRUS METHYLATION IN PERIPHERAL BLOOD LEUKOCYTES.

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Background and Aims: Epstein-Barr virus (EBV), after primary infection, persists in most individuals as a lifelong asymptomatic infection of B-lymphocytes. The expression of latent viral oncogenes is under epigenetic control by DNA methylation. DNA methylation inhibits expression of viral latency proteins which are recognized by cytotoxic T cells. We aimed at evaluating effects of PM exposure on EBV DNA methylation in workers in an electric furnace steel plant with well-characterized exposure to metal-rich particulate matter.
Methods: We measured EBV DNA methylation content (in Wp promoter) through bisulfite PCR Pyrosequencing on EBV-positive, leukocytes DNA obtained from 48 workers on the first day of a work week (baseline, after 2 days off work) and after 3 days of work (post-exposure). We determined individual exposure to inhalable particles and metals for all subjects. Paired t-test was used to compare baseline and post-exposure samples. Linear mixed models were fitted to evaluate the association between metal-rich particle exposure and EBV DNA methylation.
Results: Our date showed a change between EBV methylation measured at the baseline and at the post-exposure (difference postexposure-baseline=-9.5%, p-value=0.009). Multivariable mixed models adjusted for age, body mass index and smoking, Nickel, Arsenic and Lead had a positive association with EBV methylation (Nickel: • =16.16, p-value<0.001; Arsenic: • =13.0, p-value=0.02; Lead: • =16.53, p-value<0.001).
Conclusions: The difference observed comparing baseline and post-exposure samples may be suggestive of a rapid change in EBV methylation induced by air particles, while correlation between EBV methylation and metal exposure may represent an adaptive mechanism. These results, however, should be further characterized in future investigations on the effects air particles.

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LINKING MULTIMEDIA ENVIRONMENTAL AND PBPK MODELS TO ASSESS HEALTH RISKS – A CASE STUDY

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Background and aims: Human exposure to chemicals through multiple pathways is classically estimated by the so-called 'multimedia models', calculating the distribution of contaminants among products of interest for humans (like drinking water, inhaled air, vegetables, meat, milk, etc). Combined to data describing human behavior (diet composition, time spent outside, etc), such multimedia models provide an estimation of the daily quantity inhaled or ingested by the population of interest. Once the exposure scenario is identified, the dose-response assessment is typically achieved by comparing exposure outputs (*e.g*, the daily intake) to reference doses, estimated from toxicological data. Coupling multi-media models for different exposure pathways with a generic physiologically based pharmacokinetic (PBPK) model for the human population enables to assess directly the impact of the exposure scenarios on the chemical's concentration in the target tissues.
Methods: One aim of the European 2-FUN project (Full-chain and UNcertainty Approaches for Assessing Health Risks in FUture ENvironmental Scenarios) was to develop an integrated 'multimedia-PBPK' toolbox that also incorporates uncertainty and inter-individual variability analyses and different kinds of sensitivity analysis.
Results: In the present study, an integrated modeling approach was demonstrated for predicting internal tissue concentrations of chemicals by coupling a multimedia environmental model and a PBPK model. A case study was designed for a region situated on the Seine river watershed, downstream of the Paris megacity and for some chemicals (for example benzo(a)pyrene or lead) emitted from industrial zones in the region. In order to take into account the parametric uncertainty in the model inputs, some input parameters relevant for the multimedia model were given by probability density functions (PDFs); some generic PDFs were updated with site-specific measurements by a Bayesian approach.
Conclusions: This case study demonstrated the feasibility of a full-chain assessment combining multimedia environmental predictions and PBPK modeling, including uncertainty analysis.
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EFFECTIVENESS OF ZONES 30KM/H IN THE NUMBER OF ROAD TRAFFIC INJURIES IN BARCELONA

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Background and Aims: In Barcelona, 5 areas with a speed limit of 30 km/h were implemented in 2007 and further more up to 300km in 2009. This paper aims to assess the effectiveness of 30 km/h zones in reducing the number of people injured in a road traffic collision in the city of Barcelona. Preliminary analysis of the first 5 areas is presented in this abstract.
Methods: A pre-post evaluation study was performed using an interrupted time-series design with comparison groups. The study population include people injured in a road traffic crash in Barcelona from January 2002 to March 2010 obtained from the Crash Register of the Local Police. The intervention were zones with a 30k/h speed limit implemented in 2007 and the comparison group the adjacent zones to the intervention areas. Quasi-Poisson regression models were fitted adjusting for time trend and seasonality. Relative risks (RR) and their 95% confidence intervals (95% CI) were derived from the adjusted models which indicate the change in the mean number of injured during the post-intervention period compared to the pre-intervention period.
Results: The speed zones implemented in 2007 showed a change in the time trend of injured, from a stable to a significant 12.2% annual decrease. After adjusting for time trend and seasonality, the overall monthly average number of injured in 2009 was significantly lower than that in the pre-intervention period (-28.6%, 95%CI: -43.9%, - 8,9%), as well as for two-wheel users injured (-40.5%, 95%CI: -56.9%, -19.0%) and for the number of injured at intersections (-4.8%, 95%CI: -56.1%, -3.2%). In the adjacent areas there was no significant change.
Conclusions: The implementation of 30 km/h speed zones in 2007 has had a significant impact in reducing the number of people injured in a traffic crash. Data of the overall zones evaluation will be presented.

THE EFFECT OF A SMOKING BAN INTRODUCTION TO ENVIRONMENTAL TOBACCO SMOKE EXPOSURE IN SWISS HOSPITALITY WORKERS

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Background and Aims: To protect the population from environmental tobacco smoke (ETS) Switzerland introduced a nationwide rather heterogeneous smoking ban in May 2010. The exposure situation of non-smoking hospitality workers before and after implementation of the new law is being assessed in a prospective cohort study.
Methods: Exposure to ETS was measured using a novel method developed by the Institute for Work and Health in Lausanne. It is a passive sampler called MoNIC (Monitor of NICotine). The nicotine of the ETS is fixed onto a filter and transformed into salt of not volatile nicotine. Subsequently the number of passively smoked cigarettes is calculated. Badges were placed at the workplace as well as distributed to the participants for personal measuring. Additionally a salivary sample was taken to determine nicotine concentration.
Results: At baseline Spearman's correlation between workplace and personal badge was 0.47. The average cigarette equivalents per day at the workplace obtained by badge significantly dropped from 5.1 (95%- CI: 2.4 to 7.9) at baseline to 0.3 (0.2 to 0.4) at first follow-up (n=29) three months later ($p<0.001$). For personal badges the number of passively smoked cigarettes declined from 1.5 (2.7 to 0.4) per day to 0.5 (0.3 to 0.8) (n=16).Salivary nicotine concentration in a subset of 13 participants who had worked on the day prior to the examination was 2.63 ng/ml before and 1.53 ng/ml after the ban ($p=0.04$). Spearman's correlation of salivary nicotine was 0.56 with workplace badge and 0.79 with personal badge concentrations.
Conclusions: Workplace measurements clearly reflect the smoking regulation in a venue. The MoNIC badge proves to be a sensitive measuring device to determine personal ETS exposure and it is a demonstrative measure for communication with lay audiences and study participants as the number of passively smoked cigarettes is an easily conceivable result.

DIFFERENCE IN PERSONAL EXPOSURE TO PARTICULATE AIR POLLUTANTS IN USERS OF DIFFERENT TRANSPORT MODES (AUTOMOBILE, BUS, SUBWAY AND BICYCLE) IN SANTIAGO, CHILE: STUDY DESIGN

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Background and Aims: Daily, people can be exposed to high levels of air pollutants during their home-work trips because of their closer proximity to traffic emissions and their exposures may vary according to the mode of transport used (bus, automobile, subway and bicycle). Little is known about exposure to air pollutants in transport´s users in Chile, and even less is known regarding difference in exposure by transport mode. Here, we present a study that compares air pollutant exposures in users of different modes of transport in Santiago, Chile.
Methods: (Arial, 8pt, bold) We will conduct a first, observational cross-sectional study of personal exposure to air pollutants in users of different modes of transport in their normal routes. 68 volunteer subjects that have similar home-work routes will be recruited, allocating about 17 subject to each mode (bus, automobile, subway and bicycle). Each participant will perform its morning and evening trips as usual except that they will carry personal monitors to measure particulate air pollutants PM2.5 and ultrafine particles. Additionally, both PM fractions will be measured at a central site in order to separate the contribution of the transport microenvironment from the background. This study will be complemented with a second cross-sectional study where exposure in the different modes will be evaluated in an assigned route (Alameda Street in downtown Santiago) during morning trips. Data will be analyzed using regression models to compare the modes, and determine the effects of environmental factors such as temperature, meteorology, traffic density, and so on, on personal exposure levels.
Results: Some preliminary results are expected by the time of the conference.
Conclusions: identification of environmental factors that determine increases in pollutant's exposure may guide actions aimed to reduce people's exposure to air pollutants during their home-work trip.

EFFECTS OF METAL-RICH PARTICULATE MATTER EXPOSURE ON EXOSOME-ASSOCIATED MICRORNAS.

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Background and Aims: Epidemiological studies have reported an increased risk for cardiovascular disease (CVD) in relation to exposure to metal-rich particulate matter. Cell-derived membrane vesicles (exosomes) are released in plasma and transfer microRNAs. Exosomes might mediate the effects of air pollution, since potentially they could be produced by the respiratory system, reach the systemic circulation and lead to the development of CVD. The aim of the present study was to identify effects of exposure to metal-rich particulate matter on exosomes-associated microRNAs expression in workers of an electric furnace steel plant with well characterized exposure.
Methods: Plasma exosomes were isolated by ultracentrifuge from 55 steel workers on the first day of a workweek (baseline) and after three days of work (post-exposure). We measured the expression of the 88 most abundantly expressed and best characterized micro RNA sequences by SYBR green chemistry. The relative expression of miRNAs was measured by real-time PCR using SNORD48, SNORD47, SNORD44 and RNU6-2 as endogenous controls. Relative quantification of miRNA expression was calculated using the $2^{-\Delta Ct}$ method. Paired t-tests were used to compare baseline and post-exposure samples.
Results: Expression profiling of 88 human miRNAs extracted from baseline and paired post-exposure blood samples identified 6 miRNAs which showed significant differential expression between the two samples. Among the most notable changes were miR-302c and miR-128 which were up-regulated by 13.9- and 5.6-fold respectively ($p<0.001$), and miR-28-3p and let-7g which were up-regulated by 3.6- and 2.26-fold ($p=0.01$), miR-125a-5p and miR-181a that were up-regulated 3- and 1.7-fold ($p<0.02$).
Conclusion: These results propose a new role for exosomes in mediating the effects of air pollution exposure on CVD risk. Our findings, if confirmed, could lead to the identification of potentially reversible alterations that might be also considered as potential target for new diagnostic and therapeutic interventions.

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Occupational activities and a reported history of Malaria among women working in small-scale agriculture in South Africa

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Background and Aims: Malaria remains a persistent and major public health challenge in the developing world despite improvements in malaria control methods. Agricultural communities in malaria endemic regions may be at high risk for disease transmission with crop production and agricultural activities being associated with increased disease transmission. A better understanding of this association and particular risk activities and crop types can assist malaria control interventions.

Methods: A cross-sectional study using a questionnaire survey, compared a self-reported history of malaria among women (n=911) working in small-scale agriculture on the Irrigation Scheme and Drylands of the Makhatini Flats of northern KwaZulu-Natal South Africa. Associations between demographics, crop production and agricultural activities and a history of having malaria while working in agriculture were explored.

Results: Approximately 15% (n= 98) of 644 women reported malaria while working in agriculture with more Dryland as compared to Irrigation Scheme women reporting disease (18.4 % vs. 10.9%; $p<0.05$). Working on a self-owned or family owned farm (PR: 2.6; 95% CI: 1.3-5.2), spraying pesticides (PR: 2.3; 95% CI: 1.4-3.8), cultivating sugar cane (PR: 1.6; 95% CI: 1.1-2.3), cotton and mangoes (PR: 1.7; 95% CI: 1.1-2.6) were significantly associated with a history of having malaria when working in agriculture.

Conclusion: Agricultural work in general, and specific work tasks and crops appear to increase the risk of malaria infection in endemic areas. Future interventions by the SA Malaria Control Programme should

include educating rural populations on how to protect themselves during certain agricultural activities which could result in increased malaria transmission.

IN-UTERO EXPOSURE TO DIOXINS AND DIOXIN-LIKE COMPOUNDS AND ANOGENITAL DISTANCE IN NEWBORNS OF THE RHEA STUDY IN CRETE

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Background and Aims: Maternal exposure to dioxins and dioxin-like compounds has been related to adverse health outcomes in infants (Halldorsson et al 2009). The toxicity of these compounds is mostly traced to their blocking of the aryl hydrocarbon receptor (AhR) in part by modulating estrogen and androgen signaling (Carlson et al 2002). In animals, anogenital distance is used as a measure of fetal androgen action, tracks through life and varies by dose of antiandrogen (Longnecker et al2007). Although anogenital distance is scarcely used in human studies, results show that prenatal phthalate exposure decreases male anogenital distance (Swan et al 2005). We evaluated the association between *in-utero* exposure to dioxins and dioxin like compounds, using the DR-Calux bioassay and anogenital distance in newborns of the Rhea birth cohort in Crete.
Methods: Anogenital distance (AGD: anus to upper penis), anoscrotal distance (ASD: anus to scrotum) and penis width (PW) were measured in 64 boys. Anoclitoral (ACD: anus to clitoris) and anofourchetal distance (AFD: anus to fourchette) were measured in 62 girls. Ratios of anogenital distances divided by body weight were calculated. Maternal blood samples were collected at delivery and dioxin-like activity was measured in plasma using the DR-CALUX bioassay.
Results: Anogenital distances were wider in males (mean AGD= 50,46mm) than females (mean ACD=35,03mm). Plasma dioxin-like activity was negatively associated with AGD in males. The estimated change in AGD per 10 pg CALUX-TEQ/g lipid increase was -1.12mm (95%CI:-2.12,-0.12) and -0.39 mm/kg for the AGD weight ratio (95%CI:-0.74,-0.05) after adjusting for potential confounders. Negative but not statistically significant associations were observed for ASD and PW; no associations were found for ACD or AFD in females.
Conclusions: Male infants may be susceptible to endocrine-disrupting effects of dioxins. This is the first study that appears to replicate in humans, experimental animal evidence used by WHO/FAO for setting recommendations on human dioxin intake.
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EFFECT OF THE NUMBER OF MEASUREMENT SITES ON LAND USE REGRESSION (LUR) MODELS OF AIR POLLUTANTS

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Background and Aims: Land use regression (LUR) models used in epidemiologic studies on air pollution usually rely on air pollution measurements at a few locations across a city. The number of locations commonly varies from 20 to 100. Our aim is to explore the effect of the number of locations (N) on LUR model performance.
Methods: The REGICOR-AIR study measured NO_2 in 159 locations in the two adjacent cities of Girona and Salt (Spain). A total of 102 potential predictors like traffic, road type and land cover entered a supervised forward selection procedure to derive the final model. Training datasets of 20, 50, 80, 110 and 140 points were obtained by randomly sampling the original dataset. The remaining points were used as validation datasets. The process was repeated 200 times for each N. Adjusted R^2 (R^2a) and leave-one-out cross-validation R^2 (R^2cv) were calculated in the training datasets, and validation R^2 was obtained from the validation datasets. The median value over the 200 iterations was reported.
Results: With 20 points, the median R^2a and R^2cv were 79% and 71% but the validation R^2 was negative, indicating that the regression equation resulted in a worse prediction than assigning the overall mean to each point of the validation sample. Both R^2a and R^2cv decreased with increasing N to reach R^2a=54% and R^2cv=52% for N=140. Conversely, the validation R^2 increased with increasing N, from negative values (N=20) to 44% (N=140). The most frequent predictive variable entered in only 32% of the models for N=20, while for N=140 four variables appeared in more than 90% of the final models.
Conclusions: Increasing the number of measurement points increases both the predictability and the stability of the models. Leave-one-out cross-validation R^2 overestimates the predictive ability of the model. This bias is more important at small sample sizes.
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DETERMINANTS OF NONADHERENCE TO COMMUNITY-DIRECTED IVRMECTIN TREATMENT FOR ONCHOCERCIASIS CONTROL IN MANNA DISTRICT OF JIMMA ZONE, OROMIYA REGION, SOUTHWEST ETHIOPIA

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Background and Aims: Though a few empirical studies from endemic regions identified some determinants of nonadherence to ivermectin treatment for onchocerciasis control, no attempt was made in Ethiopia in general and Mana district in particular. The present study assessed the demographic, host behaviours, social and service related factors of why some people adhere and others not in Mana district of Jimma zone, southwest Ethiopia.
Methods: Community based unmatched case-control study was conducted. 552 (185 cases and 367 controls) eligible individuals who were registered to take ivermectin annually from 2004-2008 in 7 randomly selected Kebeles out of 25 and chosen based on lottery method through multistage sampling technique constituted the study population. Data were collected using a pre-tested structured questionnaire and interview guide, entered into a computer, edited and analysed using SPSS version 16.0. Stepwise logistic regression model was used to calculate the Odds ratios and 95% confidence interval for the different risk factors.
Results: Out of 552 sampled individuals, 536 participated in the study giving a response rate of 97.1%. Therapeutic coverage and individual adherence rate were found to be 78.2% and 59.7%, respectively. In the bivariate analysis, except the socio-demographic variables (P>0.05), ten of the host behaviours, social and service related variables were statistically significant associations with nonadherence. However, only six factors such as unsatisfactory knowledge of disease signs and symptoms, lack of participation in distributor selection (P< 0.05), and lower perceived risk of acquiring the disease, believing height not to be the best dose determination, perceiving distributor performance as poor or very poor, and family not being supportive toward taking ivermectin, were the only significant variables on multivariate analyses (<0.001).
Conclusions: As some host behaviour, social and service related factors influenced individual nonadherence, appropriate intervention programs targeting health education, community participation and empowerment should be designed.
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USE OF FINGERSTICK BLOOD COLLECTION FOR THE MEASUREMENT OF BLOOD ARSENIC

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Background and Aims: In Bangladesh millions of people are exposed to naturally occurring arsenic concentrations exceeding the World Health Organization's standard of 10 µg/L (Ahmed et al 2006). Recently a method has been developed to measure blood arsenic concentrations. Blood arsenic (BA) has the advantage of not needing to be normalized for creatinine. It also represents an internal dose, and in the case of chronic steady state exposure blood arsenic has the potential to serve as a biomarker of past exposure. A previous study conducted in Araihazar, Bangladesh has demonstrated that blood arsenic is strongly correlated with both water arsenic (r=0.76) and urinary arsenic adjusted for creatinine (r=0.85) (Hall et al. 2006). However in Bangladesh because of their cultural perceptions of blood, people often feel extremely uncomfortable giving blood by venipuncture.

Methods: In this study we employed fingerstick blood sampling, commonly used in the United States for screening blood lead levels in children, for the measurement of blood arsenic in 10 study participants. Collecting blood by fingerstick requires less blood then traditionally used venipuncture measurements. In this study, the precision of venous and capillary blood collection methods for measuring blood arsenic were compared. Whole blood samples were analyzed for arsenic using Inductively Coupled Plasma Mass Spectrometry (ICP-MS).

Results: Arsenic measured by venous and fingerstick sampling methods were found to be highly correlated (r=0.97) with a mean difference between fingerstick and venous methods of 1 µg/L.

Conclusions: Fingerstick blood collection is an acceptable alternative to venipunture for measuring blood arsenic concentrations. Blood arsenic is a useful biomarker of arsenic exposure that has the potential to help better understand the mechanisms behind arsenic toxicity. The fingerstick method of blood collection allows for this biomarker to be used in Bangladeshi populations that for cultural reasons prefer not to provide venous blood samples.

EXPOSURE TO LEAD AND COGNITIVE FUNCTION IN OLDER WOMEN

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Background and Aims: Previous research suggests that chronic low-level lead exposure is associated with impaired cognition, but little research has considered this association in women. We examined this association in expanded repeated outcome assessment data in a subset of participants in the Nurses' Health Study.
Methods: We measured lead concentrations in blood, indicating recent exposure, and patella and tibia bone, indicating chronic exposure. Women completed up to four cognitive assessments. Cognitive test scores were z-transformed. We used linear mixed models to evaluate the test-specific and global association between cognition and each lead biomarker.
Results: 584 women who were, on average, 61 (SD: 6) years old at lead measurements (mean (SD) in blood: 2.9 (1.9) µg/dL, patella: 12.6 (11.7) µg/g bone, tibia: 10.5 (9.7) µg/g bone) completed at least one cognitive assessment (average: 2.1 assessments, 3.0 years apart). In our global analysis, for each SD increase in tibia bone lead concentration, we observed a 0.044 SD lower cognitive test score (95% CI: -0.088, 0.001), an effect similar to a difference of 3 years of age. Associations were weaker for patella and blood lead concentrations. Previous work with more limited data suggested a positive association between lead exposure and performance on the letter fluency task; this suggestion did not persist in the expanded data. Preliminary evaluation of the association between lead and change in cognitive function did not suggest an association.
Conclusions: In expanded data, we confirmed previous findings that lead is related to level of cognitive function in women. Our analysis suggests the previous finding that higher lead was associated with better performance on the letter fluency task was spurious. Although we did not see an association between lead and change in cognitive function, these preliminary analyses are limited by short duration of follow-up, learning effects, and our participants' good health.

The Mobil phone use and the early childhood neurodevelopment

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Background and Aims: The effect of exposure to the RF-EMF of mobile phone still not inconsistent and need to be investigates. Our study is to explore the association between the prenatal and postnatal exposure of mobile phone use and early childhood neurodevelopment.

Methods: Our study recruited 192 children in Taiwan. All study subjects were evaluated by Movement Assessment Battery for Children (Movement ABC) at five years old and their parents also completed mobile phone use questionnaires. Multiple linear regression models were employed to assess the potential effects of the mobile phone exposure of three trimesters of pregnancy and at postnatal ages up to 60 months old on the Movement ABC score after adjusted for maternal nationality, educational level, family income, and child sex.

Results: There were borderline significantly lower (worse) scores in manual dexterity in children of frequent mobile phone users during the preconception period, second trimester and the age of children before 12 months. However, there were significantly higher (better) scores in balance in children of headsets users during the preconception period, pregnancy and the age of children up to 60 months.

Conclusions: The exposure of mobile phone may be associated with the early childhood neurodevelopment. Further research is needed to elucidate the causal relationship.

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TRADITIONAL USE OF MOSQUITO REPELLENT PLANTS AND TESTING THEIR REPELLENCY IN FIELD TRIALS AROUND GILGELGIBE RESEARCH CENTRE, JIMMA ZONE, SOUTHWEST ETHIOPIA

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Background and Aims: Although local plants as mosquito repellents are known and used among the different cultures of Africa and beyond, little effort is done to document about the knowledge, usage pattern and their repellency potential in Ethiopia in general and specifically around Gilgelgibe Field Research Centre, Jimma Zone, Southwest Ethiopia. This study was aimed to assess the ethno botanical knowledge and usage custom of traditional mosquito repellent plants among the inhabitants of Gilgelgibe Field Research Centre, and evaluating the mean percentage repellency of candidate plants.
Methods: Community based cross-sectional quantitative study and pilot field repellency test using candidate five potted mosquito repellent plants was conducted from January 19 to April 10, 2010. The total sample consisted of 417 households for quantitative study. Data were collected using a pre-tested interviewer administered structured questionnaire and by vector collectors for field test. The quantitative data were cleaned, edited and entered into SPSS version 16.0 and analyzed. Repellency of plants to mosquitoes was evaluated by using mean percentage repellency.
Results: The study identified eleven species of mosquito repellent plants. Besides, 85.9% and 73.14% of the respondents had knowledge and usage practice of mosquito repellent plants, respectively. The mean percentage repellency of Lantana camara, Cymbopogen citrates, Ocimum sanctum, Chrysanthemum cinerariaefolium and Tagetes minuta to all mosquitoes were found to be 57.0%, 56.0%, 50.7%, 46.7% and 37.0%, respectively.
Conclusions: Mosquito repellent plants are widely known and used among the inhabitants of the study area. Field evaluation on the repellent activity of plants showed that repellent plants reduced natural population of mosquitoes significantly as compared to the control house, showing repellency on the range of 37-57%. This study, therefore, provides valuable information to all stakeholders who are involved in mosquito born disease control, particularly for malaria vector control.
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INVESTIGATION OF DYSENTERY OUTBREAK AND ITS CAUSES, JIMMA CITY, SOUTHWEST ETHIOPIA

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Background and Aims: Although bloody dysentery commonly caused by Shigella is wide spread globally and occurs in outbreaks, epidemiological studies regarding shigellosis are rare in Ethiopia in general and none for Jimma City. Investigation team aimed to confirm, control and prevent further spread of suspected dysentery epidemic was formed after several cases visited Jimma University Specialized Hospital and private clinics in the city on 12th December 2008.
Methods: A data collection format containing address, demographic variables, risk factors and laboratory findings was prepared and distributed to all health facilities in Jimma City. Stool samples were collected from suspected cases and cultured to identify the causative organism and determine its antimicrobial susceptibility. Inspection of facilities and collection of water samples for bacteriological analyses was done from suspected sources. Data was analyzed using SPSS version 16 and results were presented in tables and figures.
Results: A total of 566 cases were seen in different health facilities in Jimma City in a period 29 days. Out of this, 299 (52.8%) were Jimma University students and 56 (11.7%) were residents of Jimma. Shigella flexinneri was identified from some of the stool specimens and was sensitive to most antimicrobial agents. There was a sudden increase in the number of cases starting from December 9, 2008 with a peak (161 cases) on December 12, 2008. The epidemic curve then fell down slowly with one small peak during the decline. 344 (60.8%) of the cases reported that they had consumed food prepared by Mars food factory located in the town.
Conclusions: There was dysentery epidemic from December 12-22, 2008 due to Shigella flexinneri most likely caused by food contamination at Mars food factory. To prevent future occurrence, regular health education and screening of food handlers with strong supervision of food establishments should be undertaken.
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LEAD LEVELS IN TEETH AS A MEASURE OF LIFE-TIME LEAD EXPOSURE IN CHILDREN

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Background and Aims: Lead exposure has irreversible health effects in children who are susceptible even at very low levels of exposure. The usual test for lead exposure is blood lead level (BLL), but this indicates only recent exposure. This study aimed to develop a method to assess the use of tooth lead levels as a histological marker to reveal the history of lead exposure during the child's life-time. We will ascertain whether milk teeth are suitable biomarkers of lead exposure.
Methods: Two deciduous molars each were collected from 15 children aged 6-8 years living in Northeast England. Using histological sections, the distribution of lead in different growth layers was quantified by Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS). BLLs were measured using ICP-MS. Calcium normalised lead ratios ($^{208}Pb:^{44}Ca$) were measured as lead body burden. For each tooth surface, five ablation transects (minimum 10 points/line) were sampled. Incremental growth lines in enamel and dentine were used to determine the ages and time interval of exposure at each point. The data were grouped into age intervals of 42 days, based on the mean time interval sampled. Lead intensities were plotted for each interval along each transect.
Results: BLLs ranged from 0.5-6.8μg/dl, none of the children had a BLL above the WHO threshold (10μg/dl). Lead ratios vary across individual teeth. Comparatively low intensities were observed in enamel, higher ratios were found around the dentine close to the pulp cavity. In the initial four teeth examined, $^{208}Pb:^{44}Ca(x10^{7})$ in primary dentine ranged from 1.65-95.96 (median=4.45), Standard sigma errors ranged from 0.15-13.88 (median=2.08).
Conclusions: Preliminary results indicate that lead ratios in primary dentine are consistent between teeth from the same child, and at the same age within each tooth, indicating that the history of exposure may be determined using one ablation transect in primary dentine.

TRANSPORTATION, AIR POLLUTION AND PHYSICAL ACTIVITY: INTEGRATED HEALTH IMPACT ASSESSMENT OF THE BIKE SHARING SYSTEM "BICING" IN BARCELONA, SPAIN

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Background and Aims: Motorized transport is associated with negative impacts on health and the environment. Active travel is promoted as an alternative to mitigate such impacts and increase physical activity rates in the population. We assessed health impacts of `Bicing´´, the bike sharing system implemented in Barcelona, Spain, in 2006.
Methods: We constructed a model to quantify the health risk and benefits in terms of all-cause mortality associated with traveling by Bicing compared to the car for three main domains, physical activity, air pollution and traffic accidents. Travel and safety information was obtained from institutions and agencies of local and regional government. We used dose-response functions obtained from a review of the scientific literature. We performed uncertainty and sensitivity analyses. We also conduct an economic evaluation of mortality, and quantification of CO2 emissions.
Results: The estimated annual excess mortality in the population of regular Bicing users assumed to have shifted from car travel (n=25,426) was 0.03 deaths from traffic accidents, 0.15 deaths from PM2.5 and 0.05 deaths from black smoke exposure, while 14.25 deaths were avoided due to physical activity (Benefit: risk ratio =79). The total annual number of deaths avoided was therefore 14.05 deaths, resulting in 21,088,385 million € saved per year. This represented an economic benefit greater than the initial Bicing investment and annual maintenance costs. We estimated a reduction of 9,062,344 kilograms of CO2 as a result of Bicing journeys each year.
Conclusions: The results presented demonstrate the potential health benefits of infrastructure dedicated to encouraging active commuting. In particular, short trips within the city by bicycle have benefits not only in health, but also represent a cost savings and reduced emissions of greenhouse gases.

GROWING SOCIAL AND GEOGRAPHIC INEQUALITIES IN ALL-CAUSE MORTALITY, JAPAN, 1970 to 2005

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Background and Aims: While Japan has the lowest mortality in developed world, the magnitude and patterning of health inequalities remains less understood. We examined trends in social and geographic inequalities of all-cause mortality from 1970 through 2005.
Methods: We used the Vital Statistics and the Census data among those aged 25 or older and less than 65. For each sex, we estimated odds ratios (ORs) and 95% confidence intervals (CIs) for mortality by using multilevel logistic regression models with "cells" (cross-tabulated by age and occupation) at level 1, eight survey year at level 2, and 47 prefectures at level 3.
Results: Adjusting for age and survey year, compared with production process and related workers, ORs ranged from 0.97 (95% CI: 0.96-0.98) among administrative and managerial workers to 2.22 (95% CI: 2.19-2.24) among service workers in men. By contrast, in women, the lowest odds for mortality was observed among production process and related workers (reference) while the highest OR was 12.22 (95% CI: 11.40-13.10) among security workers. The degree of social inequality appeared to increase since 1970 in both sexes; ratios of the highest OR divided by the lowest OR for men were 2.48 and 3.97 in 1970 and 2005, respectively, and the corresponding ratios for women were 11.43 and 16.25. Conditional on individual age and occupation, overall geographic inequality of mortality were relatively small in both sexes; the ORs ranged from 0.87 (Okinawa prefecture) to 1.13 (Aomori prefecture) for men and from 0.84 (Kanagawa prefecture) to 1.11 (Kagoshima prefecture) for women. Although overall geographic inequalities of mortality were relatively small, we found growing inequalities in mortality across prefectures since 1995 in both sexes.
Conclusions: The present findings demonstrate that both social and geographic inequalities in all-cause mortality have increased recently in Japan.

ASSOCIATION BETWEEN OCCUPATIONAL NOISE EXPOSURE, BEHAVIORAL FACTORS, AND TOTAL CARDIOVASCULAR RISK

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Background and Aims: Noisy occupational environment presents an increasing hazard to health. Its effects are insidious in development, particularly the non-auditive effects and/or effects on cardiovascular system. Cardiovascular diseases involve multiple biomedical risk factors. Specific aspects of the occupational environment are embedded in a large, complex matrix of their influences. The aim of the study was to compare selected lifestyle characteristics, dietary habits and health determinants in relation to total cardiovascular risk in the exposed and unexposed samples.
Methods: 2,690 healthy employees (44.9% men and 55.1% women) in the mean age 41.5±9.6 years were examined for cardiovascular risk factors (serum lipid levels, blood pressure, anthropometric parameters on overweight and obesity) and completed a questionnaire on socioeconomic, demographic and behavioral factors, nutritional pattern, self-reported health status, and mental health. Relative cardiovascular risk was calculated using SCORE chart after the projection to the age of 60. 1,210 subjects (58.3% men) exposed to noise in their workplaces were compared to unexposed subjects; chi-square and multiple linear regression analysis were performed.
Results: Exposed subjects were younger (41.1 yrs vs. 41.8 yrs; NS), with lower educational level, they had higher physical (p=0.0000) and stress load (p=0.0417) at work, worse mental health score (NS), and higher relative cardiovascular risk (OR=1.80; 95%CI=1.51-2.14; p=0.0000). They reported more often exposure to second hand smoke at work as well as in privacy and self-reported poorer health status. Linear regression analysis (adjusted for age) showed positive association among SCORE60 and noise exposure (p=0.0000), physical load (NS), second hand smoke exposure (p=0.0000), smoked meats (p=0.0025) and alcoholic beverages consumption (p=0.0000), and negative association with educational level (NS), fruit (p=0.0000) and vegetable (p=0.0345) consumption.
Conclusions: Our results point out the possible combined adverse effects of noisy working conditions, wrong lifestyle and/or incorrect nutritional habits to total cardiovascular risk.

ASSOCIATIONS OF ENVIRONMENTAL MICROBIAL EXPOSURE WITH DEVELOPMENT OF ASTHMA AND ALLERGIES

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Background and Aims: Studies on farms have suggested that environmental microbial exposure can decrease the risk of developing asthma and allergies. In contrast, studies in moisture damaged homes have shown adverse effects. The present aim was to try to disentangle the differing effects of different microbial species or types of microbes.
Methods: Birth cohorts of rural children, half from farmer families, were followed up in five European centers (n=1034). Associations of surface loads (amounts per m2 sampling surface) of house dust, endotoxin and extracellular polysaccharides (EPS) of Penicillium and Aspergillus spp. (with development of doctor-diagnosed asthma and wheezing by the age of 2 years were assessed using multivariate discrete-time hazard models and GEE. Within the same cohorts a nested case-controls study of current asthma at age 4 years was performed. Mattress dust samples (66 cases, 71 controls) were analyzed using denaturing gradient gel electrophoresis (DGGE) fingerprinting for bacterial community composition. Detected bands were dichotomized at level of detection.
Results: In the whole cohort, the risk of asthma was inversely associated with mainly increasing dust load on mother's mattress (aOR 0.76, 95%CI 0.64-0.90), especially among non-farmers (aOR 0.68, 95%CI 0.54-0.87). Weaker associations were observed for EPS and endotoxin. In the nested case-control study, 42 bands were detected in DGGE. Among these, there was a suggestion ($p<0.2$) for 4 bands for an inverses association and for 5 band for a positive association with asthma, out of which only one reached statistical significance (aOR 3.1, 95%CI 1.1-9.0). In contrast, 6 significant positive associations with sensitization (>0.7 kU/l) to any food allergen, but none with sensitization to any inhalation allergen were observed.
Conclusions: Present preliminary results suggest that methods for characterizing environmental microbial exposure in more detail may help to disentangle the differing effects of different microbes on development of asthma and allergies.

PESTICIDES EXPOSURE AND THE RISK OF CHILDHOOD ACUTE LEUKEMIA

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Background and Aims: Acute leukemia (AL) is one of the most common malignant tumors among children below the age of 15, and pesticide has been hypothesized as one of the risk factors for AL. In this study, the association between pesticide exposure and the risk of childhood AL is evaluated.

Methods: A total of 248 patients with newly diagnosed AL were recruited from four pediatric hospitals in Shanghai between January 1, 2006 and December 31, 2010, and 111 controls were matched with the cases based on gender and age. Pesticide exposure was determined by questionnaire and by measuring of organophosphate pesticide (OP) metabolites including Diethyl phosphrate (DEP), Dimethyl phophrate (DMP), Dimethyl thiophosphrate (DMTP), Diethyl thiophosphrate (DETP) and Diethyl dithiophosphrate (DEDTP) in the subjects' urine using gas chromatography with a flame photometric detector.

Results: Total environmental chemical exposure of children [odds ratio (OR)= 9.320, 95% confidence interval (CI):2.842-30.568], maternal chemical exposure during pre-gestation and pregnancy (OR=3.333; 95%CI:1.524-7.289), household use of pesticides (OR=1.786; 95%CI:1.128-2.830), and household use of mosquito insecticides (OR=2.225; 95%CI:1.304-3.796) increased the risk of childhood AL. Median concentrations of organophosphate metabolites (DEP, DMP, DMTP, DETP and DEDTP) in the cases (5.7296, 9.6673, 14.0634, 4.3642, 3.8472μg/gCr respectively) were significantly higher than those in the controls (1.6901, 1.6828, 0.8451, 0.7221, 0.7221μg/gCr respectively) ($P<0.05$).

Conclusions: This study found that chemical exposure and household use of pesticides, especially mosquito insecticides, might be associated with childhood AL, based on higher urine OPs levels in children with AL compared with those in the controls. Our findings add some evidence to the hypothesis that pesticides might be a risk factor for childhood AL. This association of AL risk with pesticide exposure merits further studies to confirm the association.

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PARTICLE POLLUTION AND COPD IN THE SALIA COHORT (1985-1994) – SENSITIVITY ANALYSIS USING BASELINE AND ESCAPE EXPOSURE DATA

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Background and Aims: ESCAPE, the European Study of Cohorts for Air Pollution Effects, was initiated in 2008. Chronic obstructive pulmonary disease (COPD) is one of four respiratory outcomes to be investigated in five studies of adults. All studies were conducted 10-20 years ago while ESCAPE pollution models reflect current conditions. An association between COPD and particle pollution (1) was published for SALIA, one of the cohort studies included. We now investigate whether the SALIA-results found for the investigation 1985-1994 can be replicated using the newly developed PM_{10} land-use regression (LUR) models of ESCAPE instead of the former SALIA estimates.
Methods: Spirometry was performed in N=2593 women living in the Ruhr- and adjacent less polluted areas. We used GOLD criteria to define COPD (FEV_1/FVC ratio <0.7 and FEV_1 <80% of predicted). PM_{10} exposure was previously assessed by measurements from monitoring stations. In ESCAPE, PM_{10} was measured at 20 locations to derive a LUR. Logistic regression was used to determine the adjusted association between exposure and COPD. Effect-estimates were based on interquartile-ranges of exposure, thus being invariant to homogeneous linear time trends.
Results: Prevalence of COPD was 4.0%. The odds-ratio describing the association with PM_{10} using means of the 5 years before baseline was 2.63 (95% Confidence interval 1.37-5.06). Using PM_{10} from the new land use regression models the odds-ratio was 2.27 (1.61-3.19).
Conclusions: The association between COPD and particle pollution as observed in SALIA is not sensitive to the use of a more current LUR to assign exposure. The slightly different odds-ratios might be due to small deviations from simple linear trends or differences in the spatial resolution.
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MEASURING PERSONAL EXPOSURE TO BLACK CARBON: THE IMPORTANCE OF BEING IN OR NEAR TRAFFIC

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Background and aims: To determine personal exposure, most epidemiological studies use proximity measures (e.g. distance of residence to a busy road) or concentrations measured by the nearest fixed AQ monitoring station; or develop land use regression models to determine the concentration at the home address. Unfortunately these exposure estimates provide only an indication of true personal exposure, since a large part of exposure during the day is not encountered outdoors at the place of residence. To improve on this, daily mobility and time-activity patterns should be taken into account, especially for air pollutants with a high temporal and spatial variability.
Methods: Real-time monitoring of personal exposure to black carbon, gives us an insight into the main drivers or activities responsible for human exposure to traffic related air pollution. The results presented here originate from two measurement campaigns monitoring weeklong personal exposure of participants using 12 portable µ-aethalometers and electronic diaries. There were 16 participants in summer 2010 and 46 participants in winter 2010-2011 resulting in over 12,000h of annotated BC measurements.
Results: In-vehicle concentrations were 5 times higher than the average concentration inside residences. Concentrations on trains, and during walking or cycling trips are lower, but still a factor of 2 higher than in the residence. Concentrations in buses were highest. For an average individual the transport microenvironment was one of the most important contributors to personal exposure: 6% of time is spent in transport but contributes over 20% of exposure. Proper transport mode or route choice, or changes to the activity pattern that reduce the total time in transport can lower exposure and will mitigate possible health effects.
Conclusions: Integrated personal exposure to black carbon is dominated by exposure in transport. Not taking into account daily mobility will thus significantly increase exposure misclassification in epidemiological studies.

CHLORINATION DISINFECTION BY-PRODUCTS AND RISK OF STILLBIRTHS AND CAUSE-SPECIFIC STILLBIRTHS IN ENGLAND AND WALES

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Background and Objective: We investigated the association between still births and Trihalomethanes (THM) concentrations in tap water across a large population residing in 12 regions of England and Wales.
The study data cover the period 1993 – 2001 and include 2.79 million births with 14,265 stillbirths.
Two cause-specific subgroups of stillbirths, as defined by Wigglesworth codes, were also investigated.
Trihalomethanes are one of the main groups of disinfection byproducts and are widely used in epidemiological studies as a marker for DBPs as they are routinely collected by the water companies.
Methods: Routinely collected THM data from each water company were modelled using a hierarchical mixture model.
The modelled individual and total THM concentrations for the final trimester of the pregnancy were categorized into one of three predefined exposure categories and linked to the outcome data via the postcode of the maternal birth address.
Logistic regression was carried out with maternal age, split into 5 categories, and deprivation, as measured by quintiles of the Carstairs Index, included in the model as confounders.
Results: Analyses were conducted to investigate the relationship between total THMs and risk of stillbirths. Further analyses using individual THMs and also the cause specific subgroups of stillbirths were also undertaken. Full results will be presented.
Conclusion: This is the largest study to date worldwide. Previous studies have shown inconsistent evidence for the association between stillbirths and trihalomethanes.
Concern remains of the possible adverse impact of disinfection by products on births outcomes due to the large population at risk. More detailed exposure assessment including information on water consumption, showering and swimming diaries and, in particular, the use of urinary biomarkers is recommended to move this important field of research forward.

CROSS-SECTIONAL ASSOCIATION BETWEEN POLYFLUOROALKYL CHEMICALS AND TWO MEASURES OF COGNITVE FUNCTION IN THE NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (NHANES)

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Background and aims: Epidemiologic and animal research suggests that non-steroidal anti-inflammatory drugs, especially ibuprofen, may be protective against cognitive decline and Alzhiemer disease. The underlying mechanism is unclear but may be related to activation of peroxisome proliferator-activated receptors (PPARs). Polyfluoroalkyl chemicals (PFCs) also appear to activate PPARs; therefore we hypothesized that exposure to PFCs may be inversely related to measures of cognitive function in older adults.
Methods: We used data from participants 60 years and older from the 1999-2000 and 2003-2008 National Health and Nutrition Examination Surveys to evaluate the association between serum concentrations of four PFCs, perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), perfluorononanoic acid (PFNA), and perfluorohexane sulfonic acid (PFHxS), and two measures of cognitive function: performance on the Digit Symbol Substitution Task (DSST) (1999-2000 only) and self-reported functional limitation due to poor memory or periods of confusion (1999-2000 and 2003-2008).
Results: In multivariable adjusted models, higher exposure to PFCs was associated with reduced odds of self-reported functional limiation due to poor memory or periods of confusion (OR: 0.84 for a doubling in PFOS, 95% CI: 0.70, 0.99; OR: 0.82 for a doubling in PFOA, 95% CI: 0.66,1.01; OR: 0.84 for a doubling in PFNA, 95% CI: 0.71,0.99; OR: 0.95 for a doubling in PFHxS, 95% CI: 0.75, 1.16). However, there was little evidence to suggest an association between performance on the DSST and PFC exposure in multivariable adjusted models.
Conclusions: This cross sectional study suggests that there may be an inverse association between exposure to PFCs and self-reported functional limitation due to poor memory or periods of confusion. However, this study cannot establish temporality and further exploration in prospective analyses is warranted. No association was seen between PFCs and performance on the DSST.

PERSISTENT EFFECT OF PRENATAL DOCOSAHEXAENOIC ACID ON HEART RATE VARIABILITY AND COGNITIVE DEVELOPMENT IN CANADIAN INUIT CHILDREN

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Background and Aims: Docosahexaenoic acid (DHA), an *n*-3 polyunsaturated fatty acid (PUFA), has been shown to be beneficial for the development of the central nervous system and cognitive functioning in adults and youth. This effect may be mediated by influences of DHA on cardiac autonomic function (CAF), which is a physiological substrate of numerous cognitive processes. Beneficial impact of DHA on cardiovascular function is well documented in adults, but information on the association between pre- and postnatal PUFA and CAF in youth is scarce. Aims: (a) to evaluate the effect of prenatal DHA on child CAF, estimated by heart rate variability (HRV); (b) to test the hypothesis that the effect of DHA on child cognition is mediated by its effect on HRV.
Methods: A sample of 278 Inuit children (138 boys, 140 girls) from Nunavik (Arctic Canada) was assessed at birth and at school age. Prenatal DHA (3.7±1.2 % phospholipids, *M*±*SD*) was obtained from cord blood at birth. HRV, estimated from 2-hour electrocardiograms, assessing high and low frequencies (HF, LF), and a vocabulary test (Boston Naming Test, BNT) were obtained at age 11 years. Direct and mediation effects were tested using path analyses.
Results: Cord DHA was positively associated with BNT scores (• =.14, *p*=.009) as well as with HF HRV (• =.12, *p*=.03) and the effect on LF HRV fell short of statistical significance (• =.11, *p*=.06). No HRV measures were significantly associated with BNT scores (• =.01, *p*=.81 and • =.05, *p*=.40 for HF and LF, respectively). Thus, the effect of DHA on the BNT was not mediated by either of the HRV measures.
Conclusions: Prenatal DHA provided lasting beneficial effects on HRV and cognitive function later in childhood. Although the effect of DHA on the BNT was not mediated by HRV, effects on other cognitive processes might be partially mediated by CAF.

DEMOGRAPHIC & SOCIO-ECONOMIC FACTORS INFLUENCING RURAL WOMEN'S PERCEPTION OF DEFORESTATION THE CASE OF SEKA DISTRICT SOUTH WEST ETHIOPIA

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Background and Aims: Globally and in developing countries in particular, women experience a major role as farmers, animal tenders, and water and fuel collectors. Studies on the knowledge, attitude and perception of women towards deforestation are scarce in the study area. There fore, the aim of this study is to assess the demographic and socio-economic factors influencing rural women's perception towards deforestation, in Seka district Southwest Ethiopia.
Methods: Cross sectional population based study was conducted from September to November 2009, to identify the demographic and socio-economic factors influencing rural women's perception of deforestation. A sample of 426 female households selected applying a multi-stage sampling were included. The information collected includes variables on socio-demographic and economic, questionnaire on the knowledge and attitude towards deforestation, was collected through, multiple methods: house to house surveys, secondary data focus group discussions, key informants and observations to gather the required information. Data was analyzed using SPSS/PC version 12.8. Statistical techniques like frequency, percentages, cross-tabulation, bivariate and multivariate analysis were used.
Results: Four hundred twenty six women were interviewed making a response rate of 100%. Out of the total studied subjects 294 (69.0%) showed low perception towards deforestation. Among the demographic factors: age and household size; and the socio-economic factors: literacy status, farmland size and contact with conservation agents have an association with the dependent variable. The results of the multivariate analysis have shown that literacy status and farmland size significantly influence women's perception of deforestation.
Conclusions: From the study it can be concluded that women living in in the study area have good perception about deforestation, which is an important input for development plans, strategies and actions; as well as conservation movements to be carried out. Empowering women, participating them in forest conservation improves the overall ecosystem and lives of people.

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Comparison of two methods for regression analysis for log-normal exposure data

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Background and Aims: Log-normally distributed variables are common in exposure data. One characteristic of the log-normal distribution is that the variance increases with the mean. Often it is of interest to analyze which background variables (e.g. time spent in traffic) that are associated with the personal exposure (e.g. particles). Often we want to estimate the absolute effect (of e.g. time spent in traffic on exposure) but by log-transforming data we instead estimate the relative effect.
We propose a new regression method for log-normal data, using a maximum likelihood approach (ML) by which we can account for the heteroscedasticity. The aim of this study was to compare this new ML-approach with ordinary Least-Squares regression (LS).
Methods: A large simulation study was performed, using a model in which expected personal exposure (MuY) is a linear function of the outdoor particle levels (x): $MuY=4.804+0.574 \cdot x$ In the model the variance (in personal exposure) increases with the exposure level. The bias of the estimated coefficients (b0 and b1) was assessed by comparing the estimated values to those in the model.
Results: Both ML and LS showed small bias for both b0 and b1 ($< 2 \cdot 10^{-4}$). However, the standard errors were larger for LS (about 54% larger for SE(b0) and 10% for SE(b1)). As a result the power of LS will be lower, especially regarding test of the intercept. The power for detecting a small effect was estimated by simulating the situation where beta1=0.10 (rather than 0.574). We found the power to be 77% (LS) and 80% (ML).
Conclusions: Both ML and LS give unbiased estimates of the regression parameter, but the larger standard errors for LS-regression means that the confidence intervals will be wider and it will be harder to detect small effects. Therefore ML-regression seems more suitable for estimating linear relationships in log-normally distributed data.

AN APPROACH TO STUDY HEALTH EFFECTS OF ENVIRONMENTAL CONTAMINATION FROM OIL REFINERIES IN A LONGITUDINAL PERSPECTIVE

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Background and Aims: In 2010 the world total number of oil refineries was more than 650, about 200 in Europe. Oil refineries are complex industrial sites that manage large amounts of raw materials and products. Refineries generate emissions of many different pollutants. Most of the emissions are into the air.
The aim of this contribution is to describe an approach developed to study the relationship between over-time emissions from oil refineries**,** and over-time health profiles of populations living near the plants. This approach was used to study refineries spread over the Italian territory.
Methods: For each plant constructed in Italy, the following data were collected: year of operation start off and close down; annual oil consumption; and, where available, type of refinery cycle. Estimates of emissions into the air of several pollutants were used to categorize plants. Populations to be studied through a small-area approach were identified by an *ad hoc* GIS model. Outcomes of *a priori* interest were selected through a review of the available epidemiological evidence.
Results: Forty-five refinery plants were constructed in Italy in the last century. Most of the plants started operations in the '60s, and some were closed down after one or more decades of activity. Oil consumption from 1948 up to 2007 was collected for each plant. Nearly 15 plants were selected to study time trends and time-related variables for risk of lung cancer, some hematopoietic neoplasms, respiratory system diseases, neurological diseases and perinatal conditions in selected populations.
Conclusions: The proposed approach has the potential to go beyond the limits of previous studies that could not evaluate refineries health impact over time. It could be used in other countries and is suitable to meta-analyses.
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RELATIONSHIPS BETWEEN LEAD EXPOSURE AND MATERNAL CORTISOL CONCENTRATIONS DURING PREGNANCY

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Background and Aims: Gestational lead (Pb) exposure and stress may increase the risk of adverse maternal, neonatal, and childhood health outcomes. Some studies suggest that Pb may alter hypothalamic-pituitary-adrenal (HPA)-axis function. Correlates of psychological stress, like depression, may modify the effect of Pb exposure, increasing susceptibility to Pb-induced HPA-axis dysregulation. We examined the relationship between Pb exposure and HPA-axis function in a cohort of 850 pregnant women from Mexico City.
Methods: Blood Pb concentrations were measured during the second trimester. Tibia and patella bone Pb concentrations were measured 1-month postpartum and represented cumulative Pb exposures. Second trimester salivary cortisol concentrations were measured in 10-timed saliva samples collected over 2-days and used to characterize diurnal HPA-axis function. Cortisol concentrations were parameterized as the area-under-the-curve, morning rise slope, and diurnal slope. Maternal depressive symptoms were examined as a modifier of Pb-coritsol relationships, measured with the Edinburgh Postnatal Depression Scale (EPDS), and dichotomized as $\geq$13/<13). Linear mixed-effect models were used to account for repeated measurements.
Results: Median blood, tibia, and patella Pb concentrations were 3.3 □g/dL, 3.6□g/g and 3.1□g/g, respectively. After adjustment for confounders, parameter estimates between patella and blood Pb biomarkers and cortisol parameters were null in value. However, each 10 □g/g increase in tibia Pb concentrations was associated with a 20% increase (95% confidence interval [CI]:-7%, 55%) in morning rise slopes. This effect was greater among women with EPDS scores $\geq$13 (76%; 95% CI:13%, 175%, interaction p-value <0.05).
Conclusions: These results suggest that tibia, but not blood or patella Pb concentrations might be associated with some aspects of HPA-axis function during pregnancy. We observed evidence that depressive symptoms modify the associations between tibia Pb concentrations and maternal cortisol rhythms. Future studies should validate these findings and determine the clinical significance of altered maternal cortisol profiles in pregnancy on child development.

HIGH TEMPERATURES AND AIR POLLUTION: INVESTIGATING INTERACTIVE EFFECTS ON CARDIOVASCULAR MORTALITY

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Background and Aims: Numerous studies have shown associations between human health and air pollution or air temperature. Whether both exposures have synergistic effects on health outcomes has so far only received limited attention. The aim of this study was to examine potential interactive effects of high air temperature and air pollution on cardiovascular mortality in Munich and Augsburg, Germany, as well as in Beijing, China.
Methods: We used data from Munich as well as Augsburg, Germany, for the period 1990 to 2006 (May to September), including daily cardiovascular death counts, meteorological variables, and air pollution concentrations (24-h averages of particulate matter with a diameter < 10µm (PM_{10}) and daily maximum 8-h ozone (O_3)). Additionally, we obtained cardiovascular death counts, meteorological variables, and PM_{10} concentrations from the urban area of Beijing, China, for the period 2004 to 2005. Data were analyzed using Poisson regression models adjusting for long-term trend, calendar effects, and other meteorological factors. We fitted bivariate models using tensor product smooth terms to explore joint response surfaces of 2-day average air temperature and 2-day means of PM_{10} or O_3. To quantify the interactive effects, we categorized air pollutant concentrations into three levels, and then included an interaction term for the pollutant categories and air temperature.
Results: A 1°C increase in 2-day average air temperature in Munich was associated with a 0.4% (95% confidence-intervals (95%-CI): -0.7%; 1.6%), 1.0% (95%-CI: 0.6%; 1.3%), and 1.3% (95%-CI: 0.5%; 2.1%) increase in mortality for low, moderate, and high 2-day average PM_{10} levels, respectively. Similar results were observed for Augsburg and Beijing. There were no interactive effects observed with O_3 in Munich and Augsburg.
Conclusions: Enhanced adverse temperature effects were found at higher levels of PM_{10}, which implies that it is important to evaluate synergistic effects and not only pure temperature or air pollution effects.

INTERACTIONS BETWEEN TRAFFIC AIR POLLUTION AND GLUTATHIONE S-TRANSFERASE GENES ON CHILDHOOD ASTHMA

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Background and aims: Ambient traffic-related air pollutants, such as nitrogen dioxide (NO_2), have shown adverse effects on respiratory health in children. However, few studies showed the interactive associations between traffic air pollution and genetic polymorphisms on childhood asthma. The aim of this study is to evaluate the role of glutathione S-transferase (GST) genetic polymorphisms potentially modifying the association between NO_2 and asthma in Taiwanese children.
Methods: We investigated 3714 seven-grade schoolchildren in Taiwan Children Health Study from 14 Taiwanese communities. Children's exposure and disease status were measured from questionnaire by parents. Multiple logistic regression models were fitted to estimate the effects of NO_2 exposures and GSTs polymorphisms on the prevalence of asthma and wheeze.
Results: Compared with children in low-NO_2 communities, those in high-NO_2 communities had significantly increased risks of asthma (OR=1.65, 95% CI=1.09~2.50), late-onset asthma (OR=2.26, 95% CI=1.11~4.62), active asthma (OR=1.85, 95% CI=1.03~3.34), asthma under medication (OR=2.65, 95% CI=1.27~5.52) and wheeze (OR=1.54, 95% CI=1.10~2.16) among GSTP1 Ile/Val or Val/Val genotypes. Significant interactions were found between NO_2 level and GSTP1 on asthma, late-onset asthma, asthma under medication and wheeze (p for interaction < 0.05).
Conclusions: Children under high traffic air pollution exposure are more susceptible to asthma, especially among those with GSTP1 Val allele.

MORTALITY ANALYSIS IN ITALIAN POLLUTED SITES (IPS) WITH INDUSTRIAL WASTE LANDFILLS AND DUMPING SITES

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Background and Aims: SENTIERI project describes mortality in 44 Italian polluted sites (IPS) "of national concern" for their contamination documented in Ministerial Decrees. IPS are classified for the presence of environmental exposures: chemical industry/petrochemical plants&refineries/asbestos or other mineral fibers/steel plants/thermoelectric power plants/mines or quarries/landfills/incinerators. For each site, Standardised mortality ratios, crude and deprivation adjusted, were calculated for 63 groups of causes (reference regional population, 1995-2002). We aim at estimating the health impact of residents in 24 sites (205 municipalities; 3,964,425 inhabitants at 2001 census) where industrial waste landfills or illegal dumping sites are located.
Methods: Twelve mortality causes were selected for analysis on the basis of the epidemiological evidence evaluation completed in SENTIERI project. Metanalysis of mortality results, by SMR adjusted for Deprivation Index, was completed overall (24 sites) and separately for the two categories of industrial waste landfills (10 sites) and illegal dumping sites (14 sites). In the analysis presence/absence of other sources of environmental contamination were included as covariates when applicable (crude and adjusted SMR estimates). A negative binomial regression model by STATA 10 software was used.
Results: The main results are for illegal waste dumping sites. Significant increases (p-value<0.05) are observed for lung cancer among men (crude: SMR=1.12; adjusted: SMR=1.13) and in both genders for liver (men: SMR=1.13; women: SMR=1.21) and bladder cancer (men: SMR=1.05; women: SMR=1.12). Mortality for congenital malformations did not show significant increases. Same results are found when the largest waste illegal dumping sites were excluded from the analysis.
Conclusions: The results suggest a contribution of waste illegal dumping sites in the increased mortality for lung cancer. A role for bladder and liver cancers can be envisaged. The ecological approach, the diversity and mixtures of environmental exposures sources do not allow conclusions on specific etiological hypothesis and hinder a causal interpretation of study results.

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THE CONTRIBUTION OF SHIPS TO MEASURED NO_x AND ULTRAFINE PARTICLE CONCENTRATIONS ALONG THE WATERWAYS IN AMSTERDAM

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Background and aim: Emissions from ships in waterways near residential areas might contribute significantly to local air pollution. The aim of this study was to assess the contribution of passing ships to short term concentrations NOx and ultrafine particles (UFP) near homes close to waterways.
Methods: Continuous measurements were made in 10 second intervals at two locations in the Amsterdam area, on different predefined days in June 2010 during a 4 hour period. One of the locations (Sumatrakade) was in central Amsterdam along the river IJ, in a street with medium traffic intensity (4000 veh/24h). The other location (Diemen) was in a low traffic zone in a suburban area along the Amsterdam-Rhine Canal. Measurements were performed near homes at 21 m from the waterside at Sumatrakade and 44 m in Diemen. Local wind direction was variable at Sumatrakade and from the canal side in Diemen. Time and type (cargo vs pleasure) of passing ships and road traffic were registered.
Results: A significant increase in NOx concentration was observed 10-90 seconds after passage of cargoships at Sumatrakade and 30-100 seconds in Diemen. Linear regression analysis showed that during those time periods, a cargo ship increased NO and NO_2 concentrations with on average 2,4 and 5,7 $\mu g/m^3$ at Sumatrakade and 20 and 11 $\mu g/m^3$ in Diemen. The effect on UFP was less clear at Sumatrakade and absent in Diemen. Mean NO_2 and NO concentration was respectively 42 and 9 $\mu g/m^3$ at Sumatrakade and 10 and 10 $\mu g/m^3$ in Diemen. Taking the number of passing ships into account, cargo ships contributed 2 $\mu g/m^3$ to the NO_2 concentration at Sumatrakade and 5 $\mu g/m^3$ in Diemen. The contribution to the NO concentration was 1 $\mu g/m^3$ at Sumatrakade and 8 $\mu g/m^3$ in Diemen.
Conclusion: Ship emissions contributed significantly to NO_2 and NO concentrations in Amsterdam.

DIVERGENT ASSOCIATIONS OF BLOOD AND URINE CADMIUM LEVELS WITH KIDNEY FUNCTION

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Background and Aims: Cadmium is nephrotoxic at high exposure levels. Lower level exposure is widespread but data on kidney impact at these levels are scarce. In the 1999-2006 National Health and Nutrition Examination Survey (NHANES), higher blood cadmium levels were related to reduced estimated glomerular filtration rate (eGFR; <60 mL/min/1.73 m^2). Our aim was to compare urine and blood cadmium with reduced eGFR in NHANES 1999-2008.
Methods: We included 6,231 NHANES 1999-2008 participants aged ≥ 20 years who had blood and urine cadmium available. eGFR was estimated using the Modification of Diet in Renal Disease (MDRD) equation.
Results: Geometric mean blood and urine cadmium and MDRD eGFR levels were 0.40 µg/L, 0.26 µg/g creatinine, and 86.8 ml/min/1.73 m^2, respectively. Blood and urine cadmium levels were correlated (r_s = 0.60). After adjustment, the odds ratio (95% CI) for reduced eGFR comparing the 75th to the 25th percentile of blood cadmium levels was 1.44 (1.15, 1.82). In contrast, for urine cadmium, the corresponding odds ratio (95% CI) was 0.47 (0.34, 0.66). Without adjustment for urine creatinine, the odds ratio was 0.97 (0.81, 1.16).
Conclusions: In this large, representative sample of US adults, blood and urine cadmium, although correlated, were associated in opposite directions with eGFR. Both dose measures reflect environmental exposure although blood cadmium incorporates current exogenous exposure and endogenous exposure from body burden. Potential mechanisms for these unexpected findings include the impact of adjusting urine cadmium for urine dilution with urine creatinine which is significantly associated with eGFR in this population; an impact of renal filtration on cadmium excretion; cadmium-related hyperfiltration with urine cadmium dose; and alterations in metal excretion due to protein binding. Prospective epidemiologic studies and experimental studies are needed to understand these cross-sectional findings.

ANATOMICAL LOCATION OF SCC TUMORS: TRENDS IN COASTAL AND INLAND AREAS IN SWEDEN

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Background and Aims: The incidence of squamous cell carcinoma (SCC) has increased, both in Sweden and worldwide. The aim was to investigate if there had been an increase in all anatomical sites and if there had been any changes in the anatomical distribution of the tumors. Another aim was to compare the incidence in geographic areas with different sun exposure.
Methods: Yearly data on SCC incidence for the period 1990-2005 were obtained from the Swedish Cancer Registry. The number of tumors on head/neck, arms/legs and trunk were available, together with the incidence (cases per 100 000 inhabitants) for each anatomical site. The investigated area was the southwest part of Sweden, divided into a coastal area (over 1700 sun hours per year) and an inland area (up to 1700 sun hours per year). The statistical analyses were made using Cochran-Armitage tests, chi-square tests and regression analysis.
Results: Preliminary results showed no change over time in the distribution of tumors (on head/neck, arms/legs and trunk). No difference could be found between the growth rates for the site-specific incidence series.
Among men on the coast we found a larger percent of head tumors than in the inland (72% vs 68%), whereas no significant differences were found for women. The incidence was found to be significantly higher on the coast, for both men and women (all three anatomical sites).
Conclusions: The proportion of tumors on head, on arms/legs and on trunk has been fairly constant over time. The similar growth rates for the three anatomical sites do indicate a general increase in tumors at all sites, reflecting a general increase in exposure.
For each of the three anatomical sites a higher incidence was found on the coast compared to the inland. This mirrors the higher exposure on the coast (more sun hours).
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LEUKAEMIA AND RESIDENCE NEXT TO GAS STATIONS: A PRELIMINARY STUDY IN SAO PAULO CITY, BRAZIL

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Background and Aims: Aromatic hydrocarbons are environmental contaminants, found in gasoline and oil products, that exhibit mutagenic and/or pro-carcinogenic properties in humans. Among them, one of the more dangerous and known to be related to the risk of developing leukaemia is benzene, which is volatile and can be inhaled by the population. In Sao Paulo city there are about 2,300 gas stations, which are responsible for the contamination of soil and/or groundwater at 82.5% of the city contaminated areas (675). It is described in the literature that living near a gas station increases the risk of developing leukaemia in childhood. This aim of this study was to investigate whether there is an excess of leukaemia in children and adolescents from 0-14 years old who live in the vicinity of gas stations.
Methods: case-control design was adopted. Cases were all children and adolescents younger than 15 years old who died of leukaemia in Sao Paulo city, from January 1996 to December 2009 (548 deaths). Control group presented equal number of participants, with the same age range and gender distribution who did not die due to cancer, external and haematologic causes. Exposure was defined by distance between residences and gas stations (≤ 50 meters).
Results: Living at a distance of up to 50 meters from gas station can increase the odds of leukaemia death (OR of 2.64, 95% IC: 0.93-7.45).
Discussion: This exploratory study suggests the association between leukaemia deaths and living in nearby gas stations even using a 1:1 proportion. We controlled for age and gender characteristics and we are aware that other confounders have to be taken into account in our further investigations.

HUMAN HEALTH RISK ASSESSMENT OF POPs IN BACKGROUND SOILS IN THE CZECH REPUBLIC

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Background and Aims: Persistent organic pollutants (POPs) cause serious problems, due to their persistence, lipophility and toxicity in the environment, for the whole ecosystem. Because of these properties they are still detectable in abiotic and biotic environmental compartments. Spatial concentrations of selected pollutants (PCBs, DDT, HCB and PAHs) in the soil and resulting human risks were modeled in high resolution network (1x1 km) for the area of the Czech Republic.
Methods: Datasets of 534 soil samples on arable land, grassland and forest land were used for analysis. Urban and industrial areas were not included in this study. We used nonparametric methods (random forests) for modeling spatial concentration in the soil. The exposure model approach was used for the risk evaluation. This method is usually used to identify areas, chemicals and exposure pathways that represent the potential risks to human health.
Results: The result of the model shows the highest concentrations for pesticides in lowlands and sites close to former application of these compounds. Human risks concerning these pesticides were determined as negligible. On the other hand the highest concentrations for PCBs were predicted in forest soils (mountain areas). Health risks resulting from exposure to PCBs do not show any important level. Concerning PAHs concentrations, the highest levels were modeled at sites close to industrial areas and at places with highest annual mean precipitation. Exposure to PAHs (especially to benzo(a)pyrene) was evaluated as the most important in health risk assessment.
Conclusions: The study shows that connection of the model techniques with monitoring give useful information about the behavior of the pollutants and their influence on human health.
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IMPACT OF DUST FROM MULTIPLE MICROENVIRONMENTS AND DIET ON PENTA-BDE BODY BURDEN

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Background and Aims: Polybrominated diphenyl ethers (PBDEs) have been widely used as flame retardants in consumer products and are ubiquitous in residential indoor air and dust. Biological measurements of PentaBDEs have been shown to be associated with concentrations in house dust and dietary intake of animal fat. However, little is known about exposure to dust in other microenvironments. Our objectives were to determine relative contributions of diet and dust exposure from multiple microenvironments to PentaBDE body burden, and to explore the role of handwipes as a measure of personal exposure to PentaBDEs.
Methods: We collected serum, dust (office, main living area, bedroom, vehicle) and handwipe samples from 31 participants. A food frequency questionnaire was administered to collect dietary information.
Results: Geometric mean concentrations of PentaBDE in dust from offices, main living areas, bedrooms, and vehicles were 2,167 ng/g, 1,691 ng/g, 1,378 ng/g, and 2,607 ng/g respectively. The geometric mean of PentaBDEs in handwipes and serum were 70 ng and 27.7 ng/g lipid respectively. PentaBDEs in handwipes collected in the office environment were correlated with dust collected from offices ($r=0.35$, $p=0.06$) and bedrooms ($r=0.39$, $p=0.04$), but not with dust from main living areas ($r=-0.05$, $p=0.77$) or vehicles ($r=0.17$, $p=0.47$). PentaBDEs in serum were correlated with dust from main living areas ($r=0.42$, $p=0.02$) and bedrooms ($r=0.49$, $p=0.008$), but not with dust from offices ($r=0.22$, $p=0.25$) or vehicles ($r=0.20$, $p=0.41$). The final regression model included variables for main living area dust and handwipes, and predicted 55 percent of the variation in serum PentaBDE concentrations ($p=0.0004$). Diet variables were not significant predictors of PentaBDEs in serum.
Conclusions: Our research suggests that exposure to dust in the home environment may be the most important factor in predicting PentaBDE body burden in humans, and potential exposure pathways may involve PBDE residues on hands.

MATERNAL EXPOSURE TO ENVIROMENTAL TOBACCO SMOKE DURING PREGNANCY AND OFFSPRING'S GROWTH AND OBESITY

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Background and Aims: The evidence of exposure to environmental tobacco smoke (ETS) on children's growth and obesity is limited and not sufficient to conclude a definitive relationship. The aim of this study was to examine whether maternal exposure to ETS will affect child grow or not.

Methods: We conducted a birth cohort study of 300 nonsmoking women who delivered normal birth weight singletons. We enrolled them before delivery, interviewed them with by a structured questionnaire, and collected umbilical cord blood. Cotinine in umbilical cord blood as an indicator of environmental tobacco smoke was analyzed by using HPLC-MS/MS and the detection limited of this method was 0.05 ng/mL. The child healthcare handbooks were used to record the child height, weight, head circumference and body mass index (BMI) from birth to three years of age. The information was measured by the doctor or nurse in each time to visit the clinic. Multiple linear regressions were used to explore the relation between maternal ETS exposure and child growth and obesity. Linear mixed model was used to explore the effect from birth to three years of age.

Results: Maternal ETS exposure was significantly associated with shorter child head circumference at birth (β = -0.389; P = 0.008) and 12 months (β = -0.475; P = 0.019) of age. Mixed model also showed adverse effect from birth to three years of age (β = -0.606; P = 0.003). In contrast,higher maternal ETS exposure showed significant higher body weight (β = 0.494; P = 0.050) and BMI (β = 0.630; P = 0.029) at 18 months of age.

Conclusions: It can be concluded that prenatal ETS exposure can cause adverse effect of child growth and future obesity.

EFFECTS OF IN UTERO EXPOSURE TO PFOA AND PFOS ON HUMAN SEMEN QUALITY AND HORMONE PROFILE

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Background and Aims: Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) are man-made compounds found globally in humans. They are suspected to act as endocrine disrupters and since they are able to cross the placental barrier, in utero exposure is inevitable. The aim was to investigate whether in utero exposure to PFOA and PFOS is negatively associated with adult semen quality and hormone profile.
Methods: We recruited 169 sons (median age 20 years) who were offspring from a Danish pregnancy cohort in Aarhus. The sons' semen samples were analysed for sperm concentration, total count, motility, volume, and morphology, and blood samples were assessed for reproductive hormone profile. Maternal blood samples from pregnancy week 30 were analysed for levels of PFOA and PFOS as a measure of prenatal exposure. Median (range) PFOA was 3.7 (1.3 - 16.6) ng/mL and median (range) PFOS was 21.4 (7.5 - 54.3) ng/mL. Based on tertiles of exposure, the sons were divided into three groups according to maternal PFOA and PFOS serum levels, and multiple regression analysis was used to evaluate possible associations.
Results: Higher in utero exposure to PFOA was associated with lower sperm concentration, total count, and percentage of progressive spermatozoa and higher levels of luteinizing hormone (LH) and follicle stimulating hormone (FSH). Trends on continuous PFOA were statistically significant for sperm concentration ($p=0.03$), total count ($p=0.02$), LH ($p=0.02$), and FSH ($p=0.01$). For progressive spermatozoa there was a statistically significant overall association ($p=0.03$).
There were no associations between in utero exposure to PFOS and any of the traditional semen parameters or any of the reproductive hormones.
Conclusions: The results indicate that in utero exposure to PFOA negatively affects adult human male semen quality and hormone profile. The results concord with earlier studies on adult exposure and emphasises the necessity of further research on this issue.

REVIEW OF EPIDEMIOLOGICAL STUDIES ON CANCER RISKS FOLLOWING DIAGNOSTIC RADIATION EXPOSURE IN CHILDREN

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Background and aims: The question of cancer risks associated with postnatal diagnostic medical exposure involving ionising radiation in childhood is particularly relevant given the growing use of diagnostic examinations, especially computed tomography scans, in children. Although several studies have indicated that in utero exposure to radiation from diagnostic radiography is associated with increased risk of cancer, the association between postnatal diagnostic exposure and risk of cancer remains controversial (Linet, 2009, Schutz-Rath, 2008, Wakeford, 2008).
Methods A review of epidemiological studies, published in English between 1990 and 2011, on cancer risks following diagnostic radiation in children is proposed following the publication of 3 recent relevant studies (Ronckers, 2010, Bartley, 2010, Rajamaran, 2011).
Results 12 case-controls studies and 7 cohort studies have been identified**.** Heterogeneous results were found for postnatal diagnostic medical exposures and leukaemia. An excess of breast cancer has been observed in cohorts of girls and young women subjected to multiple diagnostic radiation exposures for spine deformities. No significant effect of postnatal exposures was observed for other cancer sites (Non–Hodgkin lymphomas, solid tumours and brain tumours). One of the key concerns is that results from most of the epidemiological studies on postnatal radiography are based on data from interviews with parents allowing for the possibly of bias. Besides, most studies have limitations in study size and involve very low exposure.
Conclusions
As the expected cancer risks are small, epidemiological studies require very large sample sizes and long periods of follow-up combined with a good dosimetry assessment. In this context, newly launched cohort studies on cancer risks associated with exposures to CT scans during childhood will provide new results in the future.

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AIR POLLUTION HEALTH IMPACT ASSESSMENT USING TIME-ACTIVITY DATA: TIME AND LOCATION MATTER

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Background and Aims: Important differences in air pollutant concentrations can occur over a day and between different locations, e.g. higher pollution during rush hours in areas with high commuter traffic and employment facilities. At the same time, the location of individuals also varies over space and time. Previous studies have shown that exposure assessments that do not take into account this variability underestimate the exposure of the population. Choices about time and activity will therefore ultimately affect exposure and health effects.
Methods: The standard health impact assessment methodology is applied to Flanders and Brussels and modified with special attention given to the exposure assessment. Human exposure to air pollutants ($PM_{2,5}$, O_3, NO_2) is estimated by combining air quality data from a dispersion model at high temporal and spatial resolution with population data from an activity-based transport model. This model takes into account the activity-travel behaviour of individuals during the day and provides hourly population mobility data on suburban level. For children school locations are taken into account during school hours.
Results: Health effects are presented for both a dynamic and static exposure profile together with their health effects. The magnitude of the difference is compared for different population subgroups and pollutants.
Conclusions: A comparison of the dynamic with the static approach provides information on the sensitivity of the applied methodology for health impact assessment. Using a dynamic exposure assessment we argue to model the actual exposure and health impact of populations more accurately.

INVESTIGATING HEATWAVE EFFECTS THROUGH MULTI-LEVEL MODELING: THE ROLES OF HEATWAVE VARIABILITY AND HEATWAVE CHARACTERISTICS

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Background and Aims: Research that jointly investigates effects of heat and heatwaves often models heatwaves using a binary distinction (a day either belongs to a heatwave or does not). However, this approach fails to distinguish among different heatwaves. Here, we investigate heterogeneity in the characteristics and health effects of different heatwaves.
Methods: We identify all heatwaves in 43 US communities, 1987--2005, (heatwaves are defined as $\geq$ 2 days at $\geq$ 95th percentile of the community's May-September temperature). We use a Bayesian hierarchical model to quantify heatwave effects within each community. We explore heterogeneity between heatwaves both in heatwave characteristics (intensity, length, timing in summer) and in effects on human mortality.
Results: Heatwave intensities (measured as the average of mean daily temperature during the heatwave) ranged from ~80^{o}F to 103^{o}F (the most intense was in Phoenix, AZ, July 2003). Heatwaves ranged in length from 2 to 16 days (the longest heatwave was July 1998 in Dallas/Ft. Worth, Texas). Heatwaves also varied in their effects on human health: while many heatwaves had negligible added mortality effects (beyond effects explained by single days of heat), some heatwaves had substantial added effects. For example, the July 1995 heatwave was associated with a 134% increase in mortality beyond the effect expected for non-consecutive days of the same temperature.
Conclusions: Here we show substantial heterogeneity in heatwaves, both in heatwave characteristics and in their effects on human health. Our approach also helped identify unusual heatwave events (e.g., July 1995 in Chicago, IL; August 2003 in New York, NY) and generate new hypotheses based on these unusual events (in both cases, widespread power outages coincided with the heatwave).

NIGHT WORK AND BREAST CANCER RISK: CECILE STUDY

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Background and Aims: Epidemiological studies have suggested that night shift-work may increase the risk of breast cancer. Disruption of the normal circadian rhythm may explain this association. We investigated whether working at night may influence the incidence of breast cancer in a population-based case-control study in France.
Methods: The CECILE study was conducted in two administrative areas (départements). All female residents aged 25-75 years diagnosed in 2005-2007 with a cancer of the breast were eligible to the study. Population controls were frequency-matched by age group to the cases. A total of 1232 incident breast cancer cases and 1317 controls were included. An in-person interview was conducted using a standardized questionnaire to obtain information on risk factors for breast cancer, as well as on lifetime occupational history. For each job held for more than 6 months, information on night work schedules (defined as working at least one hour between 11pm and 5am) was elicited. Analyses were conducted using unconditional logistic regression adjusting for age and recognized risk factors for breast cancer.
Results: Thirteen percent of the cases and eleven percent of the controls had ever worked during night shifts (OR=1.27 [0.99-1.64]). The association was more pronounced for women who worked during overnight shifts (shift work from 11 pm to 5 am: OR=1.35 [1.01-1.80]) than for women with late evening shifts (ending before 3 am: OR=1.25 [0.79-1.98]) or early morning shifts (starting after 3 am: OR=0.90 [0.36-2.21]). Women who had worked at night for 4.5 or more years had an OR of 1.40 [1.01-1.92], but no further increase of the OR was observed for longer durations. Night work of less than 3 nights per week, implying frequent changes between night and day schedules, was associated with an OR of 1.43 [1.01-2.03]).
Conclusion: Our results support the hypothesis that working at night increases the incidence of breast cancer.

VARIABILITY OF URINARY PHTHALATE CONCENTRATIONS BEFORE AND DURING PREGNANCY

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Background and Aims: Phthalates are a diverse class of chemicals used in a wide variety of consumer products. Gestational exposure to phthalates may increase the risk of adverse infant/child health outcomes. Urinary phthalate concentrations are variable and the ability of a single spot-urine sample to classify gestational exposure remains uncertain.
Methods: We collected 1,065 urine samples before and during pregnancy from 168 women who delivered live-born infants in Boston, MA. Women provided up to three urine measurements during each trimester of pregnancy. We measured concentrations of monoethyl phthalate (MEP), monobutyl phthalate (MBP), monobenzyl phthalate (MBzP), and four metabolites of di-2-ethylhexyl phthalate (DEHP). We used intraclass correlation coefficients (ICC) to characterize urinary phthalate concentration variability before and during pregnancy. We averaged phthalate concentrations from at least 2 pregnancy urine samples and estimated the sensitivity and specificity of trimester specific spot-urine samples to classify the top tercile of mean gestational exposure.
Results: The ICCs of most urinary phthalate metabolite concentrations were similar before and during pregnancy. During pregnancy, ICCs were low for DEHP metabolites (<0.16) and MBzP (0.28) and higher for MBP (0.43) and MEP (0.50). Third trimester urine samples had the highest sensitivity and specificity for classifying the upper tercile of mean MBP (sensitivity: 0.68, specificity: 0.84), MEP (sensitivity: 0.68, specificity: 0.95), and MBzP (sensitivity: 0.75, specificity: 0.86) concentrations during pregnancy. The sensitivity and specificity were variable depending on the DEHP metabolite examined.
Conclusions: Urinary phthalate concentrations were variable before and during pregnancy, but the magnitude of variability depended on the individual phthalate metabolite. Our results suggest that a single spot-urine sample in the third trimester may accurately rank-order exposure to some phthalates during pregnancy. These results may be related to unique features of the women studied and studies with serial urine measurements should conduct their own exposure assessments.

ADULT CANCERS NEAR HIGH VOLTAGE OVERHEAD POWER LINES

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Background. Extremely low frequency electromagnetic fields are designated as possibly carcinogenic in humans based on an epidemiologic association with childhood leukemia. Evidence for associations with various adult cancers is inconsistent and currently considered inadequate to make causal judgements.
Aims. To investigate risks of adult cancers in relation to distance and extremely low frequency electromagnetic fields from high voltage overhead power lines.
Methods. Case-control study. Adult cancers identified through national cancer registry data in England and Wales, 1974-2003. 6069 leukemia, 5409 brain/central nervous system, 6218 malignant melanoma, 22,395 female breast cancer cases and 36,187 age-sex matched cancer controls (three controls/case except breast cancer, one control/case) ages 15-74 years living within 1000 m of an overhead power line. Distance measures based on a Geographical Information System of the national power line network. Calculated magnetic fields based on EM2D program, which takes into account distance from the power line, tower design, clearance above ground, phase arrangement and historical load data – mainly estimated for the winter peak and scaled to give an annual average.
Main outcome measures. Risks of leukemia, brain/central nervous system cancers, malignant melanoma and female breast cancer in relation to distance and calculated magnetic fields within 1000 m of high voltage overhead power lines, adjusted for age, sex (except female breast cancer), deprivation, and rurality.
Results. Full results including adjusted odds ratio for various adult cancers by distance from powerlines and for calculated magnetic fields, $\geq$1000 nT compared with <100 nT, will be presented at the conference (paper findings currently under peer review).
Conclusions. Our findings add substantive new evidence to the current inadequate and inconsistent body of research on low frequency magnetic fields and specific adult cancers.

SOURCE-SPECIFIC AIR POLLUTION AND SYSTEMIC INFLAMMATION IN ISCHEMIC HEART DISEASE PATIENTS

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Background and Aims: Associations between particulate air pollution (PM) and cardiovascular health have been observed in numerous studies. Exposure to PM can accelerate systemic inflammation, which has been hypothesized to play an important role in the development of cardiovascular disease. Our aim was to evaluate the association between source-specific PM and systemic inflammation among ischemic heart disease patients.
Methods: Fifty-two ischemic heart disease patients were followed for six months with biweekly clinical visits (minimum of three) including a blood-withdrawal in Kotka, Finland, between November 2005 and May 2006. Blood levels of high-sensitive C-reactive protein (CRP) and fibrinogen were determined to be used as indicators of systemic inflammation. Daily levels of air pollution were measured at a central outdoor measurement site. Source-apportionment for fine particles (< 2.5 µm in diameter) was conducted using positive matrix factorization 3.0.2.2. by the U.S. Environmental Protection Agency. Immediate and delayed associations of source-specific air pollution with levels of fibrinogen and log-transformed CRP were analyzed using mixed models with random patient effects adjusting for time-trend, temperature and relative humidity.
Results: There were 507 successful repeated clinical visits in total. Looking at 5-day average concentration, CRP had stronger association with air pollution than fibrinogen. The %-changes for CRP were 2.9% (95%-confidence interval (CI): 0.3 to 5.5%) for long-range transported PM, 31.1% (95%-CI: -6.4 to 83.8 %) for traffic emissions, 2.3% (95%-CI: 0.2 to 4.5%) for biomass burning and -16.1% (95%-CI: -27.2 to -3.3%) for pulp industry per 1µg m^{-3} increase in pollutant concentration. We found no association for seasalt.
Conclusions: Our results suggest that several sources of ambient air pollution are associated with systemic inflammation, a risk factor for coronary heart disease.

WOMEN'S PESTICIDE EXPOSURE IN RURAL BRAZIL: CONTRIBUTIONS FROM RISK PERCEPTION STUDIES

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Background and Aims: Brazil is the largest consumer of pesticides in the world and is highly dependent on agricultural production for economic sustainability. Agricultural workers and their families are at an increased risk of suffering from pesticide related illnesses due to their frequent exposure to these chemicals. Women are at an even greater risk and have been noted to suffer from reproductive health disorders and poor pregnancy outcomes resulting from pesticide exposure. This study examined the risk perceptions women had related to their occupational pesticide exposures, focusing on attitudes, behaviors, and knowledge.
Methods: This study focused on two rural communities of Rio de Janeiro State, Brazil. Rapid assessment procedure techniques were applied and a combination of questionnaires, a focus group, and toxicology exams were used to obtain data. Content analysis techniques were used to assess the results.
Results: Three themes were identified as influencing women's risk perception to pesticides: 1) invisibility of risks - women do not understand the risks involved in their work; 2) minimization of risks – some women understand there are a few risks involved in their work, however, they fail to understand the degree of harm and neglect major health risks; 3) women take on defensive strategies - even after knowing there is a risk present and understanding how harmful that risk can be, they deny there is any risk involved in order to continue working. Additionally, women did not associate their work with poor reproductive health and birth outcomes that they or other women in their community experienced.
Conclusions: Our study indicated that women do not attribute many of their work behaviors to poor reproductive and birth outcomes, or other health problems. This leads to the need for developing effective risk communication tools and incorporating risk perception studies to epidemiological and health situation analysis.

A RETROSPECTIVE ASSESSMENT OF OCCUPATIONAL EXPOSURE TO ELEMENTAL CARBON IN THE U.S. TRUCKING INDUSTRY

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Background and Aim: Despite considerable epidemiologic evidence about the health effects of chronic exposure to vehicle exhaust, efforts at defining the extent of risk have been limited by the lack of historical exposure measurements suitable for use in epidemiologic studies and for risk assessment. We seek to reconstruct exposure to elemental carbon (EC), a marker of diesel and other vehicle exhaust exposure, for a large national cohort of 55,000 US trucking industry workers enrolled in 1985 and evaluated for mortality in 2000.
Methods: Using a national set of measurements collected from 2001-2005, we identify the predictors of exposure in a statistical model, which is used to extrapolate exposures across the cohort nationally. These estimates are adjusted for changes in work-related conditions over time using a previous exposure assessment of this industry, and for changes in background levels with a trend analysis of historical air pollution data.
Results: We construct monthly estimates of EC exposure for each job and trucking terminal combination between 1971 and 2000. Occupational exposure to EC declined substantially over time, and there is significant variability in exposures both within and across job groups, trucking terminals, and regions of the US. Average EC exposures during a typical work shift ranged from less than 1 • g/m3 in the lowest exposed category in the 1990s to over 40 • g/m3 for workers in the highest exposed jobs in the 1970s.
Conclusions: Our results provide a framework for understanding changes over time in exposure to EC in the US trucking industry. Our assessment should minimize exposure misclassification by capturing between freight terminal differences, including across US regions and across time.

PRENATAL EXPOSURE TO HEAVY METALS AND COTININE IN A MOTHER-INFANT STUDY IN TAIWAN

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Background and Aims: Prenatal exposure to toxic substances such as mercury, cotinine, etc can negatively affect fetal and post-natal growth and development. Taiwan is a country with a relatively high consumption of fish and percentage of exposure to smoking. However, there are only few studies reporting the effect of environmental toxins on the effect of neonatal growth and development during pregnancy in Taiwan. The purpose of this prospective study in south Taiwan is to evaluate the effect of mercury and cotinine on fetus and postnatal development.

Methods: This is a multi-center prospective cohort which enrolled pregnant women from Kaohsiung Veterans General Hospital (KVGH) and Fooyin Hospital (FH). The questionnaire was administered to the subjects after recruitment, to assess the exposure of environmental toxins during pregnancy. Whole blood and urine samples were collected for measurement of mercury(Hg), lead (Pb), manganese (Mn), and cotinine during pregnancy. The maternal chart during pregnancy were reviewed. Newborns were examined for body weight, body length, head circumference, and function of nervous system, etc.

Results: A total of 113 pregnant women (mean age 27.05±3.80 years) in FH (rural group) and 103 (mean age 31.18±4.60 years) in KVGH (urban group) were enrolled. There were significant differences between two groups in terms of age, education, occupation, and total weight gain after pregnancy. The prevalence of maternal exposure to smoking in KVGH and FH was 33.3% and 74.4% respectively. There were significant differences between two groups in terms of consumption of lean fish, and fried and mixed fish. There was significant association of Pb with cotinine in pregnant women ($p=0.006$). There was significant correlation between Mn and Pb ($p<0.0001$). There was no significant correlation between maternal heavy metals and birth outcome.

Conclusions: Exposure to smoking environment is high for pregnant women in south Taiwan. There is no risk of mercury toxicity in pregnant women in this series, but the contamination of heavy metals in our life is still an important issue.

THE BURDEN OF DISEASE RELATED TO INDOOR AIR EXPOSURE: A COMPARISON OF TWO METHODS

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Background and Aims: Recently, two European projects estimated the burden of disease related to exposure to indoor air pollutants –EBoDE and EnVIE. EBoDE's calculations were based on population exposure and exposure-response functions derived from epidemiological studies ('exposure-based approach'). EnVIE's calculations were based on (expert judgments of) the fractions of a disease burden that can be attributed to various risk factors ('outcome-based approach'). Our aim was to compare estimates from both approaches for exposure to environmental tobacco smoke (ETS), radon, dampness, CO and VOC's in the Netherlands.
Methods: We have reviewed the calculations as carried out in the two projects and compared the calculation processes and outcomes of both approaches.
Results: For ETS, the estimates were similar. Approximately half of the total burden of disease attributable to the 5 included risk factors could be attributed to ETS. In the exposure-based approach, radon was the second most important cause of disease burden, followed by dampness. In the outcome-based approach, dampness was more important than radon. The outcome-based approach only included radon from soils, which is the most important source of indoor radon in many European countries, but not in the Netherlands. This explains the difference with the outcome-based approach, in which total radon was included. For dampness, the lower estimate in the exposure-based approach can probably be explained by difficulties in identifying exposure-response functions which cover all possible effects. This problem was overcome in the outcome-based approach, in which experts estimated the attributable fraction. Contributions of CO and VOC's to the total burden of disease were relatively low in both approaches.
Conclusions: The two approaches used provided partly different results. This study illustrates that results should always be interpreted within the context of input data, methodology and assumptions used.

APHEKOM: HEALTH IMPACT ASSESSMENT OF SHORT AND LONG-TERM EXPOSURE TO OZONE AND PM IN 25 EUROPEAN CITIES

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Background In Europe, improvements in air quality were observed between 1990 and 1997. Since then concentrations of particulate matter (PM) and ozone have not shown a significant decrease. European citizens are still exposed to concentrations exceeding the recommendations of the World Health Organization (WHO). The Aphekom project assessed the mortality and morbidity impacts of this pollution in 25 European cities: Athens, Barcelona, Bilbao, Bordeaux, Bucharest, Brussels, Budapest, Dublin, Granada, Le Havre, Lille, Ljubljana, London, Lyon, Malaga, Marseille, Paris, Rome, Rouen, Seville, Stockholm, Strasbourg, Toulouse, Valencia and Vienna, using standardized health impact assessments (HIA).

Methods HIAs were performed using routine health and air quality data. All cities used common guidelines to define the study area, the health and the exposure indicators. Concentration response functions, linking PM_{10}, $PM_{2.5}$ and ozone to mortality and hospitalizations, were selected from multicenter studies. They were applied to a scenario where the air pollutants levels are decreased to the WHO-air quality guidelines.

Results In the 25 cities, the largest health burden was attributable to the long-term impacts of chronic exposure to $PM_{2.5}$. The compliance with the WHO guideline of 10 • g/m^3 in annual mean would increase by 22 months the life expectancy for people aged 30 years and older, depending on the city. This corresponds to a burden on mortality of nearly 19,000 deaths per annum. Considering PM_{10}, in 22 cities the compliance with the WHO guideline of 20 • g/m^3 in annual mean would prevent more than 2500 hospitalizations for cardiac diseases and more than 5300 for respiratory diseases each year.

Conclusions Aphekom provided robust estimates confirming that further steps to reduce PM_{10} and $PM_{2.5}$ would result in significant health gains in Europe. This should be considered when revising the current EU legislation in 2013.

THE EFFECT OF BOILING AND FILTERING ON THE CONCENTRATION OF DISINFECTION BY-PRODUCTS IN TAP WATER

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Background and aims: Disinfection by-products (DBPs) are ubiquitous contaminants in drinking tap water with potential to produce adverse health effects such as bladder cancer and adverse reproductive effects. Filtering and boiling tap water can lead to changes in the disinfection by-products levels and affect the exposure through ingestion.

Methods: Changes in the concentration of 4 Trihalomethanes (THM4), MX and bromate were tested when boiling and filtering high bromine-containing tap water from Barcelona. For filtering we used a pitcher-type filter and a household reverse osmosis filter. For boiling we used an electric kettle, a saucepan and a microwave. Samples were taken before and after each treatment to determine the change in the DBPs concentration. pH, conductivity and free and total chlorine were also measured. Trihalomethanes were measured in quadruplicate samples using gas chromatography/electron capture detection. MX was solid phase extracted from water samples, a volatile isopropyl derivative was formed and analysed by gas chromatography - high resolution mass spectrometry. Ion chromatography with suppressed conductivity detection was used for bromate.

Results: A high reduction of THM4 (reduction ranging from 97% to 48%) and MX (reduction ranging from 72% to 54%) was observed for all experiments. Bromine-containing trihalomethanes were most eliminated when filtering and chloroform when boiling water. Bromate was highly reduced with reverse osmosis but showed little effect in the other experiments.

Conclusions: These findings suggest that exposure to THM4 and MX through ingestion is reduced when using these household appliances while bromate reduction is device-dependent. This should be taken into account in exposure assessment of epidemiological studies.

AIR POLLUTION FROM TRAFFIC AND CANCER INCIDENCE IN A DANISH COHORT

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Background and aims: Vehicle engine exhaust includes ultrafine particles with a large surface area and containing absorbed polycyclic aromatic hydrocarbons, transition metals and other substances. Ultrafine particles and soluble chemicals can be transported from the airways to other organs, such as the liver, kidneys, and brain. We have previously reported on air pollution and lung cancer and the aim of the present study was to investigate whether air pollution from traffic is associated with risk for other cancers than lung cancer.
Methods: We followed up 54 304 participants in the Danish Diet Cancer and Health cohort for 20 selected cancers in the Danish Cancer Registry, from enrolment in 1993–1997 until 2006, and traced their residential addresses from 1971 onwards in the Central Population Registry. We used modeled concentration of nitrogen oxides (NO_x) and amount of traffic at the residence as indicators of traffic-related air pollution. NO_x correlates strongly with particle number concentrations in Danish streets. We used Cox models to estimate incidence rate ratios (IRRs) after adjustment for potential confounders.
Results: NO_x at the residence was significantly associated with risks for cervical cancer (IRR, 2.45; 95% confidence interval [CI], 1.01;5.93, per 100 $\mu g/m^3$ NO_x) and brain cancer (IRR, 2.28; 95% CI, 1.25;4.19, per 100 $\mu g/m^3$ NO_x).
Conclusion: This hypothesis-generating study indicates that traffic-related air pollution might increase the risks for cervical and brain cancer, which should be tested in future studies**.**

POLLUTION CHARACTERISTICS AND RESIDENTIAL INDOOR-OUTDOOR RELATIONSHIPS OF PM_{10} ELEMENT IN ONE COMMUNITY IN TIANJIN

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Background and Aims: Studies on indoor-outdoor relationship are in need to better understand and calibrate exposure measurement errors when ambient concentrations are used as real exposure for epidemiological studies. The object is to characterize the influences of outdoor contribution and indoor sources on indoor PM_{10} and metals in Tianjin.

Methods: Residential indoor, outdoor airborne particulate matter (PM_{10}) were concurrently collected for total 55 families in Tianjin in summer of 2009, using personal exposure monitors (PEM). All the filter samples were cut into two halves and analyzed for 39 elements using ICP-MS and ICP-OES. The enrichment characteristics of elements were analyzed by enrichment factor and indoor-outdoor relationship and penetration were analyzed by regression models.

Results: Total 39 determined elements made up (19.4 ±12.8)%, (22.1 ±13.8)%, (18.7 ±7.2)% of the indoor, outdoor and community-central PM_{10}, respectively, of which 8 main elements (i.e.: Si>Ca>Al>Fe>K>Na• Mg>Ti)contributed 86.3%, 88.9%, 88.9% of their total elements. Cd, Bi and Zn were three most enriched metals in all microenvironments, of which corresponding Enrichment factors in indoor environment were 1290.80, 254.39, 252.77. The penetration rates of K, V, Mn, Cu, Zn, As, Cd, Pb were 0.51, 0.40, 0.44, 0.85, 0.58, 0.67, 0.58, 0.77.

Conclusions: By comparison of background value of soil elements, 13 metals including Cr, Ni, Cu, Zn, As were extremely enriched in indoor, outdoor and community-central PM_{10}, which indicating ubiquitous anthropogenic emission sources. Regression models were constructed for each metal, which showed high indoor-outdoor correlations and penetration rates among K, V, Mn, Cu, Zn, As, Cd, Pb, with low indoor sources contributions.

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SOURCE APPORTIONMENT OF PM_{10} PERSONAL EXPOSURE OF AN ELDERLY POPULATION IN ONE COMMUNITY, TIANJIN

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Background and Aims: Studies on personal exposure were in need to better understand and analyze source apportionment of PM_{10} personal exposure, especially for the elderly. The object of this study was to collect personal exposure samples to PM_{10} of the elderly livings in one community in Tianjin and to identify their potential personal exposure sources.

Methods: In this study, a total of 80 elderly participants were selected and monitored in August and September, 2009. 24-h average particulate matter personal exposure and simultaneously compared with residential indoor and outdoor PM_{10} concentrations were measured in Tianjin, China, together with 24-h time-activity patterns collected. Ratio method and PCA receptor model were implied to analyze related sources and contributions.

Results: Using ratio method, it was found that the ratio of OC and EC were more than 2, and the NO_3^-/SO_4^{2-} ratio were relatively lower, besides, PM_{10} indoor exposure contributed more to PM_{10} personal exposure than PM_{10} outdoor exposure. PCA receptor model showed that seven sources were resolved, namely metal smelting, motor vehicle emission and nitrate, combustion, soil, industrial sources (mainly steel-making), second sulfate and indoor re-suspended particulate matter.

Conclusions: The second organic pollution may be existed to personal exposure. The stationary emissions were a dominant source of PM_{10} personal exposure. Metal smelting, motor vehicle emission and nitrate, combustion were identified as principal sources of personal exposure to PM_{10}.

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ASSOCIATION BETWEEN CONGENITAL HEART DEFECTS AND MATERNAL EXPOSSURE TO AMBIENT AIR POLLUTION AND TEMPERATURE IN AN ISRAELI BIRTH COHORT, 2000-2006

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Background and Aims: There are new concerns that air pollution may play a role in the causation of congenital anomalies, and such an effect is of public health importance. A recent meta-analysis reported evidence for an effect of ambient air pollutants (AP) on Congenital Heart Defect (CHD) risk. The potential influence of direct temperature effects on pregnancy outcomes is an area of emerging research. Therefore we examined associations between CHD and maternal exposure to ambient AP and temperature in an Israeli birth cohort.
Methods: We conducted a population-based cohort study on 138,675 newborns in Tel-Aviv region during 2000-2006. For each pregnant woman we used GIS to assess personal exposure to carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, particulate matter (PM10 and PM2.5) during weeks 3-8 of pregnancy; using inverse distance weighting method. In addition ambient temperature was considered. Logistic models were conducted to compare exposure levels between the 2087 CHD cases and the non-cases, adjusted for socio-demographic covariates and season.
Results: We did not find positive dose-response associations in both single and multi-pollutant models between exposure to air pollutants and CHD - for total CHD and for the major subgroups (Atrial Septal Defect (ASD), Ventricular Septal Defect (VSD) and Patent Ductus Arteriosus (PDA)). However, we found a positive association between ambient temperature quartiles (<16˚C, 16.1-20.4˚C, 20.5-25.2˚C, 25.3˚C<) and CHD risk, adjusted for multi-pollutant exposure. For total CHD, OR= 1.13 (95%CI: 1.05, 1.21), for ASD OR= 1.14 (95%CI: 1.04, 1.26), for VSD OR = 1.08 (95%CI: 0.98, 1.2), for PDA OR=1.13 (95%CI: 0.95, 1.34).
Conclusions: The positive relationship between ambient temperature exposure during weeks 3-8 of pregnancy and CHD risk found in this study should be further explored since there is biological plausibility for these results, and temperatures are expected to increase due to climate change.

AIR POLLUTION DECLINE, BODY MASS INDEX AND PULMONARY FUNCTION: THE ROLE OF GENDER

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Background and Aims*:* Reduction in air pollution has been associated with an attenuation of lung function decline in adults[1]. Since obese people have an accelerated age-related decline in lung function we aimed to assess whether the impact of air pollution on the longitudinal course of lung function is modified by BMI and whether this effect differs by gender.
Methods: Data from the population-based SAPALDIA cohort was used. Baseline and follow-up assessments were in 1991 and 2002, respectively. Weight status was based on average BMI and change in BMI between surveys divided in four categories: underweight, normal, overweight and obese. Outcomes were the annual rates of change in different lung function (LF) parameters: FEV_1, FVC, FEV_1/FVC and forced expiratory flow between 25% and 75% of FVC (FEF_{25-75}). Exposure was the difference in PM_{10} at residence between follow-up and baseline. Mixed linear models with random area intercepts were used to estimate effects of air pollution and obesity on LF adjusted for potential confounders.
Results: Lung function data and complete information on potential confounders were available in 4729 participants. PM_{10} levels declined over the study period of 11 years (median: -5.3µg/m3). Among neversmokers, women had a higher benefit in lung function from a reduction in air pollution than men. The beneficial effect of declining air pollution decreased with increasing BMI. On average, a decline of PM_{10} by 10 $\mu g/m^2$ over the entire follow-up period was associated with an attenuation of the annual age-related decrease of FEF_{25-75} by 18.1% ($CI_{95\%}$= [31.3; 5.0]) in the normal weight women, whereas no attenuation was found in overweight or obese women.
Conclusion*:* First results suggest that overweight or obese women may not benefit from the previously published beneficial effect of a decline in PM_{10} on the small airways. However, overall men did not benefit to the same degree than women.

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PUBLIC HOUSING PROGRAMS: POTENTIAL ENVIRONMENTAL HEALTH BENEFITS THROUGH INDOOR AIR QUALITY: A CASE STUDY IN SANTIAGO, CHILE

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Background and Aims: Housing interventions, as rehousing/relocation of families from deprived to improved houses, can impact public health through reducing several risk factors. One of the potential benefits of relocation, which have not been studied extensively, is the improvement of indoor air quality of the relocated families. The purpose of this study was to determine differences in indoor air quality between families living in slums and families relocated through a housing program, both living in a similar geographical area in Santiago, Chile, and identify likely determinants of this difference.
Methods: Using particulate matter $PM_{2.5}$ as an indicator of indoor air quality, in this study we sampled 169 houses cross-sectionally: 98 relocated families and 71 families living in slum houses. In each home, Indoor and outdoor 24-hour samples and questionnaire about home conditions were collected.
Results: . Indoor $PM_{2.5}$ concentrations inside slum homes were higher than in homes of relocated families (77.8 $\mu g/m^3$ vs. 55.7 $\mu g/m^3$, $p<0.001$). A regression model was used to identify determinants of indoor $PM_{2.5}$ concentrations. Outdoor $PM_{2.5}$ was the main predictor of indoor $PM_{2.5}$, explaining 26.0% of the total variance of the model. Also significant were the type of fuel used to heat water and the number of indoor cigarettes smoked, which increased the indoor $PM_{2.5}$, and the presence of infants, which was a protective factor. The intervention itself – comparing slum homes with relocated homes in the model–significantly decreased indoor $PM_{2.5}$
Conclusions: These results show that a housing program may improve indoor air quality which represents a clear health benefit.

DEVELOPMENT OF A PROBABILISTIC MODEL FOR PESTICIDE EXPOSURE THROUGH SHEEP DIPPING

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Background and Aims: Whereas probabilistic exposure modelling has been used in environmental epidemiology, its use in occupational settings remains limited. Sheep dippers are exposed to pesticides when they treat sheep for ectoparasites. Previous exposure assessment models have depended on a deterministic approach incorporating only few determinants, considering other uncollected variables known to be factors of exposure process as random error only. This study aims to explore whether a probabilistic model can result in a more realistic estimation of exposure intensity in sheep dipping.
Methods: A conceptual exposure model was developed to estimate pesticide exposure intensity during sheep dipping. Distributions of exposure variables were based on previously published data where possible; determinants without prior information available were set at 1 ('no effect'). Monte Carlo simulations generated 10,000 samples of semi-quantitative exposure intensity scores of different dipping tasks (plunger, chucker and helper) in the same dipping session. The probabilistic conceptual exposure model was applied to four dippers participating in the Study of Health in Agricultural Work (SHAW) and the results were compared with the deterministic estimates obtained from SHAW.
Results: Deterministic exposure scores for a plunger, chucker and helper in a same session were 3.51, 2.40, and 1.17, respectively whereas probabilistic estimates showed a considerable overlap with the 1st and 3rd quartiles (Q1,Q3) being (3.3,6.5), (2.0,5.2), and (1.0,2.9) respectively. Deterministic scores of four SHAW farmers were 13.84, 6.89, 7.38, and 3.89 respectively. In contrast, the probabilistic estimates resulted in similar exposure distributions for farmers 2 (10.2,14.5) and 4 (10.4,15.4), but higher scores for farmer 1 (19.1,22.2) and farmer 3 (14.3,19.7).
Conclusions: This study indicates that probabilistic models may give more comprehensive estimations for occupational exposures than deterministic estimations. Probabilistic models could be a solution to bridge the gap between conceptual models and applicable ones which can be used in epidemiological studies.

CONDITIONAL POISSON MODELS: A BETTER WAY TO ANALYZE CASE-CROSSOVER AND RELATED DATA?

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Background and Aims: Almost universally, case-crossover studies are analyzed using a conditional logistic regression model with aggregated data reconstructed to resemble case-control sets. This is somewhat laborious to program and inefficient computationally. It does not easily permit allowance for over-dispersion or auto-regression. Time stratified case cross-over studies may equivalently be modeled using Poisson models with indicator variable for time strata, but these models fit large numbers of nuisance parameters so are again inefficient, sometimes infeasible. Similar issues can arise in related spatio-temporal designs.
Methods: Poisson models with large numbers of indicator variables can alternatively be fit with conditional Poisson models (conditioning on numbers of events – for example deaths - in the time stratum). Despite this model's long life (Chapman 1954) it seems only very few researchers (Whitaker 2009) have considered it for purposes similar to this one. These models can incorporate both overdispersion and autocorrelation in the same ways that this can be done in unconditional Poisson models, though in both approaches problems arise if data are sparse. The models can be fit using R function *gnm* with the *eliminate* option or Stata command *xtpoisson* with option *fe*.
Results: Fitting case-crossover data for a 15-city 14-year time series study using conditional Poisson models stratified by city-month gave identical parameter estimates to unconditional ("regular") Poisson models or conditional logistic regression but in dramatically less computer time. Incorporating overdispersion and auto-correlation was straightforward.
Conclusions: Conditional Poisson models are easier and quicker to fit and more flexible than conventional methods for case crossover and related studies.
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RISK OF CATARACTS IN MEDICAL STAFF EXPOSED TO IONIZING RADIATIONS: FOCUS ON INTERVENTIONAL CARDIOLOGISTS IN THE O'CLOC STUDY

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Background and aims: Interventional cardiologists are exposed to ionizing radiations which may induce radiation-induced cataracts. To test the existence of an increased risk of cataracts among interventional cardiologists compared with unexposed workers, the O'CLOC study (Occupational Cataracts and Lens Opacities in interventional Cardiology) was performed in France.
Methods:O'CLOC study includes an exposed group of interventional cardiologists and a comparable unexposed group (including non nterventional cardiologists and unexposed French workers). Individual risk factors of cataracts (age, diabetes, myopia, ...), were collected during a telephone interview. For the exposed group, in order to assess exposure level, a specific part of the questionnaire focused on their interventional practice (description of type of procedures , frequency, use of radiation protection tools). All participants underwent a clinical eye examination. The use of the international standard lens opacities classification – LOCS III, allowed detecting cataracts even at the early stages and for different localisation (nuclear, cortical or posterior subcapsular).
Results: Preliminary results were based on 92 interventional cardiologists, and 70 unexposed individuals. Mean age was 51.9 ± 7.3 years in the exposed group and 51.8 ± 7.5 years in the control group. Some posterior subcapsular lens opacities, known as radiation-induced eye lens damages, were observed in the exposed group and have to be analyzed more precisely. Complete analyses will be based on more than 200 individuals and final results will be presented during the congress.
Conclusion: The O'CLOC study is the largest study ever performed on lens opacities among interventional cardiologists. Preliminary results need further analyses, in particular to consider the level of exposure and means of protection against X-rays used by cardiologists.

THE IMPACT OF SECOND HAND SMOKE EXPOSURE ON THE HEALTH IN SLOVAK SCHOOLCHILDREN

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Background and Aims: The prevalence of smoking in adult Slovak population is high. The aim of the project is to analyze the situation in school age children exposure to SHS and to analyze the impact of exposure on their health status.
Methods: Study elaborates the representative data of the sample of 1478 Slovak schoolchildren in the age 6 - 15 years, the same number of boys and girls, using anonymous questionnaire filled in by parents. General questionnaire was aimed at children's health status and environmental conditions. Validated questionnaires CIS (Columbia impairment scale) and BPI (Behavior Problem Index) are focused on emotional and behavioral functions in children. Basic anthropometric variables were measured. SAS program was used for statistical analysis.
Results: From 7.8 to 27.6% of Slovak children are exposed to passive smoking. The significantly highest numbers were in big cities Bratislava and Kosice. There were 21.3 % of smoking and 8 % ex-smoking mothers; 36.5 % of fathers smoke and 12.2 % of fathers are ex-smokers. Lower family social status was reported by the almost 30% of families. Older school children have been more exposed to passive smoke. Exposure to passive smoke decreases with the level of parental education. The positive relationships with low socio-economic status and incompleteness of the family have been shown. The significantly higher prevalence of respiratory diseases in children exposed to passive smoke was confirmed ($p = 0.02$). Children exposed to SHS have worse eating habits and regimen, lower physical activity and sports. No relationship between overweight / obesity (BMI ≥ 90%) and exposure to passive smoking has been confirmed.
Conclusions: Results showed that 19% of Slovak children are exposed to passive smoking in family with health consequences. The results of the study contribute to the effective protection of children from exposure to toxic tobacco smoke.

FLU TRANSMISSION IN A SAHELIAN CITY: TEMPERATURE PLAYS A MAJOR ROLE AT NIAMEY, NIGER

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Background and aims: Flu threatened the world during four pandemics that occurred within the last century and recently in 2009. Temperature and humidity seem the main climatic factors involved in flu transmission. This study aimed to provide insight on the role of meteorological factors on flu transmission in Niamey, a Sahelian city that exhibits climate particularities of a very long dry season with consistently hot temperatures.
Methods: In April 2009, a surveillance system for flu composed of ten sentinel sites in Niamey was set up by CERMES, the national research institute of Niamey, Niger. A nasopharyngeal swab was taken from subjects with influenza like illness or severe acute respiratory illness symptoms attending the sentinel sites and analyzed by RT-PCR. Long-term trend, seasonality, day of the week, holidays and religious periods were taken into account in a generalised additive model to link temperature, humidity, wind speed and visibility with daily counts of biologically confirmed influenza cases between 1st June 2009 and 31 May 2010.
Results: Seventy six among 319 subjects were positive (23.8%) for influenza virus, comprising 46 A/H1N1(2009), 19 A/H3N2 and 11 influenza B. Positive cases were detected more frequently during cold and rainy seasons, with respectively 46.9% and 34.4% of positive subjects. Minimal temperature between 13 and 22°C and visibility were significantly and positively correlated respectively three days and one day before the occurrence of flu cases ($\beta = 3.99$, $p = 0.022$ and $\beta = 3.30$, $p = 0.014$, respectively).
Conclusions: The occurrence of flu cases could be related to the lowest minimal temperatures mainly found during cold season and to the highest values of visibility occurring during rainy season. This work brought new evidence on the important role of temperature in the transmission of flu in a Sahelian tropical city like Niamey, Niger.

THE IMPACT OF CLIMATE CHANGE ON DENGUE TRANSMISSION IN NICARAGUA

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Background/Aims: In 2007, 918,495 cases of dengue and dengue hemorrhagic fever occurred in Latin America (Barclay 2008). Climate change is projected to alter the transmission of dengue through changes in temperature and precipitation, which affect biological factors and human ecology. A sustained decline in precipitation could lead subsistence farmers to migrate to urban areas, where dengue can become hyperendemic due to poor living conditions and unsafe water storage (Campbell-Lendrum and Corvalán 2007). This study compared the incidence of dengue in Nicaragua under climate change and non-climate change scenarios using mathematical models.
Methods: The study used a deterministic Susceptible, Infectious, Recovered (SIR) compartmental model to compare dengue incidence projections over the next 100 years with and without climate change. Climate change was parameterized as a temperature increase of two degrees Celsius over 100 years and a decline in precipitation, resulting in urbanization. Incidence projections were compared between non-climate change, climate change, and intervention scenarios, which included 1) controlling mosquito population growth; 2) reducing the effective contact rate between mosquitoes and urban residents; 3) promoting sustainable agricultural practices (thus reducing urbanization); and 4) increasing mosquito mortality through vector control programs.
Results: The projected number of symptomatic dengue cases over the next 100 years (from 2010 to 2110) under the climate change scenario was 91% higher than under the non-climate change scenario. This increase was reduced to 89, 86, 44, and 27% by applying interventions one through four above, respectively.
Conclusion: Climate change mitigation will require strengthening public health infrastructure to address biological and socioeconomic determinants of infection. Future research should identify interdisciplinary interventions employing optimal combinations of strategies to reduce dengue transmission in the face of climate change.
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PHTHALATES IN COW MILK: POSSIBLE CONTAMINATION PATHWAYS AT FARM LEVEL

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Background and Aims: Phthalates are organic lipophilic compounds which are mainly used as plasticizer in plastic polymers. Human exposure occurs mainly via food intake and can cause a wide range of negative health effects. Phthalates are not only present in food because of environmental contamination, but also as a result of migration from contact materials. This study investigated phthalates in cow milk in order to determine the contamination pathways at farm level.
Methods: The levels of eight phthalates were determined in raw milk samples collected during summer and winter at five farms located in 'The Kempen' (Belgium). Both manually obtained milk samples as milk samples milked by machine were collected. Analysis was performed by gas chromatography-mass spectrometry.
Results: The analysis of the milk samples milked by machine revealed a difference in average total phthalate level between the summer and the winter sampling period (572 versus 379 µg/kg fat). While the total phthalate levels of the different farms during winter were nearly of similar magnitude (291-587 µg/kg fat), a wide range could be observed during summer (95-1550 µg/kg fat). Comparing milk samples within a farm, lower total phthalate levels were found in the milk samples milked by hand than those by machine (100 versus 179 µg/kg fat). Di(2-ethylhexyl) phthalate which is the most commonly used plasticizer worldwide, was the most dominating one (79 % of the total concentration in milk from the central collecting tank).
Conclusions: The results indicate that the contamination pathways for phthalates in cow milk vary across seasons. An explanation therefore is that the feed composition is different during summer than during winter. In summer, cows are grazing in the fields where an extra phthalate contamination can occur via soil ingestion. Comparing the milk samples milked by hand with those by machine reveals that the milking equipment is another important contamination pathway.

COMPARISON OF PM MASS CONCENTRATION AND PM OXIDATIVE POTENTIAL EXPOSURE METRICS IN RELATION TO CAROTID INTIMA MEDIA THICKNESS WITHIN THE WHITEHALL II COHORT

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Background and Aims The epidemiological evidence that particulate matter (PM) can augment the progression of atherosclerosis remains limited and the specific attributes of PM responsible for observed health effects is unclear. We previously developed a model to predict exposure to PM10 mass concentration weighted by its oxidative potential (OP), a measure of particles' capacity to induce oxidative damage. Our present objective was to estimate the association between PM10 mass concentration and carotid intima media thickness (CIMT), a measure of subclinical atherosclerosis, and to compare the association with that of PM10 weighted by its OP (PM10xOP).
Methods Analysis was based on 2,348 participants of the Whitehall II cohort of British civil servants who had CIMT measured between 2003-05 and lived in Greater London. Weekly PM10 and PM10xOP were predicted at each participants' residence. Primary exposure metrics were defined as predicted PM10 and PM10xOP averaged over 52 weeks prior to CIMT scan. Associations between exposure metrics and CIMT were estimated using generalized linear regression models.
Results Median exposures were 24.4μgm^{-3} for PM10 and 15.6m^{-3} for PM10xOP. An interquartile range increase (5.2μgm^{-3}) in PM10 was associated with a 2.3% (95% CI 0.7%, 3.8%) increase in CIMT without adjusting for covariates. This association increased to 5.0% (95% CI 1.9%, 8.3%) after adjustment for age, sex, smoking, BMI, year and season. An interquartile range increase (1.6m^{-3}) in PM10xOP was associated with a 1.8% (95% CI 0.6%, 3.1%) increase in CIMT in the fully adjusted model. Although the association with CIMT was larger for PM10, the predictive value (AIC) of the two exposure metrics was comparable.
Conclusions This analysis adds to the evidence of the relationship between PM exposure and the extent of atherosclerosis, but also for the first time, incorporates information on the oxidizing characteristics of particles in this relationship.

HEALTH OF RESIDENTS LIVING NEAR INTENSIVE LIVESTOCK FARMS

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Background and Aims: Swine and poultry farmers are at increased risk of developing adverse respiratory health effects. Research into the health of residents living near intensive livestock farms is sparse and repeatedly based on self-report, while the potential health effects of intensive livestock farm emissions are of great interest for public health. The aim of this study was to explore the health of neighboring residents based on medical information registered by their general practitioner, with focus on the respiratory and gastrointestinal tract and possible intertwining comorbidity.
Methods: Data were collected from routine electronic medical records of 28 general practices (total population of 122,542 patients) in an area with a high density of intensive pig, poultry, and cattle farms. A comparison was made with 22 practices (78,060 patients) in other rural areas with low density of these facilities. Information included patient characteristics and all registered health problems (in the Netherlands everyone is obliged to register with one general practice) during 2006-2009. Prevalences of symptoms and diagnoses were calculated by multilevel analyses accounting for differences between practices and the patient's age, gender and follow-up duration.
Results: The overall prevalence of respiratory diseases was similar or even lower compared to other rural areas, with the exception of pneumonia (OR=1.4; 95%CI=1.1–1.8). No increased prevalence of asthma was observed (OR=0.9; 95%CI=0.7–1.2). The most frequently presented reasons for encounter among patients with asthma were cough, upper respiratory tract infections and rhinitis. We found an increased prevalence of atopic eczema (OR=1.3; 95%CI=1.1–1.6). More detailed analyses are currently being performed, including the geographical distribution of diseases within the study area.
Conclusions: The first results showed no differences for respiratory diseases other than pneumonia. The prevalence of atopic eczema was increased compared to controls. Having data from general practice is an important addition to self-reported complaints.

IS PM_{10} ASSOCIATED WITH EMERGENCY AMBULANCE DISPATCHES?

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Background and Aims: Positive short-term associations between particulate matter and mortality has been well established. To investigate the impact of air pollution on non fatal events we analyzed for the first time the exposure-response curve of ambulance dispatches using a region-wide real time database.
Methods: Daily Emergency Ambulance Dispatches (EAD) for people aged 35 or older were collected for six chief towns of the Emilia-Romagna region between 2002 and 2006. In a first stage, Poisson regression models were used to assess the relationship between PM_{10} daily mean concentrations and EAD, controlling for potential confounders and including natural splines to adjust for trend and seasonality. City-specific estimates were obtained for three age groups (35-64, 65-74, 75+ years) and for non-traumatic, cardiovascular and respiratory disease. Cumulative lagged effect was investigated up to five days and temporal patterns were explored using distributed lag models. Hot and cold season effect modification was also verified in additional analyses. In a second stage, city-specific effects were combined in fixed effects meta-analyses.
Results: The percent change of EADs associated with 10 • g/m^3 increase in five-day mean exposure was 1.06% (95%CI: 0.74;1.38) for non-traumatic disease. Effects were larger during the hot season with significant effects for all-age cardiovascular and respiratory disease. The highest effects were found for respiratory 75+ EAD during the hot season for lag0-3 of exposure (3.38%, 95%CI: 1.06;5.7).
Conclusions: EADs data showed a strong relationship with PM_{10} with larger effects during the hot season. The effects were similar to those found in previous studies on mortality. EAD are relevant indicators in order to achieve a wider view of the effects of air pollution on human health and possibly to establish real-time surveillance systems.
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LEAD CONCENTRATIONS IN CANDIES FREQUENTLY CONSUMED BY CHILDREN LIVING IN MEXICO CITY

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Background and aims: For more than a decade Mexican candies have been found to have lead concentrations higher than the FDA recommendation of 0.1 ppm. A study that assesses the type, quantity, and frequency of candy that children eat has not been previously carried out in Mexico. This study aims to identify what candy brands are consumed by children, to measure the lead concentrations in the candies that children consume more frequently and to evaluate if the recent ingestion of these candies has an association with their blood lead concentrations.

Methods: We conducted a cross-sectional study nested in a cohort of children living in Mexico City. From June 2007 to July 2008 a recall questionnaire for recent candy ingestion was administered to 181 children between 1 and 6 years of age and their mothers. Children had a capillary blood lead test at the time of the interview. The most frequently consumed candy brands were analyzed for their lead concentrations.

Results: Children reported 171 different candy brands. We analyzed 137 samples of the top 30 brands reported. Three brands exceeded a lead concentration of 0.1 ppm and 9 candy samples exceeded 6 µg of lead (FDA's provisional total tolerable intake level for lead by small children of per day). The mean blood lead concentration was 4.96 µg/dL. After adjusting for sex and age, we found an association between blood lead concentrations and candy ingestion (*ß=0.025, p-value 0.025, 95% C.I. 0.003, 0.047*).

Conclusions: Eating candies with lead concentrations above 0.1 ppm may have an association with an increase of blood lead concentrations in children. The results of this study suggest that Mexican health authorities should further supervise the quality control of candy production and advice the general population with respect to candy intake by small children.

LIGNANS, FLAVONOLS, AND BREAST DEVELOPMENT

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Background and Aims: Phytoestrogens are dietary micronutrients with known hormonal activity. They have been associated with reduced cancer risk, and they alter pubertal onset in experimental animals and in some human studies. Lignans and flavonols are dietary phytoestrogens found at high levels in the western diet. The Breast Cancer and Environment Research Project (BCERP) cohort is investigating environmental exposures and puberty in females.
Methods: Breast stage, dietary recall data, body size, and other information were collected for 1239 girls enrolled at 3 US sites during 2004-2007, followed through 2010. Phytoestrogen intake was calculated for lignans and flavonols using a new micronutrient database. Associations between phytoestrogens and breast stage (pubertal [B2+] vs prepubertal [B1]) were investigated using bivariate comparisons and Hazards Ratios (HR) with 95%-confidence intervals (CI), adjusting for energy intake, body mass index, race, age and parental education. Data are currently available for 747 girls.
Results: Breast development was present in 81% (N=606/747) at the last visit. Mean level of lignan intake was 0.12 ± 0.07 mg/day; mean flavonol intake was 5.2 ± 3.6 mg/day, mainly quercetin. Energy and quercetin intakes were greater among girls at B2+ compared with B1. Age at B2+ was similar across quartiles of intake, for example HR 1.03 (CI 0.77-1.25) in the 4^{th} vs 1^{st} quartile of lignan intake. We found no attenuation of the BMI-effect on puberty by dietary lignans. Additional analyses will examine how associations may differ at different times during development.
Conclusions: Preliminary results from this longitudinal study suggest that dietary lignans and flavonols are not directly associated with pubertal developmental. Dietary intake during puberty may reflect different windows and duration of exposures than urinary biomarkers of phytoestrogens. Timing of dietary intake may influence associations of weak hormonal agents in relation to pubertal development.
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AN ANALYSIS OF SPATIAL VARIABILITY IN DISINFECTION BY-PRODUCT CONCENTRATIONS FOR EXPOSURE ASSESSMENT APPLICATIONS

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Background and Aims: Many epidemiological studies of disinfection by-products (DBPs) in public water systems (PWSs) rely on system average trihalomethane (i.e., THM4; sum of chloroform, dibromochloromethane, bromodichloromethane, and bromoform) and haloacetic acid (i.e., HAA5; sum of monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid and dibromoacetic acid) concentrations as surrogates for chemical-specific personal exposures. The study objective is to assess intra-system variation and evaluate the utility of various methods for determining spatial variability of DBPs.
Methods: To determine the utility of system-averages in estimating DBP levels, we assessed spatial variability in THM4 and HAA5 monitoring data for 144 and 132 PWSs in Massachusetts from 1995-2004. High spatial variability was defined using three methods. Methods 1 and 2 consider a PWS to have high spatial variability if the absolute difference between at least two sampling locations is • 20 and • 30 • g/L, respectively. Method 3 categorizes concentrations based on cut-points of regulatory significance (<40 µg/L, 40-80 µg/L, >80 µg/L), and a PWS is defined as having high spatial variation if same-day sample concentrations fall into multiple categories.
Results: For THM4, 108 PWSs (75%) had high spatial variability according to Method 1, compared to 95 PWSs (66%) using Method 2. Results for HAA5 were lower with 79 PWSs (59%) and 60 PWSs (45%) based on Methods 1 and 2, respectively. Over half of these PWSs had high THM4 and HAA5 spatial variability for at least 25% of their sampling dates. Using only chlorinated surface water PWSs from 1996 (17 PWSs), we found comparable results from Methods 1 and 3, with 76% of PWSs having high spatial variation.
Conclusions: The spatial variability noted within PWSs could result in misclassification bias if system averages are used to estimate individual-level DBP exposures. Therefore, exposure assessment approaches should target systems with minimal spatial variability for epidemiological application.

EXPOSURE TO ENVIRONMENTAL POLLUTION IN THE GENERAL FLEMISH POPULATION: RESULTS OF THE SECOND FLEMISH ENVIRONMENT AND HEALTH STUDY

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Background: The second Flemish human biomonitoring survey (2007-2011) generated information on the distribution of biomarkers for a large number of environmental pollutants in a representative sample of the Flemish population.
Methods: Between May 2008 and July 2009, 255 newborns and their mothers, 210 students (14-15 years old) and 204 adults (20-40 years old) were recruited as a representative sample of the Flemish population. Blood, urine and hair samples were collected; questionnaire data were obtained through self-assessment. For each biomarker, the detection frequency, geometric means and 90th percentiles were calculated as reference values for the Flemish population.
Results: Levels of historical compounds were compared with the first Flemish human biomontioring campaign. Persistent chlorinated compounds, cadmium and lead levels decreased over time, while 1-hydroxypyrene (metabolite of PAHs) and t,t-muconic acid (benzene metabolite) remained at similar levels.
New emerging pollutants such as perfluorinated compounds, bisphenol A, phthalates, musks, triclosan, *para*-hydroxybenzoic acid (a metabolite of parabens) and 2,5-DCP (a metabolite of *para*-dichlorobenzene) were detected in 80% or more of the samples. For metabolites of organophosphate pesticides, the detection frequency ranged between 5 (DEDTP) and 95 % (DMTP) of the individual urine samples. Levels of brominated flame retardants were under the limit of quantification in most blood samples.
Margins of safety (MOS) were calculated by dividing the 90th percentile by the available health based biomonitoring equivalants (BEs). MOS below 10 were observed for toxicologically relevant arsenic, cadmium, lead, methyl mercury, hexachlorobenzene and phthalates.
Conclusions: Flemish reference values for exposure to environmental pollutants were obtained, both for historical and new emerging chemicals. These reference values may be used to follow up time trends and to compare exposure of the general Flemish population with health based guidance values.

Dionisio KL[1], Howie S[2], Dominici F[1], Fornace KM[3], Adegbola RA[2], Spengler JD[1], Ezzati M[4] (2011)
"Calculating the exposure of infants and children to particulate matter from biomass fuels in The Gambia"

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Background and aims
Smoke from biomass fuels is a risk factor for pneumonia, the leading cause of child death worldwide. While particulate matter (PM) is the metric of choice when evaluating the health effects of biomass smoke, measuring children's exposure to PM is very difficult. Previous studies have used indirect methods to estimate children's PM exposure, including using carbon monoxide (CO) as a proxy for PM, and using time-location-activity budgets in combination with microenvironment PM monitoring. The validity and comparability of these indirect methods is not known. We report on a study which used multiple methods to quantify children's exposure to PM, and validated estimates from indirect methods against direct measurements.

Methods
Two estimates of personal exposure of children in The Gambia to PM were compared to a directly-measured personal PM exposure. A parsimonious mixed effects model was previously used to predict usual 72-h personal CO exposure for 1,200 children. 186 co-located 72-h cookhouse measurements of CO and PM were used to model the CO-PM relationship, with the model including a natural spline to account for non-linearity. In addition, for 60 children time-location-activity budgets and continuous PM measurement in the cookhouse were used to calculate a second estimate of personal PM exposure. For 25 children, these two estimates were compared to a direct measurement of personal PM exposure.

Results
72-h CO and PM concentrations in the cookhouse had a correlation coefficient of 0.85. Based on Bayesian model selection, the CO-PM relationship was best described by a model including CO with a natural spline with 2 degrees of freedom, type of fuel used, season of measurement, and study site. Preliminary results show a mean calculated 72-h PM exposure on children of 112 ± 32 $\mu g/m^3$.

Conclusion
Children's exposure to $PM_{2.5}$ in The Gambia is well above WHO Air Quality Guidelines. The results of multiple measurement methods can be combined to estimate children's personal $PM_{2.5}$ exposure.

DISINFECTION BY-PRODUCTS AND COLORECTAL CANCER IN SPAIN

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Background and aims: Disinfection by-products (DBPs) are colorectal carcinogens in rodents exposed experimentally, but epidemiological evidence in humans is contradictory. A multi-case control study conducted in Spain (MCC-Spain) aims to evaluate the risk of colorectal cancer associated with long-term exposure to DBPs.

Methods: Incident cases 20-85 years old were enrolled and population-based controls were age- and gender-frequency matched to cases in Asturias, Barcelona, Gipuzkoa, León, Madrid, Murcia and Navarra. Study subjects were interviewed on residential history and water use (ingestion, showering, bathing, dishwashing and swimming in pools) and potential risk factors. Assessment of lifetime trihalomethane (THM) exposure is based on historical data on THM levels and determinants (water source and treatment) in the study municipalities.

Results: Among the 3762 study subjects included, water ingested at the longest residence (35 years on average) was mainly municipal water (65% cases, 75% controls), followed by bottled water (24% cases, 18% controls). Municipal water consumption at the longest residence, showering/bathing above the median (>35 min/week) and hand dishwashing above the median (>140 min/week) were not associated with colorectal cancer risk (odds ratios around 1 and not statistically significant). Stratified results by area showed consistent results. In a subset of Barcelona (488 cases, 422 controls), the study population was grouped in tertiles of lifetime residential THM concentration from age 16 years. Tertiles in μg/l were 7.5, 21.5 (chloroform); 22.7, 31.5 (bromodichlormethane), 13.9, 26.9 (dibromochloromethane) and 16.5, 49.2 (bromoform). In a model adjusting for the 4 THMs simultaneously, a decreased risk for colorectal cancer was observed for chloroform, and an increased risk for bromodichloromethane, both with statistically significant dose-response trends. No significant associations were found for dibromochoromethane and bromoform.

Conclusions: Results based on the questionnaire show consistent results among areas, with null associations. Results for THM exposure differ widely among specific THMs and need replication in other study areas.

SAHARAN DUST AND CAUSE-SPECIFIC MORTALITY IN EMILIA-ROMAGNA (ITALY)

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Background and Aims: There is a growing concern about the health effects of Saharan dust outbreaks but evidence is limited. We investigated the association between Saharan dust outbreaks and natural, cardiovascular and respiratory mortality.
Methods: A case-crossover design was adopted to assess the effects of Saharan dust days (SDD) on mortality in the Emilia-Romagna region of Italy. The population under study consisted of residents in the six main towns of the central-western part of the region who died between 2002 and 2006. Saharan events have been identified by using observations carried out at the Italian Climate Observatory at Mt. Cimone (2165 m a.s.l.). Based on previous analysis on particulate size distribution of Saharan air masses we decided to use PM_{10} data for particulate exposure instead of $PM_{2.5}$ and $PM_{2.5-10}$ separately. The association of Saharan dust outbreaks and PM_{10} concentration with mortality was estimated using conditional logistic regression, adjusted for apparent temperature, holidays, summer population decrease, flu epidemic weeks and heat wave days. The role of the interaction term between PM_{10} and SDD was analysed to test for effect modification induced by SDD on the PM_{10}-mortality concentration-response function. Separate estimates were undertaken for hot and cold seasons.
Results: We found some evidence of increased respiratory mortality for people aged 75 or older on SDD. Respiratory mortality increased by 22.0% (95% CI 4.0% to 43.1%) on the SDD in the whole year model and by 33.9% (8.4% to 65.4%) in the hot season model. Effects substantially attenuated for natural and cardiovascular mortality with ORs of 1.042 (95% CI 0.992 to 1.095) and 1.043 (95% CI 0.969 to 1.122), respectively.
Conclusions: Our findings suggest an association between respiratory mortality in the elderly and Saharan dust outbreaks. We found no evidence of an effect modification of dust events on the concentration response relationship between PM_{10} and daily deaths.
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AMBIENT TEMPERATURE AND RISK OF CARDIOGENIC SHOCK – A CASE-CROSSOVER STUDY

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Background and Aims: Cardiogenic shock is a life-threatening medical condition. The authors investigated the association between ambient temperature and risk of cardiogenic shock.

Methods: This population-based case-crossover study used claims data from Taiwan National Health Insurance. We identified patients with an initial hospitalization for cardiogenic shock during 1996-2008 using the primary hospital discharge diagnosis. For each subject, we defined the date of hospitalization for cardiogenic shock as the case period. Ambient temperature was compared between the case period and the 14 control periods: 7th, 14th, 21st, 28th, 35th, 42ed and 48th day before and after the case period. We used conditional logistic regression models, mutually adjusted for mean daily temperature and daily temperature change, to assess the association between the two variables and risk of cardiogenic shock.

Results: During the 13-year period, 53352 patients had an initial hospitalization for cardiogenic shock. Mean daily temperature of 30°C and above presented in 3.9% of case periods and 3.6% of control periods (p=0.004), and the adjusted odds ratio (OR) was 1.16 (95% confidence interval [CI]=1.08-1.25), as compared with mean temperature of 20-24°C. The corresponding OR was 1.02 (95% CI=0.99-1.05) for mean temperature of 25-29 C, 1.00 (95% CI=0.97-1.03) for that of 15-19°C and 0.99 (95% CI=0.95-1.03) for that of <15°C. However, greater daily change in temperature was associated with increased risk of cardiogenic shock. Compared with the change of <5°C, the adjusted OR was greatest for the change of 15°C and above (OR=1.15, 95% CI=1.09-1.21), follow by the variation between 10-14°C (OR=1.09, 95% CI=1.04-1.15) and 5-9°C (OR=1.08, 95% CI=1.04-1.13).

Conclusions: Elevated ambient temperature and increased daily variation in temperature are associated with increased risk of cardiogenic shock in this study in Taiwan. We found no appreciably association between low temperature and the risk of cardiogenic shock.

RESIDENTIAL HISTORY, DURATION OF ENVIRONMENTAL AND NEIGHBORHOOD SOCIOECONOMIC EXPOSURES AND MENTAL AND CARDIOVASCULAR HEALTH

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Background and Aims: High traffic at the residence has been linked to cardiovascular and mental health in cross-sectional analyses; however, the lack of a residential history to assess duration of exposure has limited prior analyses. We investigate the effect of exposure duration on disease prevalence.
Methods: We used baseline data (2000-2003) from the population-based prospective Heinz Nixdorf Recall Study in Germany. Residential history of 10 years before baseline examination was obtained from the city registries for 3,320 participants, aged 45-75 years. Proximity to state/federal highways, traffic noise (EU-directive; 2002/49/EC), and neighbourhood unemployment rate were assigned on a monthly basis to all of the participants´ addresses. Outcomes included depression, high coronary artery calcification (CAC), and hypertension. Logistic regression was used, adjusting for cardiovascular risk factors and traffic proximity (in models with noise and neighbourhood unemployment as main exposures).
Results: Full ten-year residential history was available for 95.3%, 20.7% changed their residence at least once. In the subset of participants with complete residential history (n=2,830), night-time noise exposure >60 dB for 1-60 months yielded ORs for depression (2.68; 1.08-6.64) and high CAC (1.67; 0.86-3.23); similar trends, but smaller effect sizes were observed for longer exposure duration. ORs for 1-60 and 61-120 months of residence in neighborhoods with high unemployment rate (upper quintile) were 1.20 (0.54-2.71) and 1.60 (1.10-2.31) for depression and 1.40 (0.87-2.28) and 1.01 (0.80-1.27) for high CAC, respectively. Marginal associations of residence within 100 m of a major road were observed for depression and high CAC, however, no consistent exposure-response relationship was found. ORs for hypertension were elevated, though inconclusive.
Conclusions: We found weak associations of long-term residential exposures with mental and cardiovascular health outcomes, but reductions in sample size due to out-of-area relocations and extrapolation of exposures into the past have to be considered.

INFLUENCE OF TRAFFIC-RELATED AIR POLLUTION ON BIOMARKERS OF OXIDATIVE STRESS AND INFLAMMATION IN HEALTHY ADULTS: SEASONAL FOLLOW-UP

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Background and Aims: Traffic-related air pollution is known to induce oxidative stress and inflammation in humans. Our aim was to assess whether measurement of oxidative stress and inflammation markers are associated with exposure parameters.
Methods: The study population consisted of 48 healthy non-smoking adults. Following biomarkers for oxidative stress and inflammation were analysed in both Winter and Summer season: oxidative DNA damage in blood (comet assay, FPG sites), 15-F2T-isoprostane in plasma, 8-oxo-2'-deoxyguanosine (8-oxodG) in urine, and nitric oxide (eNO) in exhaled breath.
Exposure to traffic-related air pollution during the 2 seasons was assessed: NO_2, PM_{10} and O_3 concentrations at the home address (4x4 km grids) were calculated by interpolation of measured concentrations at stationary stations. A Geographical Information System (GIS) was used to calculate traffic-related parameters. Also, participants wore a personal dosimeter for NO_2.
Associations between exposure parameters (single pollutant/exposure model) and biomarkers, within each individual in Winter and Summer, were tested using multiple mixed-effects regression models.
Results: NO_2 and PM_{10} concentrations correlated positively with eNO ($p<0.10$ and <0.01, respectively). For ozone, positive associations were found with comet assay results, 15-F2T-isoprostane measurements, and 8-oxodG in urine ($p<0.05$, <0.10 and <0.10, respectively). No correlations with GIS data or personal NO_2 dosimetry were observed.
Further, multi-pollutant models will be analysed. Results will be presented at the ISEE meeting.
Conclusions: It is well known that traffic-related air pollution triggers inflammation and oxidative stress reactions in individuals with chronic diseases, such as cardiovascular patients, asthmatics and diabetics. In our study biomarkers measured in healthy adults correlated with background outdoor pollutants at home address.
Ackownledgements: This study was financed by the Flemish Government (Department of Environment, Nature & Energy, Environment and Health unit), and the EU-FP7 project INTARESE.

PULSE PRESSURE AND CONSTITUENTS OF PARTICULATE AIR POLLUTION IN ELDERLY

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Background and Aims: An increased pulse pressure (Δ systolic – diastolic pressure) suggests aortic stiffening. New evidence also suggests that pulse pressure is a more sensitive measure of risk than other indexes of blood pressure in middle-aged and older persons. The objective of this study was to examine the acute effects of both particulate matter (PM) mass and composition on systolic blood pressure, diastolic blood pressure and pulse pressure, among a more susceptible population of elderly persons.
Methods: During the period June 2007 until October 2010, we carried out a panel study in persons living in elderly homes located in the province of Antwerp, Belgium. Blood pressure was measured and a blood sample was collected on two time points. Exposure to in- and outdoor 24 hour mean $PM_{2.5}$ mass concentrations was determined. The elemental content of the collected in- and outdoor $PM_{2.5}$ was measured. Oxygenated polyaromatic hydrocarbons (oxy-PAHs) sorbed onto outdoor PM_{10} were measured.
Results: We recruited 84 persons, 70 % women with a mean age of 83 years (SD: 5.2). Each interquartile range (IQR) increase of 21.1 µg/m³ in 24 hour mean outdoor $PM_{2.5}$ was associated with an increase in systolic blood pressure of 3.9 mmHg (95%CI:1.6 to 6.2) and in pulse pressure of 4.1 mmHg (95% CI: 1.8 to 6.5), in persons taking antihypertensive medication (n=54), but not in persons not using antihypertensive medication (p for interaction: 0.02). Vanadium, iron and nickel content of $PM_{2.5}$ were significantly associated with systolic blood pressure and pulse pressure, among persons on antihypertensive medication. Similar results were found for indoor concentrations. Of the oxy-PAHs, chrysene-5,6-dione, benzo[a]pyrene-3,6 and benzo[a]pyrene-6,12 were significantly associated with increases in systolic blood pressure and pulse pressure.
Conclusions: In elderly, pulse pressure was positively associated with acute increases in outdoor and indoor air pollution, among persons taking antihypertensive medication. These results might form a mechanistic pathway linking air pollution as a trigger of cardiovascular events.

MONETISING ROAD TRAFFIC NOISE AND AIR POLLUTION IMPACTS: DOES IT MATTER WHICH EFFECTS YOU SPECIFY?

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Background and aims: There is an increasing trend to monetise environmental health impacts. Only few studies provided original data on the economic valuation of environmental health impacts in terms of public's willingness-to-pay (WTP) and willingness-to-accept (WTA). We studied how people value the impacts of road traffic noise and air pollution.
Methods: A web-based survey was conducted in the United Kingdom, Finland, Germany, the Netherlands, and Spain in 2010. Our objective was to gather 2,000 respondents per countries. There were 2 types of survey: one on air pollution and the other on noise. Respondents randomly received one of the two types of the survey. We inquired respondent's WTP and WTA to avoid or to accept the current level of road traffic noise and air pollution related to different types of health and wellbeing outcomes.
Results: Nearly 10,500 respondents answered the survey and 75% of them decided to answer the other type of survey. Circa 10% of the respondents rejected the concept of WTP and 2% rejected the WTA concept, with various motivations between countries. When the effects of road traffic noise and air pollution were specified, their WTP and WTA increased, compared to when the effects were unspecified. The annual WTP for separated effects summed up for noise and air pollution had an average between €40 and €200 for the participating countries. For the annual WTA of separated effects, the average was between €130 and €2,230.
Conclusions: When effects were presented as a combination of effects which occurred simultaneously, the amounts of WTP and WTA were much lower than the sum of the individually scored health outcomes. Specifying the impacts of road traffic noise and air pollution lead us to a higher amount of WTP and WTA, compared to valuation of traffic noise and air pollution in general.

VALIDATION OF EXPOSURE ASSESSMENT IN ESCAPE, THE VE3SPA PROJECT

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Background and aims Land use regression (LUR) models can be used to provide individual estimates of outdoor air pollution concentrations at the residential address. There is limited information on how closely these residential exposure estimates are related to personal exposure. The objective of the VE3SPA project is to measure the personal exposure to PM2.5 and NOx for volunteers living at a busy street, an urban background location or a suburban/regional background location. The results will be used to quantify the agreement between modelled outdoor concentrations at the home address and measured personal exposures.

Methods In Barcelona, Helsinki and Utrecht fifteen volunteers participated, five from each location type. Volunteers were asked to adhere to predetermined time activity patterns representative for schoolchildren and elderly adults. The volunteers participated for two weeks in three different seasons (winter, summer and spring/autumn). During every 2-week measuring period, three participants (one from every site type) were selected.
At the house of the volunteer, three identical PM2.5 filter sampling units and NOx/NO2 (Ogawa) badges were placed. One unit was placed outdoors, one indoors in the living room and another was a mobile unit placed in a backpack. The participants took the backpack to different locations for a prescribed amount of hours.

Results We will present the differences in outdoor, indoor and personal exposures between busy street, urban and suburban/regional background sites for the three cities. In the Netherlands, average PM2.5 concentrations were 14, 11 and 11 $\mu g/m^3$ for outdoor, indoor and personal exposure respectively. Average absorbance values (a marker for elemental carbon) were 1.1, 0.8 and 0.8 for outdoor, indoor and personal exposure.

Conclusions Measured personal and indoor exposure to PM2.5 and black carbon were slightly lower than measured outdoor concentrations. A comparison between exposure modeled with LUR and measured exposures will be presented at the conference.

THE IMPACT OF URBAN SPRAWL ON THE WALKABILITY OF SUBURBAN, TRADITIONAL, AND URBAN COMMUNITIES IN CINCINNATI, OHIO, USA

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Background and Aims: The prevalence of obesity in the United States of America (USA) has risen over the past 25 years. Participation in regular physical activity and adopting a healthy diet are recommended behaviors in preventing obesity. An individual's level of physical activity is influenced by the walkability of his or her environment which has been compromised by the trend of urban sprawl. This research addressed the effect urban sprawl has on physical inactivity of members of suburban Cincinnati, Ohio, USA, communities as well as the negative impact of urban sprawl on physical activity of members who remained in the urban communities.
Methods: Using geographic information systems (GIS) and field observations, the walkability of a suburban, traditional, and urban community was assessed using six walkability criteria. In each community, two residences were chosen and observations related to the walkability criteria were recorded within a 400 meter buffer zone of the house.
Results: The suburban community was considered safe with good path quality and context, but deficient land use mix, poor connectivity, and minimal access to other modes of transportation proved to be a barrier to walking. The neighborhoods in the urban community had good mix ofland uses, high connectivity of the path network, acceptable path quality, and multiple linkages to other modes of transportation. Safety and path context proved to be extremely poor attributes of this neighborhood. The traditional neighborhood could be deemed walkable based on all six walkability criteria.
Conclusions: City planners and public health practitioners must work together to evaluate their communities and plan improvements that will support walking and outdoor physical activity. Enhancing neighborhood walkability by adding sidewalks, addressing safety concerns, or improving neighborhood aesthetics can reduce the negative effects urban sprawl has had on physical activity and ultimately the rates of obesity.

ENVIRONMENTAL CONTAMINATION AND ITS IMPACT ON PREGNANCY FREQUENCY IN ESTUARY OF SANTOS AND SÃO VICENTE, SÃO PAULO, BRAZIL

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Background and Aims: There are many sources of pollution like capital goods industries, port terminals and open air dump sites in the region of Santos and São Vicente Estuary. Heavy metals, organochlorine pesticides, polychlorinated biphenyl, dioxins and furans are stood out within toxic substances found in this region that are deleterious to health and cause mostly effects on reproductive system. The aim of this study was to evaluate occurrence of pregnancy in these contaminated areas comparing to a non contaminated area (control).
Methods: We adopted a cross sectional study. A structured and pre-tested questionnaire was applied to 820 families in each one of the five studied areas: four of them in the Estuary region and one in a control area without evidences of environmental contamination but with the same socioeconomic profile of the contaminated ones. We estimated the proportion of pregnant, controlling to important fertility risk factors (time of exposure in the area, occupational exposure, use of alcohol and tobacco), in those areas and tested differences among them and the control area using the Fisher's exact test and adopting a significance level of 5%. This study is part of a wide project which aims to estimate the effects to health associated to environmental contaminants exposure in the Santos and São Vicente Estuary Region.
Results: We found a significant association between living in contaminated areas in three of four areas and decrease of pregnancy percentage. Area 2 (Cubatão) 26,2% (133), Area 3 (São Vicente) 30,7% (125), Area 4 (Guarujá) 30,9% (141) compared to control area (Bertioga) 38,4% (128).
Conclusions: This study shows enough evidence in reducing number of pregnancies in contaminated areas and reinforces the necessity of deepening additional studies in the region of the Santos and São Vicente Estuary.

EARLY LIFE BPA EXPOSURE AND OBESITY AND METABOLIC SYNDROME IN CHILDREN

Con formato: Derecha: 0 cm

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Background and Aims: Bisphenol A (BPA) is a widely used, endocrine disrupting compound detected in 93% of Americans. Prenatal and early postnatal BPA exposures are associated with increased weight gain in rats, but no published studies have examined early life exposure and obesity in children.
Methods: Participants were 313 children enrolled in the Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS), a longitudinal birth cohort study in northern California. We measured BPA concentrations in urine from mothers during pregnancy and children at 5 and 9 years of age. Children were examined at 9 years of age to measure height, weight, waist circumference, percent body fat, and blood pressure. Fasting blood was collected on a subset (n=119) of 9-year old children for measurements of glucose and lipids.
Results: Urinary BPA concentrations in pregnant mothers (median = 1.1 µg/L), and children at age 5 (median = 2.3 µg/L) and age 9 (median = 1.6 µg/L) were within U.S. national averages. Prenatal and age 5 BPA concentrations were unassociated with anthropometric measures at age 9. However, $\log_{10}$-transformed BPA concentrations at age 9 were associated with increased BMI (• =2.1 kg/m^2, 95% confidence interval (CI): 0.6, 3.6), waist circumference (• =6.0 cm, 95% CI: 2.0, 10.2) and percent body fat (• =4.3%, 95% CI: 0.4, 8.2) at age 9. Results were similar after adjustment for urinary creatinine and other covariates. Future analyses will examine associations with elements of metabolic syndrome, including blood pressure, glucose, and lipid levels.
Conclusions: Prenatal and early childhood exposures to BPA were not associated with BMI, waist circumference, and percent body fat at age 9 years, but concurrent BPA levels were. It is unknown whether BPA is causally related to obesity or whether the association is due to weight-related differences in storing or metabolizing BPA.

VALUING ENVIRONMENTAL HEALTH IMPACT OF TRAFFIC CIRCULATION PLAN IN THE HAGUE

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Background and aims: Within the framework of Integrated Assessment of Health Risks of Environmental Stressors in Europe (INTARESE), the impact of the traffic circulation plan (VCP) in The Hague during 2007-2010, was assessed. Our aim was to provide an overview of the relevant costs and benefits of different health endpoints related to the traffic exposure of this transport intervention.

Methods: The impact of VCP was quantified by selecting traffic-related exposure and health endpoints, modelling of population exposure, selecting exposure-effect relations, estimating the number of attributable cases, and assessing these outcomes in terms of Euros.
By applying the "revealed-preference" method using the existing market prices for cardio- and respiratory diseases, the perceived depreciation of property, and the aggregated health indicator for mortality, we derived economic values for persons with a certain disease/health end-point attributable to road traffic noise exposure or exposure to air pollution.

Results: Some 90,000 people live in the study area which covers about 8 km^2. The benefit of discounted mortality in the period between 2010 and 2115, which is the expected life period of a birth cohort in 2010, is approximately projected to be €7 million for 467.4 life years gained with the implementation of VCP. The annual gains in terms of less hospital admissions for cardiovascular- and respiratory diseases are circa €3,000. A reduction of noise to 50 dB and 55 dB increases the property values with approximately a range of between €120,000 and €105,000 annually in the housing areas influenced by VCP.

Conclusions: In the period up to 2020, the monetary value of the total health benefits from VCP implementation is projected to be approximately 1.5 to 2 million euros. Two thirds of this would be due to health benefits from noise reduction, while one third from cleaner air. For a longer time span, e.g. 2030, the benefits from cleaner air would be greater than from noise reduction.

AIR QUALITY MONITORING SYSTEM FOR A MORE COMPREHENSIVE LOOK AT TRANSPORTATION EMISSIONS

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Background and Aims:
Recent studies indicate that pedestrians are regularly exposed to high levels of sulfur dioxide (SO_2), nitrogen dioxide (NO_2), nitric oxide (NO), ozone (O_3) as well as carbon monoxide (CO) at street level, with peak concentrations during the rush hour commute. Many respiratory and cardiovascular issues for children under 18 years of age and elderly people have been linked to exposure to air pollutants. Current roadside monitoring of transportation emissions is irregular and subjective to the availability of personnel to remain on site, indicating the need for a more continuous system for data acquisition.
Methods: The unit under development is compact, unobtrusive, cost effective and easily installed at street level for continuous monitoring of air pollution to provide a more comprehensive data set on daily pedestrian exposure to air pollution. This system utilizes compact sensors and a unique Linux based operating system, facilitating a simple expansion protocol to a network of sensor nodes, allowing for regional comparison as well as the facilitation of modeling urban levels of carcinogenic gas. It currently has pressure, temperature and relative humidity sensors integrated in to the system, while lab testing continues on the selected gas sensors.
Results: The system is fully functional. The temperature, pressure and relative humidity sensors have been integrated and are producing accurate results. The system is functionally robust where any error occurs, the system is set to reboot and start anew. The units can be left running for months at a time without issues enabling them to continuously collect data 24 hours a day.
Conclusions: The system is created in order to minimise size and maximise performance to enable monitoring in close proximity to the breathing height of the public. Additional units deployed are easily integrated in to the network to facilitate mapping of pollution levels.
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EPIDEMIOLOGY OF UNINTENTIONAL CARBON MONOXIDE FATALITIES IN THE UK

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Background and Aims: Carbon monoxide (CO) is a colourless, odourless, tasteless, non-irritant gas, which is potentially lethal. We describe the epidemiology of unintentional non-fire related CO fatalities in the UK and where possible to link this to sources of CO.
Methods: Unintentional CO related deaths were as recorded on the CO-Gas Safety Society (COGSS) database. Results were compared to results from the English House Condition Survey (EHCS). Statistical tests included the calculation of relative risk and 95% confidence intervals.
Results: The COGSS database from 1 January 1996 to 31 December 2007 inclusive was used, covering 462 deaths. Patterns were mostly as expected with spikes of death in the colder season but some small changes over time occurred. The most striking results concerned those related to heaters which could not be tested against national usage data and gas vs non-gas heating fuels which was tested. By consulting the EHCS the overall relative risk for death due to non-gas vs gas fuels was found to be 10.52 (95% CI 7.71 – 14.34).
Discussion and Conclusion: The main weaknesses of the study lies in the heavily reliance on figures from an incomplete database. While confident in the broad observations there is the possibility of sample bias in the COGSS figures. There do not appear to be any other studies, which have examined CO-poisonings in a similar way. However, several of the more generic findings are corroborated in a few recent studies.
Despite possible apprehensions about the quality of the data, there is nonetheless a clear need for concern regarding CO-related deaths in the UK. In particular, the use of non-gas fuels has not before been highlighted as a significant cause of CO poisoning and the relative risk (although not the absolute risk) of CO-related fatalities from these fuels is substantial. Further investigation and more elaborate use of existing data is needed.

AGE AT PUBERTY IN RELATION TO PREPUBERTAL MEASURES OF PFOA – NEW FINDINGS

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Background and Aims: Polyfluoroalkyl compounds (PFCs), such as perfluorooctanate (PFOA) and perfluorooctane sulfonate (PFOS), have been reported to change mammary gland structure in laboratory animals and pubertal timing in humans. We explored the relationships between serum PFOA and PFOS concentrations and pubertal maturation in young girls.
Methods: Within the NIH Breast Cancer and the Environment Research Program, we conducted a study of PFC environmental biomarkers, including PFOA and PFOS, in young girls (age 6-7 years at entry) from two sites (N=688 girls). Pubertal staging (breast and pubic hair) has been conducted by clinicians or trained research staff, every year or more frequently, for as long as six years. Using longitudinal analysis methods (time to event) we studied the relationship between PFOA and PFOS serum concentrations measured at the beginning of the study (2005-2006) with age at pubertal Stage 2.
Results: Median serum concentrations of PFOA and PFOS differed at the two sites (California: PFOA= 5.8 ng/ml, PFOS=12.5 ng/ml vs. Cincinnati PFOA =7.9 ng/ml, PFOS 14.0 ng/ml). Among girls at the Cincinnati site, we found a statistically significant relationship between PFOA serum concentration and age at Tanner breast Stage 2, and an inverse relationship between PFOS and age when Tanner pubic hair Stage 2 was first noted, with adjustment for race/ethnicity, body mass index percentile for age, caregiver education and mother's age at menarche. Neither of these relationships reached statistical significance among the girls at the California site.
Conclusions: PFOA and PFOS may act as endocrine disruptors, affecting the timing of pubertal maturation in humans.

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PREVALENCE OF PREGNANCY OUTCOMES IN CONTAMINATED AREAS IN ESTUARY OF SANTOS AND SÃO VICENTE, SÃO PAULO STATE, BRAZIL

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Background and Aims: The Estuary region hosts a large number of industries, based on petrochemical, steel and production of fertilizers since the 1950s. Epidemiology provides evidence that fetus and infants are probably more susceptible to environmental toxic substances than adults. Therefore, the aim of this study was to evaluate the occurrence of adverse pregnancy outcomes in these contaminated areas comparing to a non contaminated area (control).
Methods: We adopted a cross sectional study. A structured and pre-tested questionnaire was applied to 820 families in each one of the five studied areas: four of them in the Estuary region and one in a control area without evidences of environmental contamination but with the same socioeconomic profile. We estimated the prevalence of pregnancy outcomes (abortion, prematurity, low birth weight – LBW, stillbirth, congenital malformation), controlling to important pregnancy risk factors (time of exposure in the area, occupational exposure, use of alcohol and tobacco), in those areas and tested differences among them and the control area using the Fisher's exact test and adopting a significance level of 5%. This study is part of a wide project which aims to estimate the effects to health associated to environmental contaminants exposure in the Santos and São Vicente Estuary Region.
Results: We found a higher prevalence of pregnancy outcomes in contaminated areas. A significant association was found between living in contaminated areas and increase of spontaneous abortions prevalence; Area 1 (Pilões) 14.9% (20), and Area 3 (São Vicente) 17.8% (21) compared to control area (Bertioga) 7.3% (9). There was also a significant increase in prevalence of LBW in Area 1 (Pilões) 9.2% (12) compared with the control area (Bertioga) 3.3% (4).
Conclusions: This study shows evidence in increase number of pregnancy outcomes in contaminated areas and reinforces the necessity of additional studies in these regions.

Arsenic methylation is associated with breast cancer risk in northern Mexico

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Background and Aims: Arsenic (iAs) exposure has been associated with several types of cancer (1). However, most studies to date have not yet implicated iAs as a cofactor for breast cancer (BC). BC incidence and mortality are 3-fold higher in Northern Mexico (NM) than in the rest of the country (2). iAs levels in drinking water are a source of concern since they have been above international standards (3). We hypothesized that iAs exposure and individual Arsenic-methylation ability are potential cofactors for BC risk.
Methods: We investigated 840 BC incident cases and 973 controls from a population-based case-control study performed in NM. Women were directly interviewed about dietary and reproductive BC covariables. iAs metabolites in urine were determined by HPLC/ICP-MS. Methylation capacity was assessed by calculating the percentage of iAs species and primary [MMA(V)/(As(III)+As(V)] (PMI) and secondary [DMA(V)/MMA(V)] methylation indexes (SMI).
Results: The range of total urinary Arsenic was 0.4-303.9 ug/L. Most women (91%) had values above 50 ugAs/L. %MMA(V) was significantly higher in BC cases while %DMA(V) was significantly lower. PMI was positively associated with BC (OR T3vsT1=1.47; 95%CI=1.17-1.84; p for trend=0.001), while SMI was negatively associated (OR T3vsT1=0.54; 95%CI=0.42-0.68; p for trend<0.001).
Conclusions: As exposure may pose a risk for BC, particularly in women with higher capacity to methylate iAs to MMA(V) and lower capacity to further methylate MMA(V) to DMA(V). This is consistent with studies indicating that the proportion of MMA(V) in urine was positively associated whereas that of DMA(V) was inversely associated with the risk of skin, bladder and lung cancer (4,5). Further research is needed about the temporal relationships between disease and methylation capacity and the presence of potential association modifiers, including environmental and genetic factors involved in one carbon metabolism.
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MOTORISED TRIPS SUSCEPTIBLE OF BEING SUBSTITUTED BY WALKING IN CATALONIA, SPAIN

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Background and aims: Walking as a mean of transport is considered a moderate physical activity that can be integrated into daily life and suitable for achieving recommended activity levels. This study aims to quantify the number of people who could achieve recommendations by substituting short motorised trips (5 minutes or less) by walking.
Methods*:* A cross-sectional study was developed. Data come from individuals older than 3 years who reported, in the 2006 Daily Mobility Survey, having travelled on the referred working day (N=98,665). A bivariate and multivariate logistic regression analysis was carried out to determine the factors associated with making short motorised trips among those not reaching recommended physical activity levels through walking, by calculating odds ratios (OR) and their corresponding 95%CI.
Results: A total of 79% of men and 70.6% of women did not achieve recommended physical activity levels through walking. Of those, 16% of men [95%CI 15.6-16.4], and 14.5% of women [95%CI 14.1-14.9], could achieve recommended levels of physical activity if they were to substitute at least one (in adults) or two (in younger than 18) short motorised trip by walking. This change would increase in 405,694 men [95%CI 394,742-416,619] and 321,303 women [95%CI 311,989-331,012] the number of people in Catalonia who would achieve recommended daily levels of physical activity through walking as a means of transport. In both men and women, the association of making short motorised trips increases with decreasing age (OR=3.01, [2.13-4.50] in 4-11 aged boys; OR=6.04[3.91-9.31] in girls), increases with decreasing size of municipality (OR=4.32[3.71-5.05]; OR=6.49[5.34-7.89], men and women, respectively, residing in the smallest municipalities) and is associated with living with 2 or more other people only among women (OR=1.71[1.44-2.04]).
Conclusion: This study shows the potential of daily trips on foot as a source of physical activity when combating current levels of sedentarism.

PRENATAL EXPOSURE TO PM2.5 AND ITS RELATIONSHIP WITH LOW BIRTH WEIGHT IN THE INMA-GIPUZKOA COHORT.

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Background and Aims: Research has shown that prenatal exposure to air pollutants may have a detrimental effect on foetal development. Weight at birth is the most commonly used anthropometric variable for assessing foetal growth. The objective of this study was to assess the role of exposure to 2.5 µm particulates ($PM_{2.5}$) in the first trimester of pregnancy considering the birth weight of children of the INMA-Gipuzkoa cohort (Spain) (www.proyectoinma.org).
Methods: Growth charts for both sexes were constructed from the data of children born between 2006 and 2008 in Gipuzkoa (N=21,629). The estimation of percentiles was carried out using the Least Mean Square (LMS) method for smoothing and Small for Gestational Age (SGA) babies among INMA children were identified. Data on exposure to $PM_{2.5}$ were obtained from 3 DIGITEL high volume samplers and two stations in the air quality network of Basque Government (Spain).Assignment to a level of exposure was made for those women who lived in the city less than 500 metres from one of the sites where measurements had been taken. They were assigned an average value for $PM_{2.5}$ for week 12 of their pregnancy. Two multivariate regression models were build using birth weight and SGA as the dependent variables, while exposure was introduced as a continuous and dichotomous variable (>20 $\mu g/m^3$).
Results: Out of the 601 births in INMA, 64 (10%) were identified as SGA. The average level of exposure to $PM_{2.5}$ at week 12 of pregnancy was 17.56 $\mu g/m^3$ (range: 8.3-35.4 $\mu g/m^3$). Results showed a statistically significant relationship between exposure and SGA ($OR_{PM2.5}$ =1.007; p=0.036, unadjusted OR>20 =2.537; p=0.008 and OR>20 adjusted=1.11; p=0.038).
Conclusions: We observed a positive relationship between the prenatal levels of exposure to $PM_{2.5}$ during the embryonic stage of pregnancy and an increased risk of low weight at birth in terms of SGA.

PUBLIC HEALTH RISK ASSESSMENT ASSOCIATED WITH HEAVY METAL AND ARSENIC EXPOSURE NEAR AN ABANDONED MINE (KIRKI, GREECE)

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Background and Aims: The "Agios Philippos" lead-zinc mine in the Kirki region (NE Greece) is now closed but its legacy of heavy metal contaminated land remains at the site (Loupasakis and Konstantopoulou 2009, Nikolaidis *et al.* 2010). A risk assessment approach was elaborated in order to address the potential adverse health effects associated with lead, cadmium, zinc and arsenic exposure.
Methods: Soil samples from the proximity of the mine were collected and analyzed using standard procedures (Chen *et al.* 2006). Risk assessment guidelines developed by US EPA were employed in order to assess exposures related to i) inhalation of dust particles, ii) dermal absorption of trace elements adhered to the skin and iii) soil ingestion (US EPA 1997). The average daily dose (ADD) was calculated taking into account both the carcinogenic and non-carcinogenic risk. The reference dose (RfD) for each element was used to yield a hazard quotient (HQ) of non-carcinogenic effects. The hazard index (HI) was then generated by summing up all individual HQs. A slope factor (SF) was used to calculate the carcinogenic risk (CR) for arsenic (IRIS 2009).
Results: The majority (69.2%) of samples approximating the source of heavy metal contamination produced an increased toxicological risk for arsenic and lead. The overall hazard index near the mine portal exceeded the accepted value (HI• 1) by 4.3-fold. An unacceptable carcinogenic risk for arsenic (CR> 1 x10^{-5}) was evident near the contamination source, which gradually faded out with distance from the mine.
Conclusions: These findings indicate that heavy metal contamination in the "Agios Philippos" mine poses a significant risk to the exposed population (Kirki, NE Greece). These exposures have to be carefully evaluated at the biological level and validated by appropriate epidemiological methods before any further conclusions can be made.

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EFFECTS OF PRENATAL AIR POLLUTION EXPOSURE ON CHILDHOOD BLOOD PRESSURE AND CAROTID INTIMA-MEDIA THICKNESS

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Background and Aims: Air pollution exposure is a risk factor for atherosclerosis in adults but whether this association exists at a younger age remains unclear. We hypothesized that prenatal and lifetime exposures to air pollutants would be associated with increased blood pressure and carotid intima-media thickness (CIMT) in children.

Methods: We investigated these hypotheses in a subset of 568 children from the Children's Health study on whom we measured blood pressure and right common carotid IMT and calculated prenatal and lifetime air pollution exposures. Average pollutant concentrations for each trimester and total lifetime exposure were computed using a weighted average of calendar month averages based on central site monitoring data and residential history. Caline dispersion model estimates of $PM_{2.5}$ and NO_x based on traffic data within 5 km of each residence were calculated. Linear regression models were used in all analyses.

Results: Prenatal exposures to NO_2, $PM_{2.5}$, and CO were associated with increased childhood systolic blood pressure (SBP) in univariate analyses. After adjustment for sex, age, ethnicity, BMI percentile, income, town, and parental history of high blood pressure and high cholesterol, only prenatal exposures to NO_2 (β= 0.09 mm Hg per 1ppb, p= 0.06) and PM_{10} (β =0.05 mm Hg per 1 $\mu g/m^3$, p=0.06) during the third trimester remained marginal predictors of childhood SBP. Second trimester exposure to elemental carbon (EC) was significantly associated with a 0.01 mm increased CIMT (p=0.04) per $\mu g/m^3$ change in a smaller subset of children with EC data (n=403). However, this association was reduced by half after adjustment for covariates. None of the lifetime exposures and Caline-derived estimates were associated with childhood SBP or CIMT.

Conclusions: Prenatal exposure to air pollutants may have deleterious effects on childhood cardiovascular risk factors.

SHORT-TERM EXPOSURE TO AMBIENT AIR POLLUTION AND BLOOD PRESSURE IN THE FRAMINGHAM HEART STUDY

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Background and Aims: The association between exposure to ambient particulate matter (PM) air pollution and blood pressure (BP) is uncertain. We investigated the association between short-term average levels of PM2.5 and black carbon (BC) and BP in the Framingham Heart Study (FHS) Offspring cohort, hypothesizing that higher short-term exposure would be associated with higher BP.
Methods: In a repeated measures prospective cohort study, systolic (SBP) and diastolic (DBP) BP and clinical and demographic information were obtained at the FHS Offspring Exams 7 (1998-2001; 1966 eligible participants [n]) and 8 (2005-2008; n=1604). PM2.5 (mean daily level 9.9 $\mu g/m^3$) and BC (mean 0.84 $\mu g/m^3$) concentrations were measured at a central monitoring site near downtown Boston, Mass. Subjects living beyond 40 km from the monitor were excluded. We assessed the association between 1, 2, 3, 5, 7, 14, 21, and 28-day moving averages (MAs) of the pollutants' concentrations and the BP outcomes. We used a linear mixed effects model with a random intercept for each subject to analyze the overall association between pollution exposure and BP measurements, adjusting for age, sex, body mass index, use of lipid-lowering and antihypertensive medications, diabetes, cardiovascular disease, smoking , season, apparent temperature, and date.
Results: A 1 $\mu g/m^3$ higher 7 day MAs of PM2.5 was associated with a 0.010 (p=0.92) lower SBP and 0.078 (p=0.17) lower DBP. For BC, a 1 $\mu g/m^3$ higher 7 day MA was associated with a 0.23 (p=0.86) lower SBP and a 0.98 (p=0.18) lower DBP. Results for other MAs were similar.
Conclusions: In this cohort of largely suburban community-dwelling middle-aged-to-elderly white adults, there was no association between short-term exposure to PM2.5 or BC and BP. Future analyses will incorporate additional FHS exams and more precise exposure assessments, as well as assess the association between chronic exposure to traffic related pollutants and BP.

THE PILOT STUDY OF HEARING LOSS IN JUNIOR HIGH SCHOOL STUDENTS USE MP3 PLAYER

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Background: Along with the technical progress, MP3 (MPEG-1 Audio Layer III) is modern person indispensable electronic product. Many studies showed that the the most noise source of recreational activities was MP3 for teenagers. Fligor et al. indicated that MP3 sound pressure levels measured volume control setting ranged from 91 to 121 dB(A) and peak sound pressure levels exceeded 130 dB(A) in 2004. It's very easy to damage the structure of ear. The study discussed that junior high school students used MP3 whether or not and it influenced hearing seriousness and relationship.

Methods: The subjects were 101 grade seven students in north Taiwan. Using MP3 were exposed subjects and disusing MP3 were non-exposed subjects. The degree of hearing loss measured was interview questionnaire which assisted pure-tone audiometry.

Results: In both groups, their left and right ears had poorer hearing thresholds at low frequency. There was a dip in 6k Hz which is included noise hearing loss primarily. And the hearing thresholds of non-exposed group were worse than exposed group in right ears. The possible reason was that the non-exposed group were used to watch TV in entertainment activities 3.03 times than exposed group. The volume of TV also affects the hearing. In blood pressure, two groups didn't have significant difference but exposed group who systolic and diastolic blood pressure were higher than non-exposed group. Noise exposed made blood pressure rising indeed and raised probability to get hypertension.

Conclusions: The volume don't surpass 60% in the loudest volume by using MP3 and continuous listening time don't exceed 60 minutes. To avoid teenagers have early hearing loss.

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RISK-BENEFIT ANALYSIS: NUTRITIONAL AND ENVIRONMENTAL SAFETY OF FISH CONSUMPTION

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Background and Aims: Research reveals associations between fish consumption and long-chain polyunsaturated fatty acid (n-3PUFA) intake, exposure to environmental contaminants and health outcomes including developmental, coronary heart disease (CHD) and cancer (IOM, 2007; Mozaffarian and Rimm, 2006; Willett, 2005). There is also evidence of public confusion about risks and benefits inherent in consuming fish, raising concerns about food safety communication. (WHO, 2009; McManus et. al., 2009). The aims of this study are to: (1)demonstrate the influence of fish consumption choice on exposures to risks and benefits; and (2)quantify associated health and socio-economic outcomes.

Methods: A risk-benefit framework is applied to the association between CHD and low-dose, chronic exposure to methyl mercury (MeHg) and n-3PUFAs resulting from fish consumption. Ecological exposure assessment is conducted with reference to species and quantity consumed and whether fish are farmed or wild. A baseline consumption profile and exposure factors are constructed for the US population. Five consumption/exposure scenarios are elaborated and input into a dose-response synthesis to assess associated changes in CHD. The Value of a Statistical Life Year (VSLY) method is used to analyse the socio-economic implications of the dose-response results.

Results: The distribution of fish species within the consumption portfolio is the main determinant of exposure factors. Significant improvements are achievable with minor adjustments in consumption patterns. The dose-response synthesis supports assertions that for CHD outcomes, n-3PUFAs and MeHg are, respectively, the main sources of benefits and risk. The simulations point to associations between lower relative risk of CHD death and consumption profiles featuring lower MeHg/ higher n-3PUFAs species.

Conclusions: This risk-benefit framework is effective for analyzing and communicating food safety information and is applicable to multiple attributes and health associations. Incorporating socio-economic analysis translates health information for a wider audience.

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LINKAGE OF THE NATIONAL HEALTH INTERVIEW SURVEY TO CLIMATE INDICATORS: A RESOURCE FOR UNDERSTANDING THE IMPACT OF CHANGE

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Background and Aims: Although there is growing literature describing acute health effects of extreme climate events, such as heat waves, less is known about the effects of climate changes on chronic conditions. Appropriate measures that reflect long term climate changes that can be linked to health outcome data are unknown. This study describes potential climate indictors for linkage to the U.S. National Health Interview Survey (NHIS).
Methods: 2006-2008 NHIS data for adults were linked to county-level climate data from National Climatic Data Center. Health measures examined included: fair/ poor health, heart disease, hypertension, and asthma. Using 1977-1987 as the baseline, the 99th and 1st percentiles of maximum and minimum temperatures for each county and month (about 300 values) were used to define thresholds of excessively hot and cold days. Indicators were created for each county by summing the number of days in the prior 5 years that exceeded thresholds and identifying the 90th percentile of days; approximately 75% of NHIS respondents lived in counties with complete data for the prior 5 years. Odds ratios (AOR) of associations between indicators and health measures were adjusted for race/ethnicity, age, region, and urbanization.
Results: Respondents in areas with a relatively large number of hot days over the prior 5 years may experience more adverse health outcomes, including hypertension, heart disease, and fair/poor health. Furthermore, living in areas with a large number of hot spring days was associated with significant increases in hay fever (AOR=1.24 (95% CI 1.04, 1.48)) and asthma emergency department visits (AOR=1.68 (CI 1.08, 2.62)). Cold days were not associated with these outcomes.
Conclusions: People in unusually hot areas may experience more adverse health conditions, although mechanisms are not understood. Developing appropriate indicators of extreme climate conditions will increase our ability to monitor potential impacts of climate change on health.

SOURCE IDENTIFICATION AND APPORTIONMENT OF PARTICULATE MATTER IN ACCRA, GHANA

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Background and objective

Cities in the developing world are growing rapidly, particularly in sub-Saharan Africa, with corresponding increases in economic activity and traffic. Little is known about air pollution sources and their relative contributions to air pollution in African cities. The objective of this study is to identify sources of ambient particulate matter (PM) in Accra, Ghana and to characterize the contribution of each source.

Methods

We collected 48-hour $PM_{2.5}$ (aerodynamic diameter less than 2.5 μm) and PM_{10} (aerodynamic diameter less than 10 μm) samples at 11 residential or roadside sites in four neighborhoods of Accra between November 2006 and August 2008. Elemental composition of PM was assessed by performing X-ray fluorescence (XRF). We developed an extended factor analysis method that accounts for spatial and temporal correlation of data and for site-specific covariates. We applied this method to the elemental concentration data for source identification and apportionment.

Results

XRF results show that crustal elements (Al, Si, Fe, Ca, Mg), sea salt elements (Na, Cl), K and S had the highest concentrations at various sites. Source apportionment results indicate that crustal material, road dust, combustion, and sea salt are the four main sources contributing to the observed concentrations in Accra. Crustal material was found to be the most important contributor at each site, followed by combustion. The sea salt factor was seen at each site, with the highest contribution at the site closest to the coast.

Conclusion

Crustal material, road dust, combustion, and sea salt are primary source contributors to PM in urban Accra.

LYMPHOHEMOPIETIC NEOPLASMS AND DIOXIN EXPOSURE IN THE SEVESO COHORT 30 YEARS AFTER THE ACCIDENT (1977-2006)

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Background and Aims: The 1976 Seveso, accident caused the contamination of a large inhabited area by 2,3,7,8-tetrachlorodibenzodioxin (TCDD). Three zones with decreasing soil TCDD levels were delimited: A (highest), B (high) and R (low). Persons ever living in the contaminated zones and in a surrounding non-contaminated area were followed-up, blind of their exposure status, to evaluate long-term health consequences. The main finding of the mortality (1976-2001) and cancer incidence study (1977-1991) was an increase in lymphatic and hematopoietic cancers in the most polluted zones (A and B). We report preliminary results of the extension of the follow-up to 30 years after the accident for lymphoemopietic cancers.
Methods: Incident cancer cases were ascertained through the hospital discharge registration system of the Lombardy region, where over 95% of the cohort was still resident in 1986. For each case all relevant medical records were reviewed. Relative risks (RR) and 95% Confidence Intervals (CI) were estimated with Poisson regression techniques controlling for age, gender and calendar period using the surrounding non contaminated area as reference.
Results: The incidence of all lymphohemopietic cancers was slightly increased in zone A (6 cases, RR =1.2; 95%CI 0.5-2.7) and showed a 50% excess in zone B (47 cases; RR=1.5; 95%CI 1.1-2.0). Non-Hodgkin's Lymphomas were modestly increased in zone B, whereas the RR for all leukemias was 2.0 (95%CI 1.2-3.4). 5 cases were lymphatic leukaemia and yielded a RR of 1.6 (0.6-4.1); 10 cases of myeloid leukaemia showed a RR of 2.1 (95%CI 1.04-4.15). All lymphatic leukaemias occurred after 20 years since the accident (RR=4.0; 95%CI 1.4-11.6) whereas myeloid leukaemia did not show a consistent pattern across different categories of time since the accident.
Conclusions: The extension of the follow-up confirms an increased risk for lymphatic and hemopoietic cancers, particularly leukemia, in the Seveso population.

PREVALENCE OF CIGARETTE SMOKING AND ENVIRONMENTAL TOBACCO SMOKE (ETS) VS URINARY COTININE IN A SPANISH COHORT OF PREGNANT WOMEN

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Background and aims: To estimate the prevalence of smoking during pregnancy and establish the cut-off point for urinary cotinina (UC) that differentiates smokers from non-smokers, as well as assessing exposure to ETS.
Methods: A total of 2,263 women from the INMA cohort (www.proyectoinma.org) recruited between 2003 and 2008 were included in the study. Data concerning smoking was collected using a questionnaire, and UC was measured by immunoassay in week 32 of pregnancy. Validity was assessed and the area under the ROC curve was calculated. Factors associated with tobacco smoking and misclassification (nondisclosure) were analysed using logistic regression.
Results Fifty-five per cent of women reported having smoked at some point in their life, 32% smoked at the beginning of their pregnancy, 20% at week 12 and 18.5% at week 32. A cut-off value of 50 ng/ml UC was found to have 95.7% sensitivity and 95.2% of specificity, while the positive and negative predictive values were 81.6 and 99.0% respectively and the area under the ROC curve was 98.6% (89.2-99.0%). There were 18 cases of false negative results and 90 false positives, while the numbers of true positive and true negative cases were 400 and 1,755, respectively. Smoking status and nondisclosure were associated with: women age<24 years old, social class IV, a low level of education and being European. The median of UC in smokers was 1,744 ng/ml. A linear correlation was found between UC and tobacco smoking ($p<0.001$), while among non-smoking women with UC <50ng/ml, UC was linearly correlated with the number of sources of exposure to ETS ($p< 0.05$). **Conclusions**: In week 32 of pregnancy, 18.5% of women reported that they were smoking and a further 3.9% probably smoked, or nonsdisclosure. We propose 50 ng/ml as a cut-off point for UC among pregnant women. UC was significantly associated with ETS.

ASSOCIATIONS BETWEEN ARIES AIR POLLUTION MEASUREMENTS AND ACUTE PRIMARY CARE VISITS FOR RESPIRATORY ILLNESSES—TEN-YEAR TIME SERIES

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Background and Aims: Previous 53-month analyses found several statistically significant air pollutants for acute childhood asthma primary care visits. Air pollution and primary care visit data are now available for 10 years. This analysis examines the effects of particulate matter and its components and gases on acute primary care visits for asthma and upper and lower respiratory infection (URI and LRI) over 116 months beginning 8/1/98. Presented results will cover 120 months.
Methods: Data sources are daily acute respiratory visits from a nonprofit managed care organization and air pollution measures from a centrally-located air monitoring site, both in Atlanta, GA, USA. Acute visits are appointments made on the same day the visit was completed. Pollutants included in this analysis are: $PM_{2.5}$, PM_{10}, Coarse PM, OC, EC, $PM_{2.5}$ water-soluble (ws) metals, coarse ws metals; $PM_{2.5}$ Zn, ws Cu, ws Fe, and ws Mn; and coarse PM ws Cu, ws Fe, and ws Mn. Poisson GLM was employed to determine the relationships between lagged pollutants (0-2, 3-5, and 6-8 day moving averages) and acute visits.
Results: Most pollutants produced insignificant results for each respiratory outcome. Significant findings included: PM10 (lag 3-5) and EC (lag 6-8) with acute childhood asthma visits (RR=1.024 and 1.018, respectively), and $PM_{2.5}$ ws metals (lag 3-5) and $PM_{2.5}$ ws Fe (lag 3-5) for LRI (RR=1.033 and 1.039, respectively). There were no significant findings for adult asthma and URI.
Conclusions: This is one of the longest times series analyses for examining the relationships between primary care outcomes and ambient air pollutants. As with our 53-month analysis, EC and PM_{10} are significant for childhood asthma. Additionally, presented results will compare ten-year results for two-pollutant, VOCs, and other models to 53-month results.

VARIATION OF NO_2 and NO_x CONCENTRATIONS AND NO_2 and NO_x LAND USE REGRESSION (LUR) MODELS IN 37 STUDY AREAS IN EUROPE

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on behalf of the ESCAPE WP2 group

Background and Aims: NO_2 and NO_x are important pollutants because they have been used extensively as a marker for several air pollutants in motor vehicle exhaust. Within ESCAPE, measurements of NO_2 and NO are made to develop land use regression (LUR) models. The comparison between and within study areas concerning the measured NO_2 and NO_x variation and the results of LUR modelling will be presented.
Methods: In the framework of ESCAPE, annual mean NO_2 and NO_x were estimated in 37 study areas across Europe between in 2008-2010. In each study area the concentrations were measured at 40-80 monitoring sites. The measurements were conducted for two weeks per site in three different seasons, using Ogawa badges. The calculated annual means were regressed against several GIS data. Here we present the results for 6 selected study areas: Barcelona, Catalunya, Dutch-Belgian, Ruhr, Munich-Augsburg, and Erfurt.
Results: Between and within all study areas significant variation was found for NO_2 and NO_x concentrations. In study areas in southern Europe the highest median levels and ranges (10-90th percentile) were observed (NO_2: 55 (34-82) µg/m³, NO_x: 90 (48-158) µg/m³). In densely populated areas in Central Europe smaller median levels and ranges were observed (NO_2: around 30 (20-45) µg/m³, NO_x: 45 (30-90) µg/m³). A small city in a less densely populated area (Erfurt, Germany) showed lower median and ranges (NO_2: 18 (12-30) µg/m³, NO_x: 26 (17-48) µg/m³). Land use regression models were developed which explained a large fraction of the measured variance of NO_2 (R^2 between 0.71-0.89) and NO_x (R^2 between 0.69-0.88). All LUR models include variables which cover road traffic as substantial predictor variables.
Conclusions: There was a substantial spatial variation in annual mean NO_2 and NO_x between and within all study areas. LUR models were developed which explained a large fraction of variability, with road traffic being the most important predictor.

GREEN CITIES AND HEALTH: A QUESTION OF SCALE?

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Background and Aims: Cities are expanding and accommodating an increasing proportion of the world's population. It is important to identify features of urban form that promote the health of city dwellers. Access to green space has been associated with health benefits at both individual and neighbourhood levels, but no studies have tested this association at the scale of entire cities. We investigated whether a relationship between green space coverage and selected mortality rates exists at the city level in the USA.

Methods: An ecological cross-sectional study. A detailed land use dataset was used to quantify green space for the largest US cities (n = 49, combined population 142 million). Linear regression models were used to examine the association between city-level 'greenness' and city-level standardised rates of mortality from heart disease, diabetes, lung cancer, motor vehicle fatalities, and all causes, after adjustment for confounders.

Results: There was no association between greenness and mortality from heart disease, diabetes, lung cancer, or automobile accidents. Mortality from all causes was significantly higher in greener cities.

Conclusions: While considerable evidence suggests that access to green space yields health benefits, if we green our cities without attention to the form the green spaces take, and the form of contact with it, there may be no benefit to population health. In the USA, greener cities tend also to be more sprawling cities, with higher car dependency. Any benefits that the green space might offer seem easily eclipsed by these other hazardous exposures and the lifestyles they engender.

DISTINGUISHING THE POSSIBLE INDEPENDENT HEALTH EFFECTS OF EXPOSURE TO AMBIENT NITROGEN DIOXIDE FROM THOSE OF PARTICULATE MATTER AND OTHER FACTORS

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Background: It has been suggested that the epidemiological associations between ambient concentrations of nitrogen dioxide (NO_2) and health outcomes might not be due to NO_2 *per se* but to other air pollutants, mainly fine particulate matter (PM), within the urban mixture of air pollutants. Furthermore, the heterogeneity in those estimates has added to the uncertainties regarding a possible independent effect for NO_2.
Aim: To assess systematically ecological time-series studies on NO_2, which simultaneously incorporated concentrations of PM in two- or multi-pollutant statistical models, to identify adverse health effects that are independent from those of PM and other factors, and, if so, to suggest concentration-response functions for NO_2 for use in health impact assessments.
Methods: A Microsoft Access relational database is being constructed by assembling data from the literature; the Air Pollution Epidemiology Database (APED) (managed by St George's); and, a range of other sources. The database will include quantitative estimates pertaining to NO_2 and PM: all relevant two-/multi-pollutant model, seasonal model and lagged model results reported in the literature; data on possible confounders and effect modifiers, i.e. various study-level characteristics; Pearson correlations among the concentrations of pollutants. Analyses will use meta-analytical techniques, including meta-regression. Exploratory analyses will test for and investigate sources of heterogeneity and effect-modification. Tests for evidence of publication bias will also be conducted.
(Preliminary) Results: Work to date has focused on constructing the database. Data extracted from APED (for time-series studies published up to the year 2006 (2007 for studies conducted in Asia)) have been interrogated: 185 papers are available for 11 categories of health outcomes linked to NO_2. Of the 185 studies, 70 examined associations between NO_2 and health (hospital admissions; mortality; GP consultations; emergency room visits; GP house calls) using two-/multi-pollutant statistical models, with mortality and hospital admissions being the most common endpoints examined. The corresponding 336 estimates were produced largely from studies conducted in Europe, the USA and Canada using mainly 1-hour and 24-hour measures of exposure to NO_2. Less than 25% of the estimates from two-/multi-pollutant analyses are based on studies using a multi-city design. The final database will include time-series studies published up to May 2009.
Conclusions: Investigating heterogeneity in NO_2-effect estimates by way of systematic review is not common place in air pollution epidemiology. It is hoped that the final results will add to the evidence on whether there is an independent effect of NO_2.

CADMIUM AND ARSENIC EXPOSURE FACTORS IN A POPULATION LIVING ON POLLUTED SOILS, CASSIOPÉE STUDY, AVEYRON, FRANCE, 2008

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Background and Aims:
The town of Viviez (south-west of France) experienced 150 years of industrial activity generating atmospheric emissions until 1987 and substantial soil pollution, in particular by cadmium and arsenic. A public health assessment was carried out in order to estimate the health impact of this pollution and to formulate recommendations. This assessment included an exposure study with the objective of identifying exposure factors that increase the cadmium and arsenic body burden.

Methods:
Adult residents of Viviez and Montbazens (an unexposed town) who did not have occupational exposure to pollutants were included. Urinary cadmium and arsenic were analyzed by multivariate regression taking into account individual factors (age, smoking…) and environmental factors. Statistical methods for analysis of censored data were used in order to take into account concentrations below detection limit.

Results:
In Viviez, 21.6% of adults exceeded 1 µg of cadmium/g.creatinine and 5% exceeded 2 µg/g.creatinine against 4% and 0% in Montbazens. After adjustment for individual factors, the geometric means of urinary cadmium and arsenic were higher in Viviez than in Montbazens. Contrary to Montbazens, some environmental factors in Viviez were associated with urinary cadmium (length of residence, consumption of local fruit and vegetables and animal products), and with urinary arsenic (recent consumption of local poultry, consumption of local well and spring water, low frequency of mopping the floor, frequency of gardening).

Conclusions:
Differences in mean concentrations between the exposed and the unexposed town and exposure factors associated with cadmium and arsenic body burden suggest an environmental exposure of Viviez population. Residents could be presently exposed by local food ingestion and by inhalation or ingestion of polluted dust and soils. They could also have been exposed in the past by inhalation of atmospheric emissions. Recommendations based on these results will be made to limit further exposure.

ANALYSIS OF CHARACTERISTICS AND SOURCES OF PM10-BOUND PAHs IN TIANJIN City

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Background and Aims: Polycyclic aromatic hydrocarbons (PAHs) are a series of certain compounds, many of which have proven to be mutagenic and/or carcinogenic. This study elucidates the temporal and spatial distribution of PM_{10}-bound PAHs in Tianjin, as well as their possible sources and healthy impacts, to provide a baseline reference on exposure assessment, health risk, and pollution controlling in such a densely populated city.
Methods: Atmospheric PM_{10} samples were collected at 8 sampling sites in Tianjin City every six-day from September 2009 to August 2010. The mass concentrations of 16 PAHs loaded in PM_{10} samples were measured by GC-MS method. PAHs ratios, PCA and PMF methods were applied for source identification.
Results: The results shows that the total mass concentrations of PM_{10}-bound PAHs ranged from 10.91 ng m^{-3} to 1988.81 ng m^{-3}, while the average concentration was 41.91 ng m^{-3} in spring, 24.56 ng m^{-3} in summer, 129.78 ng m^{-3} in autumn and 355.32 ng m^{-3} in winter. Vehicle exhaust was recognized to be a most significant PAHs contributor in both summer and winter, while and the contribution of coal combustion increased in winter.
Conclusions: The total mass concentrations of PM_{10}-bound PAHs varied temporally and spatially at a remarkable extent, with a higher concentration in winter and a lower one in summer, while concentration was the highest in industrial area. With more complex molecular structures, PAHs species with four and more rings composed most of the PAHs concentrations, namely, four-rings in winter and five and six-rings in summer. Coal combustion, vehicle exhaust and steel industry emission were identified to be three major sources of PM_{10}-bound PAHs, however, in summer there may existed more other sources such as biomass combustion and refinery.
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CHILDHOOD ASTHMA AND AIR POLLUTION: DO FINDINGS VARY BY WARM AND COLD SEASONS?

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Background and Aims: Ambient air pollution has been associated with asthma outcomes in children in time series analyses that control for season. In this study, we examine the effects of air pollution on acute outpatient visits for childhood asthma separately for warm and cold months to assess whether the associations vary by season.
Methods: Data sources are daily acute respiratory visits from a nonprofit managed care organization and air pollution measures from a centrally-located air monitoring site, both in Atlanta, GA, USA. Acute visits are appointments made on the same day the visit was completed. Pollutants included in this analysis are: $PM_{2.5}$, PM_{10}, Coarse PM, OC, EC, $PM_{2.5}$ water-soluble (ws) metals, coarse ws metals; $PM_{2.5}$ Zn, ws Cu, ws Fe, and ws Mn; and coarse PM ws Cu, ws Fe, and ws Mn. Poisson GLM was employed to determine the relationships between lagged pollutants (0 -2, 3-5, and 6-8 day moving averages) and acute visits. The warm season months were defined as April through October, while cold season was November through March.
Results: For the warm season, we found one significant positive association for a 3-day moving average lag: OC (lag 3-5). For single day lags, we also found significant positive associations for PM_{10} (lag 4), OC (lag 4), and $PM_{2.5}$ (lag 4). For the cold season, there were no significant positive associations, but two significant negative findings both for lag 0: OC and $PM_{2.5}$. Compared to the overall 116-month findings that controlled for season, PM_{10} (lag 4) was significant in both analyses.
Conclusions: These findings show seasonal variation in associations between childhood asthma and ambient air pollution. More pollutants are significant in the warm season, with positive effects. Separate models for warm and cold months may be more informative in some cases than controlling for season. Presented findings will include additional pollutants for a 120-month time period.

GENETIC SUSCEPTIBILITY TO ARSENIC EXPOSURE AND PREVALENT SKIN LESIONS IN BANGLADESH

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ABSTRACT
Background and Aims: Elevated concentrations of arsenic in groundwater pose a public health threat to millions of people worldwide. While arsenic is an established human carcinogen, a mode of action has yet to be determined for arsenic carcinogenesis. However, the oxidative stress and DNA repair pathways have been implicated in arsenic toxicity and have been hypothesized to underlie arsenic carcinogenesis.
Methods: Utilizing cross-sectional data from the 2000-2002 survey of the Health Effects of Arsenic Longitudinal Study (HEALS) for 610 prevalent arsenical skin lesion cases and 1,079 randomly selected controls, we evaluated the associations of single nucleotide polymorphisms (SNPs) in genes encoding antioxidant enzymes and DNA repair enzymes on skin lesion prevalence based on logistic regression and Hierarchical Bayes modeling. We also evaluated potential SNP-SNP interactions as well as SNP-environment and higher-order interactions in determining skin lesion prevalence through a multi-analytic approach by MDR, CART, and logistic regression models.
Results: There were no statistically significant associations between individual SNPs and skin lesion prevalence. However, there was marginal evidence that skin lesion prevalence was increased among individuals who carried 4 or more risk alleles compared to individuals carrying 0-2 risk alleles in antioxidant enzyme SNPs. Additionally, there was a significant departure from additivity for the risk allele score and primary methylation index (i.e., ratio of MMA to inorganic arsenic) on skin lesion prevalence. Additionally, we observed a significant inverse association of total fruit and vegetable consumption with skin lesion prevalence and, there was a significant interaction on the additive scale between fruit and vegetable intact with the polymorphism in ERCC5 in relation to skin lesion prevalence.
Conclusions: The results of this study provide evidence of genetic and gene-environment effects in relation to arsenic-related skin lesion prevalence.

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THE UNIQUE PHARMACOKINETIC CHARACETERISTICS OF BISPHENOL A IN AMNIOTIC FLUID: THE IMPLICATION OF FETAL EXPOSURE

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Background and Aims: Bisphenol A (BPA) is an estrogenic compound widely used in polycarbonate plastics and many household products. The placental β-glucuronidase may deconjugate BPA into its "free" active form, which has estrogenic, endocrine-disrupting properties. There are few data regarding BPA levels in the fetal compartment, and even sparser data regarding conjugated versus free BPA fractions. The effects of prolonged exposure of the fetus to the active form of BPA are unknown. Thus, we sought to quantify levels of conjugated and free BPA in second trimester amniotic fluid specimens to better define the role of the placenta in fetal exposure.
Methods: Liquid chromatography/mass spectrometry was used to measure BPA concentrations in 20 prospectively collected second trimester amniotic fluid specimens. Concentrations were quantified using stable-isotope BPA. The total and free BPA were measured by direct analysis of samples with and without overnight enzymatic hydrolysis, respectively. The conjugated BPA concentrations were obtained by subtracting free BPA levels from the total BPA measurements.
Results: Total BPA was detected in 17/20 samples, with levels ranging from non-detect to 0.75 ng/mL, with a median concentration of 0.44 ng/mL. Three samples contained no BPA, and 7 samples contained only conjugated BPA. Free BPA was detected in 10/20 samples, and levels ranged from non-detectable to 0.43 ng/mL, with a median concentration of 0.26 ng/mL. For those 10 amniotic fluid specimens that contained free BPA, it represented an average of 82% of the total BPA level.
Discussion: Free BPA was detected in the fetal compartment in 50% of amniotic fluid specimens, and its concentration comprised 82% of total BPA levels. Because BPA is quickly conjugated in the adult liver once absorbed, our data suggest that BPA may be deconjugated in the placenta by β -glucuronidase, which leads to increasing potential fetal exposure to the active form, or free BPA.

INTEGRATED ENVIRONMENTAL HEALTH IMPACT ASSESSMENT BASED ON PERSONAL EXPOSURE TO PM2.5

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Background and Aims: When drafting regulations for enhancing environmental quality or public health, it is useful to assess their health effects in advance as policies might have interrelated but opposing effects. Currently, in integrated impact assessments of air pollutants the estimation of health effects is based on concentration response functions that are applied to outdoor air concentration. In contrast, this study aims to assess the health effects of exposure to PM2.5 using modelled personal exposure.
Methods: Personal exposure to fine particles as time-weighted concentration in different micro-environments was derived for various policy measures (e.g. increased insulation and simultaneously decreased emissions) using the tooL for Air pollution exposure Modelling and Assessment (LAMA). Based on this personal exposure, health effects, DALYs and damage costs were estimated.
To derive health effects, concentration response functions were scaled and converted into exposure response functions based on the relationship between background concentrations and personal exposure experienced indoors from outdoor sources.
Results: Results show that the mean exposure due to insulation of residential buildings increases: For insulation scenarios for the years 2020, 2030 and 2050 about 10 to 500 thousand DALYs are caused due to accumulation of PM from indoor and outdoor sources in residential dwellings in the EU30 (corresponding to about 800 to 40,000 million EUR_{2010}). However, due to a simultaneous decrease in the outdoor air concentration the total impact of the modelled measure ranges from -20 thousand to 100 thousand DALYs. When only considering outdoor air sources 100 to 300 thousand DALYs can be avoided due to the measure.
Conclusions: Personal exposure modelling as a basis for integrated environmental health impact assessment provides a means of better assessing mitigation measures with direct effects on exposure. However, there remains the need for further enhancement of the input data and assumptions, including the exposure response functions
References:

NO EXERCISE-INDUCED INCREASE IN SERUM BDNF AFTER CYCLING NEAR A MAJOR TRAFFIC ROAD

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Background and Aims: Commuting by bike has a clear health enhancing effect. Moreover, regular exercise is known to improve brain plasticity, which results in enhanced cognition and memory performance. Animal research has clearly shown that exercise upregulates Brain-Derived Neurotrophic Factor (BDNF – a neurotrophine) enhancing brain plasticity. Studies in humans found an increase in serum BDNF concentration in response to an acute bout of exercise. Emerging evidence suggests that exposure to air pollution is increased during commuting. Furthermore, enhanced exposure to particulate matter (PM) air pollution is linked to negative neurological effects, such as neuroinflammation and cognitive decline. We carried-out a cross-over experiment to examine the acute effect of exercise on serum BDNF and the potential effect-modification by exposure to traffic-related air pollution.
Methods: 38 non-asthmatic volunteers (mean age: 43, 26% women) performed two cycling trials, one near a major traffic road (mean UFP concentration: 28867 particles/cm^3) and one in an air-filtered room (mean UFP concentration: 496 particles/cm^3). The heart rate during cycling and cycling duration were similar for both trials. Serum BDNF concentrations were measured before and 30 minutes after each cycling trial.
Results: As expected, exercise significantly increased serum BDNF concentration after cycling in the air-filtered room (+14.4%; p=0.02). In contrast, serum BDNF concentration did not increase after cycling near the major traffic road (+0.5%; p=0.94).
Conclusions: Although active commuting is considered to be beneficial for health, this health enhancing effect could be negatively influenced by exercising in an environment with high concentrations of PM. Whether this effect is also present with chronic exercise and chronic exposure must be further elucidated.

ADOLESCENT NEIGHBORHOOD ENVIRONMENT AND HYPERTENSION IN YOUNG ADULTHOOD

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Background and Aims: Associations between features of the built environment and hypertension have been noted among adult populations. However the relationship between neighborhood built environment in adolescence and hypertension in young adulthood has not been studied.
Methods: We examined the relationship between adolescent neighborhood environment (landscape diversity, street connectivity and access to pay and public recreational facilities) and elevated blood pressure in young adulthood, and whether gender modified this association in the National Longitudinal Study of Adolescent Health. Neighborhood environment during adolescence (Wave 1 1995-1996, mean age 15.5, n=12627) and young adulthood (Wave 3 2001-2002) was assessed using a geographic information system. The presence/absence of having received a diagnosis of elevated blood pressure was assessed by self-report (Wave 3). Generalized estimating equation models were adjusted for individual level sociodemographic factors and neighborhood level median household income.
Results: An interquartile range increase in landscape diversity was associated with lower odds of reporting a diagnosis of elevated blood pressure (OR 0.92 95%CI 0.8, 1.0). This association did not vary significantly by gender, though there was evidence that and increase in access to public facilities was associated with lower of odds of reporting a diagnosis of elevated blood pressure among females.
Conclusions: Our findings suggest that adolescent neighborhood environment may affect the development of hypertension. Further studies should examine the potential mechanisms through which the built environment could affect the development of hypertension.

EXPOSURE ASSESSMENT AND SOURCE CHARACTERIZATION OF LEAD IN LATINO CHILDREN IN SAN DIEGO, CALIFORNIA

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Background and Aims: Lead poisoning is an insidious problem to which Latino children may experience additional exposure related to their cultural practices. The current cross-sectional exposure assessment study evaluated environmental (housepaint, dust, soil and water) and cultural factors (family acculturation, child behavior and exposure to potentially lead-contaminated Mexican products) plus socioeconomic status and heath care access.
Methods: This 2006 study was conducted in 15 census tracts in southern downtown San Diego, California. Parents/guardians of 166 Latino children (aged 12 - 71 months) from 128 households participated. Environmental samples and child blood samples were analyzed for lead and a questionnaire, including photos, was administered. Lead exposure due to contaminated candy was estimated based on California Department of Public Health analyses.
Results: The 68% participation rate was quite respectable for this underserved group (77% spoke Spanish at home and 80% of respondents identified as Mexican). Blood lead measurements on 89% of the child participants indicated a 2 µg/dL median value, with 9% at or above 5 µg/dL. Mexican candy consumption (1 to 6 g/day) was the only important cultural exposure reported. Close to 90% of analyzed candy had undetectable lead levels (< 0.05 µg/g), which IEUBK modeling indicated are unlikely to represent daily child intakes of more than 0.1 µg lead/day in the most conservative scenario. SAS Generalized Estimating Equations modeling indicated elevated blood lead levels related to child age and gender, candy consumption, soil lead levels and child private health insurance coverage.
Conclusions: This work served an exploratory purpose, providing both a solid methodologic basis for future work and hypothesis generation. More work is necessary to evaluate the extent to which both environmental and cultural components are driving lead exposure.The study's culturally-appropriate in-home phlebotomy approach proved so successful that its implementation to reach the most underserved Latino children merits consideration.

APPLYING ALTERNATIVE EXPOSURE METRICS IN A MULTIPOLLUTANT EPIDEMIOLOGICAL STUDY

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Background and Aims: Epidemiological studies of air pollution have traditionally relied upon surrogates of personal exposures, such as ambient concentration measurements from central-site monitoring stations. This study examines the spatial and temporal variations of alternative measured and modeled exposure metrics for multiple pollutants (i.e., particulate matter, elemental carbon, sulfates, nitrogen oxides, carbon monoxide and ozone), developed and applied within an epidemiological study in a large US metropolitan area.
Methods: Several tiers of exposure metrics for ambient traffic-related and regional pollutants were used for predicting health impacts of ambient air quality and population exposures on daily ZIP code level emergency department (ED) visits in Atlanta, GA for the period 1999-2002. The approaches included central site or interpolated monitoring data, regional pollution levels based on measurements or models (CMAQ) and local scale (AERMOD) air quality models, hybrid models, statistically blended modeling and measurement data, concentrations adjusted by home infiltration rates based on LBL algorithms utilizing information on housing stock and meteorology, and the population human exposure (SHEDS and APEX) model predictions.
Results: The various exposure metrics were compared in their ability to characterize the spatial and temporal variations of multiple ambient air pollutants across the study area. These metrics were then used to examine associations between ambient air pollution and acute morbidity. The pollutant–specific relative risks (RRs) obtained from epidemiological analyses of the alternative exposure metrics were compared to those obtained from using a conventional approach (i.e., central site data alone). Both pollutant and metric dependent differences were found suggesting a complex exposure prediction error structure among the pollutants studied.
Conclusions: Our results suggest the need for case-specific enhancements for future exposure assessments in conjunction with different types of individual or multipollutant air pollution epidemiologic study designs.

THE ROLE OF ENVIRONMENTAL POLLUTANTS IN THE CAUSATION OF BIRTH DEFECTS IN CALI, COLOMBIA: DEVELOPMENT OF A RESEARCH STRATEGY WITH AN INTERDISCIPLINARY APPROACH

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Background and Aims: In Cali, Colombia, clusters of very rare congenital defects were reported at a hospital-based registry and subsequent evaluation demonstrated a 5 to 10 fold prevalence increase of other birth defects including vascular disruption defects (VDD) and neural tube defects (NTD). An inadequately managed municipal landfill site and a polluted river with different sources of contamination were hypothesized as potential environmental sources of teratogens. Our aim is to provide a framework and strategy for assessing concerns about the role of environmental pollutants in causing birth defects in a locality.
Methods: A multidisciplinary team designed and implemented a comprehensive study aimed to describe social and environmental conditions of the area, and to determine risk factors of birth defects.
Results: The steps for developing such integrated approach are presented, including the definition of common gaps of knowledge inside the research team. Key questions arising during study implementation are: How better integrating methodological issues? How constructing a pathway model for research? How defining a risk communication strategy? What analytical tools are fundamental?
Conclusions: We support the notion that synergistic efforts from different disciplines are required to better understand causes and also to help making decisions

Using Statistical, Technological, and Participatory Methods to Identify Environmental and Health Disparities in California

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Background and Aims: Low-income and communities of color often bear the disproportionate burden of environmental hazards and poor health outcomes. The mission of the California Environmental Health Tracking Program (CEHTP) is to provide data and develop tools to identify environmental and health inequities, examine trends over space and time, and generate hypotheses about relationships between environmental hazards and health outcomes.
Methods: To accomplish the mission, CEHTP utilizes advanced statistical, technological, and participatory methods. Hierarchical Bayesian methods are employed to calculate rate estimates where data are sparse. Hazard and health data are displayed in dynamic web maps, allowing users to pan and zoom across the state. Participatory processes are used to engage stakeholders to provide input on tools development, validate data, and disseminate data. Stakeholders include community groups, governmental and non-governmental organizations, planners, and researchers.
Results: Using these innovative methods, CEHTP identifies and examines critical environmental hazards and health disparities that exist in California. For example, pesticide exposure and pre-term birth are of concern to many communities throughout California, especially low-income communities and communities of color. The CEHTP Pesticide Web Mapping Tool displays agricultural pesticide use at the community level for the entire state. A non-governmental partner organization has used the tool to identify and outreach to communities most vulnerable to pesticide exposure. CEHTP also created a web mapping tool that displays modeled pre-term birth data. This has enabled community-based partners to see spatial patterns of pre-term birth that vary significantly by census tract and follow patterns of poverty.
Conclusions: CEHTP's efforts have contributed to the identification and characterization of environmental hazards and health disparities in California, a critical function of public health programs. CEHTP must continue to utilize statistical, technological, and participatory methods to support a variety of stakeholders in their efforts to reduce environmental and health disparities in communities.

ETHYLENE OXIDE HEMOGLOBIN ADDUCTS AND BIRTH WEIGHT. THE NEWGENERIS EUROPEAN STUDY

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Background and aims: A general exposure to ethylene oxide in the population originates from endogenously produced ethylene, metabolised to ethylene oxide. Cigarette smoke is also a source of exposure and give rise to elevated ethylene oxide hemoglobin adduct levels. There is limited epidemiologic evidence that exposure to ethylene oxide may be associated with an increased risk of spontaneous abortions and preterm births. We determined whether ethylene oxide hemoglobin adducts measured in cord blood are associated with birth weight.
Methods: Singleton births (n=1069) from Greece, Norway, Spain, Denmark and the United Kingdom were included in the study. Cord blood adducts were determined by the "adduct FIRE procedure" using liquid chromatography–tandem mass spectrometry (LC–MS/MS).
Results: A significant association between ethylene oxide hemoglobin adducts and self-reported maternal smoking status during pregnancy was observed, with higher levels among newborns born by smokers (22.8 (3.8-120.7) vs. non-smokers 8.8 (2.8-40.5) pmol/g Hb, median (min-max); $p<0.001$). In the full study population, in which 152 smokers were included, a 10 pmol/g Hb increase in hemoglobin adducts from ethylene oxide were associated with a significant decrease in birth weight (adjusted □: 30 grams; S.E.: 10, $p=0.002$). The difference in mean birth weight for infants in the highest quartile compared to those in the lowest quartile was -68 grams (SE: -37; $p=0.07$, n=1069), while the difference in infants of non-smokers was -17 grams (SE: -39, $p=0.7$, n=917). Similar decreases in birth weight were observed when maternal age, pre-pregnancy BMI, gender, parity and season of birth were included as additional covariates but associations were non-significant.
Conclusions: These results indicate that reduced birth weight and ethylene oxide hemoglobin adduct levels are associated. The association was not significant when the study population was restricted to self-reported non-smokers. Further results on other birth outcomes will be presented.

Optimizing the use of on-street car parking system as a passive control of air pollution exposure in street canyons by large eddy simulation

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Background and Aims: An investigation was carried out to establish the effectiveness of parked cars in urban street canyons as passive controls on pedestrian pollutant exposure. A numerical model of a generic street canyon was developed using a large eddy simulation (LES) model to compare personal exposure on the footpath with and without the presence of parked cars.
Methods: Three configurations of car parking systems were investigated (parallel, perpendicular and 45_parking) in addition to the influence of wind speed, wind direction and car parking occupancy. A tracer gas (CO_2) was used as a representative pollutant from vehicular sources within the street canyon models. The results indicated that parked cars may act as a temporary baffle plate between traffic emissions and pedestrians on the footpath.
Results: The results indicated that parked cars may act as a temporary baffle plate between traffic emissions and pedestrians on the footpath. Reductions in exposure of up to 35% and 49% were attained on the leeward and windward footpaths in perpendicular wind conditions, with parallel winds allowing up to 33% pollutant reduction on both footpaths for parallel parking. The perpendicular and 45_car parking configurations investigated proved less successful as passive controls on air pollution exposure and an increase in pollutant concentration occurred in some models. An investigation of parking space occupancy rates was carried out for parallel parked cars. The fraction of parked cars influenced the level of reduction of pollutants on the footpaths with steady reductions in perpendicular winds, yet reductions were only evident for occupancy rates greater than approximately 45% in parallel wind conditions. One negative impact associated with the parked cars study was the increase of pollutant levels on the roadway as the parked cars acted as a baffle wall, which trapped pollutants in the road.
Conclusions: The paper underlines the potential of on-street car parking for reducing the personal exposure of pollutants by pedestrians and the optimum parking layout to achieve maximum health protection.

Blood lead levels in children and adolescents in Torreón, Mexico, 1999 - 2009: an age, period, and cohort analysis

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Background and Aims: Torreón, a large city in Northern Mexico, is home to the 4th largest lead smelter in the world. Previous studies indicate that children in Torreón are exposed to high levels of lead, but these studies used selected samples and did not track study participants over time. In 1999, officials in Torreón established a biomonitoring program for blood lead levels (BLLs) based on a census of children and adolescents in the communities surrounding the smelter. We describe age, period and cohort trends in BLLs in Torreón from 1999 to 2009 using data from the community biomonitoring program.
Methods: BLLs were available in 45,702 children and adolescents between January 1, 1999 and October 1, 2009. 31,383 (68.7%) participants had at least one additional measurement. We examined trends in BLL by calendar year and age using mixed models for longitudinal data.
Results: BLLs decreased from 1999 (median 18.5 μg/dL; 5th and 95th percentiles 6.4 – 48.5) to 2009 (median 4.5 μg/dL; 5th and 95th percentiles 1.9 – 11.3). The percentages of children and adolescents with a BLL above 10 μg/dL were 89.1% in 1999 and 18.0% in 2009. BLLs peaked at around age one (median 9.6 μg/dL; 5th and 95th percentiles 2.7 – 32.1) and decreased thereafter. Boys had higher BLLs compared to girls (medians 8.5 vs. 7.8 μg/dL, respectively), and there was a sex by age interaction in BLLs (after the initial peak at early ages, BLLs in girls decreased faster than in boys).
Conclusions: BLLs in Torreón's children and adolescents have decreased markedly from 1999 to 2009, due in part to environmental remediation efforts. In spite of these changes, BLLs in children and adolescents in Torreón are still high compared to other Mexican and US areas.

A RISK ASSESSMENT OF CHILDHOOD LEUKAEMIA AND NATURAL RADIOACTIVITY IN FRANCE

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Background and Aims: Natural radioactivity (NR) is an ubiquitous phenomena and exhibits large geographical variations. Current risk models for radiation-induced leukaemia prediction, which are mainly issued from the epidemiological study of Hiroshima and Nagasaki A-bomb survivors, imply that levels of NR could induce some leukaemia cases. In the framework of an epidemiological research project designed to study the link between childhood leukaemia and NR, we conducted a risk assessment of the proportion of leukaemia cases that could be attributable to NR in France.
Methods : National rates of childhood leukaemia over period 1990-2004 were provided by the French registry of childhood malignancies. Mean doses to the red bone marrow that children would receive from radon, cosmic and terrestrial gamma rays in France were estimated. Risk models proposed by the United Scientific Committee for the Effects of Atomic Radiation and by the US National Research Council to predict radiation-induced leukaemia cases were applied.
Results : Overall, 6,784 leukaemia cases were registered over the study period. A mean annual dose of 1.25 milliSieverts was estimated for the sum of radon, cosmic and terrestrial gamma rays. The proportion of leukaemia cases that could be attributed to these dose components vary from a few percents to several tenths, according to the risk model used, the age group and the hypotheses for transposition from A-bomb survivors to French children (additive or multiplicative risk transfer).
Conclusions : These estimates are issued from a risk assessment approach that rely on many assumptions and hypotheses. They should be interpreted cautiously, as an indication for the magnitude of the expected risk related to NR. Variability and uncertainty analyses will focus on alternate dose scenarios, as well as statistical uncertainty. Refined estimates will allow appreciating the capacity of an ongoing epidemiological study to detect a leukaemia risk related to NR in French children.

WATER CONTAMINATION BY POLYCHLORINATED BIPHENYLS IN ARMENIA

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Background and Aims: To reveal the state of environmental pollution by such Persistent Organic Pollutants as Polychlorinated Biphenyls (PCBs) in the surface water basins of the Republic of Armenia the following categories of water basins were selected:
1. Rivers Hrazdan, Vorotan, at which there are hydroelectric power plants
2. Rivers Debet and Voghchi, at which there are industrial enterprises;
3. Lake Sevan and Arpa river, at which no industrial enterprises or hydroelectric power plants are functioning.
Methods: Samples of water were analyzed by means of gas-liquid chromatography.
Results: Determination of PCBs in samples taken from water reservoirs of the 3rd category demonstrated that PCBs were detected in the range of 0.07-0.93mkg/l.
In Sevan – Hrazdan ecosystem the highest level of determination in bottom sediment made 1.193 mcg/kg, in periphyton the residues reached 1.505 mcg/g. In macrophytes PCBs content amounted to 2.119 mcg/g, while in the organism of craw-fish – 1.347 mcg/g.
In samples of water taken from rivers belonging to the 1st category the content of PCBs was 2-fold higher than in water samples from reservoirs of the 3rd category. In these samples PCB residues ranged from 0.44 mcg/l to 2.93 mcg/l.
Conclusions: Study of water samples taken from the rivers, in the water collection area of which there are enterprises having potential to contaminate the environment by PCBs (category 2), revealed that from the point of view of PCB-induced contamination these samples were in an intermediate state. Residues of PCBs made from 0.44 to 1.68 mcg/l. Average PCB content in these samples was 0.68-1.33 mcg/l.
Open water basins studied for PCBs were contaminated by these substances, signifying that the environment of Armenia is contaminated by PCBs and power engineering system is the main source of PCB-related contamination in Armenia.

PERSONAL EXPOSURE TO ULTRAFINE PARTICLES; BLACK CARBON AND $PM_{2.5}$ IN DIFFERENT MICROENVIRONMENTS

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Background and Aims: Exposure assessment studies have shown that air pollution measured by fixed monitors at residential locations may not adequately represent individual exposures, especially for times spent away from home. In the framework of an ongoing study combining individual and central monitoring site measurements we characterize personal exposures in specific micro-environments to particulate air pollutants from different sources.
Methods: During a three weeks period in February 2011, exposure data were collected by a single researcher equipped with personal monitors for continuous measurements of particle number concentration (PNC), black smoke (BS) and $PM_{2.5}$. As pedestrian or passenger in public transportation he was taking the same route including major roads, urban background and industrial areas every day. His position was recorded by a GPS device.
Results: The overall average personal exposure to each pollutant was higher than the corresponding ambient levels (39 vs. 27 μgm^{-3} $PM_{2.5}$, 4.1 vs. 2.8 μgm^{-3} for BS and 21375 vs. 12497 cm^{-3} for PNC). Whereas personal exposure to $PM_{2.5}$ during his walks along busy streets and in a residential area was very similar (41.5 vs. 41.1 μgm^{-3}), there were very pronounced differences regarding PNC or BS (35656 vs. 15369 cm^{-3} or 5.7 vs. 3.3 μgm^{-3}, respectively). Times spent in the bus highly contributed to elevated personal BS levels. As the measurements are planned for winter, spring and summer weather conditions, the study is still ongoing. At the conference results for all three periods will be shown.
Conclusions: The obtained results provide insight into the potential air pollution levels to which people could be exposed and will be used in planned analyses in addition to data from the fixed monitoring station in order to get more reliable estimates concerning people's total exposure to UFP, BS and $PM_{2.5}$, especially when being in traffic or in a near-road environment.

COMPARISON OF ACUTE NEUROLOGICAL EFFECTS OF UFP EXPOSURE DURING EXERCISE AND REST

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Background and Aims: Long term exposure to air pollution, such as particulate matter, is associated to negative neurological effects, including neuroinflammation and cognitive decline. Regular exercise stimulates brain health and plasticity. Brain-Derived Neurotrophic Factor (BDNF), a neurotrophine, is suggested to play a key role in this process. However, recent evidence suggests that exposure to air pollution during exercise is about 4 times higher compared to rest, due to higher ventilation.
The first aim is to find out if a short exposure to a high concentration of ultrafine particles (UFP) during rest or exercise induces acute neurological effects. Effects are investigated by gene expression analysis of IL1• , IL1• , TNF• , IL6, COX-2 (inflammatory cytokines and mediators), NRF (transcription factor activated by oxidative stress), BDNF. The second aim is to investigate if there is a difference in effect size between UFP exposure during rest and exercise.
Methods: 24 male, Wistar rats were divided into 4 groups and each group (n=6) was exposed for 1.5 hours to 1 of 4 exposure scenarios. The four exposure scenarios included: peak UFP exposure during exercise, peak UFP exposure during rest, ambient air exposure during exercise, and ambient air exposure during rest. The miniCAST sootgenerator was used to create a peak UFP concentration of 10^7particles/cm^3 into an exposure chamber containing a treadmill. UFP concentration was monitored (DMS50) in the exposure chamber. Blood, hippocampus, bulbus olfactorius and frontal cortex were collected 24 hours after exposure. Hippocampal BDNF was analyzed by ELISA. All tissues were analyzed for gene expression by Q-PCR.
Results (preliminary) and conclusions: Hippocampal BDNF is not significantly increased (p=0.16) 24 hours after exercise (n=4) compared to rest (n=4), during ambient air exposure. Analysis of RNA quantity and integrity shows that the RNA meets the requirements that are needed for further gene expression analysis.

CARDIOVASCULAR HOSPITAL ADMISSIONS IN RELATION TO AIRCRAFT NOISE, ROAD NOISE AND AIR POLLUTION IN WEST LONDON

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Background: There is increasing evidence that environmental noise exposure has a range of impacts on cardiovascular disease.
Methods: A small area study was conducted covering 12 local government districts in west London partly or wholly within the 2003 L_{day} 50 dBA Heathrow aircraft noise contour over the time period 2001-2005. Exposure variables were 2001 values for (i) aircraft noise for daytime $L_{eq,16hr}$ and nighttime L_{night}, (ii) daytime road traffic noise $L_{eq,16hr}$ (Rd16) from maps produced to comply with the European Noise Directive 2002/49/EC and (iii) modelled annual average concentrations of NO_2 and PM_{10}. These were examined in relation to hospital admissions for cardiovascular disease for people living in the study area. Census output areas (COAs), which comprise 250 people on average in the UK, were chosen as the unit of analysis. A Bayesian disease mapping model was constructed using a log-linear model for the risk for each COA and accounting for spatial residuals using a conditionally autoregressive structure and a hierarchical structure for unstructured residuals. Results were adjusted for ethnicity structure of the area and deprivation (Carstairs index). Tests for linear and quadratic trends across categories were conducted using the median value of each noise or air pollution category.
Results: There were 2,616,448 million people resident in the study area in 2001 and 180,738 cardiovascular hospital admissions in 2001-5, giving approximately 4 person admissions per COA per year of study. Correlation coefficients were low between road traffic and aircraft noise (r=0.018 for Rd16 and aircraft $L_{eq,16}$) but moderate between road noise and NO_2 (r=0.432). NO_2 and PM_{10} were highly correlated (r=0.952). The correlation between daytime and night aircraft noise was 0.88. Analytic analyses have been completed and results are currently being evaluated.
Conclusions: This study is expected to influence policy planning for high volume airports in urban areas.

HEALTH-PROMOTING EFFECTS OF VISITS TO GREEN SPACE – CASE STUDIES IN KUALA LUMPUR AND KUCHING, MALAYSIA

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Background and Aims: Major Malaysian cities such as Kuala Lumpur (Peninsular Malaysia) and Kuching (Sarawak) have been experiencing rapid development. The importance of green spaces as a contributor to the better quality of a resident's life has been recognized, though data on the use of green spaces and resulting benefits are still lacking. This paper presents results from a comparative study on the use of green spaces and visitor preferences for five selected parks located in Kuala Lumpur and Kuching. The study comprised, among others, a survey which conducted among residents living within two kilometre radius from the park boundaries.
Methods: A part of the survey focused on health promoting aspects of urban green spaces. Questions related to self-reported health status were proposed, which enabled a comparison between visitors and non-visitors to the nearby park. Moreover, respondents were also asked about the activities that they would recommend their close friends or family members should they experience stress or anxiety.
Results: A total of 1692 respondents answered the questionnaire. Result shown that most of the people who spend time visiting the neighbouring park claimed that they are in good health, while a larger share of people who do not spend time visiting the park reported that they are in conversely poor health condition. Respondents who live within 300m from the park reported that they are in better health condition than that of respondents who live far away. Most of respondents suggested that their close friends and family members go for vacation or involve themselves in sports/outdoor activities should they experience stress or anxiety.
Conclusions: This research claimed most people healthier because they visit green spaces frequently and these results had drawn attention to the importance of green spaces to human health, confirming the findings of studies from other parts of the world. Hence, decision makers and green space managers should consider and incorporate this health promoting role of green spaces in their activities.
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ARSENIC EXPOSURE AND BLOOD INFLAMMATORY MARKERS OF CARDIOVASCULAR DISEASE

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Background: Arsenic exposure from drinking water has been related to elevated risks of an array of cardiovascular disease, including hypertension, ischemic heart disease, and carotid atherosclerosis. Although mechanistic studies have suggested that arsenic promotes inflammatory activity and lead to endothelial dysfunction, epidemiologic studies that evaluate the associations of arsenic exposure with biomarkers for inflammation and endothelial dysfunction relevant to CVD are needed.
Methods: We assessed the relationship between arsenic exposure, measured in both well water samples and urinary samples, and an arrays of makers for inflammation and endothelial dysfunction, including tumor necrosis factor-α (TNF-α), interleukin-6 (IL-6), soluble intracellular adhesion molecule-1 (sICAM-1), and soluble vascular cell adhesion molecule-1 (sVCAM-1), in serum samples collected from 669 participants aged 30 and above randomly selected from the Health Effects of Arsenic Longitudinal Study (HEALS), a population-based study in Araihazar, Bangladesh. Serum levels of markers were analyzed using xMap™ technology, with commercially available high-sensitivity kits from Linco/Millipore Research. Linear regression was conducted to evaluate association between arsenic exposure and each of the markers.
Results/Conclusions: Ongoing data analyses suggest that arsenic exposure is positively related to levels of several markers for oxidative stress and inflammation relevant to CVD. This is the first large study on arsenic exposure and markers of vascular inflammation and endothelial dysfunction in cardiovascular disease (CVD), and the findings may suggest possible mechanisms by which arsenic may lead to CVD.

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PARTICULATE AIR POLLUTION EXPOSURE AND C-REACTIVE PROTEIN DURING EARLY PREGNANCY

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Background and Aims: It is not well understood how air pollution leads to adverse pregnancy outcomes. One pathway may be through C-reactive protein, a biomarker of systemic inflammation that has been reported to increase the risk of preterm delivery. We examined whether air pollution influences serum concentrations of C-reactive protein in early pregnancy.
Methods: We studied 1696 pregnant women in Allegheny County, PA, from 1997 through 2001. C-reactive protein concentrations were assayed in blood collected before the 22nd week of gestation. We estimated levels of particles of less than 10 µm (PM_{10}) and less than 2.5 µm diameter ($PM_{2.5}$), carbon monoxide, nitrogen dioxide, sulfur dioxide, and ozone at the maternal ZIP code using Kriging interpolation for measurements obtained from ambient stations. Employing logistic regression we evaluated associations between air pollution and high C-reactive protein concentrations (• 8 ng/ml).
Results: Among non-smokers, observed 9.2 µg/m^3 increase in PM_{10} (averaged over 28 days prior to the blood sample) was associated with an odds ratios of 1.41 for high C-reactive protein concentrations (95% confidence interval = 0.99 – 2.00). Similarly, a 4.6 µg/m^3 increase in $PM_{2.5}$ was associated with an odds ratio of 1.47 (1.05 – 2.06). The odds ratio was 1.49 (0.75 – 2.96) per 7.9 ppb increase in ozone during summer. We saw no associations in smokers or for other air pollutants, and no evidence for effect-measure modification by obesity.
Conclusions: PM_{10}, $PM_{2.5}$, and ozone exposures were associated with increased C-reactive protein concentrations in early pregnancy, suggesting that these air pollutants contribute to inflammation and thereby possibly to adverse pregnancy outcomes.

AIR POLLUTION AND MOLECULAR MARKERS OF ASTHMA AMONG UTEP COHORT SIBLING PAIRS

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Background and Aims: The Sibling Pair Asthma (SPA) study is a joint effort between the University of Texas at El Paso and the University of New Mexico Health Sciences Center funded by NIEHS. We investigated the impact of air quality on asthma prevalence among Mexican-American children.
Methods: Households from an ongoing cohort study with at least one asthmatic child and a non-asthmatic sibling were invited to participate in this study (N=104 children from 51 households). Participants of this study were 98% Mexican- Americans. Blood samples were collected using a mobile van among community residents. Serum total IgE was obtained and categorized as high (>89 IU/ml) or low concentration. Quantification of 10 serum cytokines important in asthmatic inflammation was carried out using xMAP bead-based technology and Luminex 100™ detection system. Daily concentrations of NO_2, O_3, SO_2, $PM_{2.5}$, and PM_{10} from USEPA air quality archives were used to calculate 1-7 day lagged concentrations. Chronic spatial gradients in pollution levels were created using traffic intensity, elevation, and distance to major point sources to predict NO_2 concentrations.
Results: Higher IgE levels were associated with coughing (60.8% vs. 35.9%, p=0.01) and with the number of respiratory symptoms (2.4±2.1 vs.1.6 ± 2.0, p=0.036). IgE was correlated with 7-day average 8-hr maximum ozone (rho =0.34 p=0.01). IL-4 was correlated with average one-day lagged ozone (rho=0.34 p=0.01) and two-day lagged ozone (rho=0.29 p=0.03). The effect of NO_2 exposure on increased IL-5 cytokine production was stronger among asthmatic children than in their non-asthmatic siblings. Increased serum IL-8 concentrations were associated with increased $PM_{2.5}$ exposures among non-asthmatic children, but not among asthmatics with high IgE. The chronic spatial exposure gradient was not associated with cytokine production.
Conclusions: Air pollutants had different effects on serum immune markers among sensitive asthmatic children compared to their healthy sibling pairs.

EXAMINING THE MORTALITY EFFECTS OF THE IRISH NATIONAL SMOKING BAN

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Background and Aims: Secondhand smoke causes disease and death in those exposed, with cardiovascular and respiratory problems as the most likely outcomes. The purpose of this study was to examine the mortality effects of the Irish national smoking ban of 2004.
Methods: Irish mortality data for years 2000-2007 were analysed for smoking ban effects following policy implementation in 2004. Population estimates for the years 2002 and 2006 were obtained from Irish census data and used to calculate death rates in adults (ages 18+) for each of the study years. Smoking-related causes of death were assessed by determining the absolute difference between the average death rates for pre-ban (2000-2003) versus post-ban (2004-2007) years. Analyses were conducted with SAS version 9.2 and Microsoft Office Excel 2007.
Results: These preliminary analyses indicated that when compared to pre-ban death rates, 5.63/10,000 (95% confidence interval [CI] = 0.98; 10.27) cardiovascular deaths were prevented for each year post-ban. On average, this was a 20% reduction in cardiovascular mortality. Additionally, 3.44/10,000 (95% CI = -0.19; 7.08) respiratory deaths were prevented, representing an average 22% reduction when compared to pre-ban years. This was roughly equivalent to 2,900 lives saved each post-ban year (with as few as 252 or as many as 5,560 lives saved). Further and more rigorous analyses are ongoing.
Conclusions: A decrease in smoking-related mortality was detected following the implementation of the Irish national smoking ban, indicating that comprehensive smoking ban policies can play a significant role in reducing mortality from cardiovascular and respiratory causes.

SENTIERI project: mortality study of residents in Italian polluted sites – IPS

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Background and Aims: Soil contamination occurs in approximately 250,000 sites in the European Environment Agency member countries. In Italy several thousands qualify for remediation and 57 are defined as "of national concern" on the basis of documented contamination. SENTIERI project, funded by the Ministry of Health, aims at describing the health status of population resident in Italian polluted sites – IPS.
Methods: Forty-four IPSs were selected for mortality analysis. IPSs were classified in terms of presence of environmental exposure as documented in Ministerial Decrees, namely: chemical industry/petrochemical plants&refineries/harbour area/asbestos or other mineral fibers/steel plants/thermoelectric power plants/mines or quarries/landfills/incinerators. In eah IPS, for the period 1995-2002, for 63 causes of death, for both genders were calculated: i) Italy 2001 mortality rates (x 100,000) ii),standardised mortality ratios, crude and adjusted for deprivation, regional reference
Results: In 1995-2002 Italian mortality rate for all causes is 1340 (100,000/year) for males and 828 for females. The rate is higher than the regional one respectively in 27 IPSs for males and 24 for females. For all tumors the national rate is 410 for males and 210 for females, the rate is higher than the regional one in 28 IPSs for males and 21 IPSs for females. Adjusting for deprivation, in all IPSs combined, around 10,000 and 4,000 excess deaths over the regional expected values are observed respectively for all causes and for all tumors.
Conclusions: The study shows that Italian IPSs contribute substantially to the environmental burden of disease confirming findings from previous investigations. Health impacts are heterogeneous, and several questions arise in the interpretation, for example regarding mixtures of exposures, residual confounding, occupational vs environmental effects. However, findings do provide an overall picture of the health profile of residents, and indications on priority action on mitigation and remediation of contaminated sites.

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EXPOSURE ASSESSMENT OF FORMALDEHYDE FROM BABY CARE PRODUCTS

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Background and Aims: Formaldehyde-releasers are widely used as preservatives in water-containing cosmetics (baby care products/toiletries). It was observed that these compounds very rapidly release formaldehyde when dissolved in aqueous /polar solvents. Formaldehyde is a well-known sensitizer in children and allergy to this chemical is a more widely recognized problem in recent years[2]. In some children, small amounts of formaldehyde can trigger and maintain an eczematoid-type dermatitis, headache, or symptoms of asthma[3].
This study aims to conduct a survey to measure the free formaldehyde content in baby care products and assess exposure to formaldehyde during the usage of these products.
Methods: Extraction method is developed in our lab to extract free formaldehyde from a variety of matrixes such as water solution and baby wipe cotton. We also evaluated analytical methods to determine free formaldehyde levels in the presence of the formaldehyde releasers. We acquired products labelled with formaldehyde releasers, according to CDPH's cosmetics database. To assess exposure, we locate baby care products in a small chamber simulating real environment, and measure the formaldehyde concentrations in the air and in the solution.
Results: From the pilot test of six baby bath products, we found the free formaldehyde amount was about 0.3% of the product (weight percentage). The formaldehyde released in the sample air was in the range of 18~1700 μg/m^3.
Conclusions: Previous study reported that 23 out of 28 baby bath products tested contained formaldehyde at levels ranging from 54 to 610 parts per million[4]. Our pilot findings confirmed the presence of free formaldehyde in the products. We also found the formaldehyde released in the air during use of baby bath products, which may cause potential inhalation exposure.
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IMPACT ESTIMATION OF THE EYJAFJALLAJÖKULL ERUPTION ON THE GROUND LEVEL OF PM_{10} IN AUGSBURG, GERMANY

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Background and Aims: On April 14, 2010 the Icelandic volcano Eyjafjallajökull erupted and its ash cloud was transported by wind directly towards Central Europe. On April 19 and 20 exceedences of the daily PM_{10} threshold value were reported at nearly all monitoring stations in Munich and Augsburg, two cities located around 2500 km apart from the Icelandic volcano. In this study we applied positive matrix factorization (PMF) method using particle size distribution (PSD) data in the range from 3 nm to 10 µm for the identification of the Eyjafjallajökull ash plume and estimation of its contribution to PM_{10} levels in Augsburg, Germany.
Methods: A Twin Differential Mobility Particle Sizer system combined with an Aerodynamic Particle Sizer was used to measure PSD. We used the receptor model PMF 3.0 from the U.S. Environmental Protection Agency to identify and quantify PSD factors.
Results: A PMF factor associated with long range transported dust rose from background concentration to high levels simultaneously with the arrival of the volcanic ash plume in the planetary boundary layer. We used this factor for estimation of the Eyjafjallajökull ash plume contribution to ambient PM_{10} measured on ground level in Augsburg. From April 17 to 22, 2010 this factor contributed on average 31.6% (12.3 µg m^{-3}) to ambient PM_{10}. The maximal contribution of this factor to PM_{10} level in Augsburg was 70% (37 µg m^{-3}) which was observed at 20:00 on April 19, 2010.
Conclusions: The PMF method could be used for identification and quantification of natural source impact on PM threshold exceedences. Without further evidence from toxicological studies and following the knowledge about the ash plume components we assume that the volcanic plume contributed to the overall exposure of the population and therefore in principal may have had minor effects on exacerbation of respiratory and cardiovascular symptoms.

MEASURING THE LUNG FUNCTION CONTINUOUSLY AND UNOBTRUSIVELY

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Background and Aims: The conventional pulmonary function tests (PFTs) require respiratory maneuvers like forced maximal expiration, and only give snap shot information of the lung function. Our aim is to devise methodology for continuous unobtrusive assessment of the lung function using a wearable impedance pneumography (IP) system.
Methods: IP is based on the knowledge that the electrical impedance of the thorax is proportional to the lung volume. Thus, variation in the lung volume can be assessed by placing two or more measurement electrodes on the surface of the body to measure the impedance variations. Furthermore, the obtained signal can be used to produce diagnostic tidal breathing flow-volume loops. The shape of these loops change in a characteristic way when an airway obstruction occurs or is relieved (Beydon et al. 2011).
Results: We have conducted multiple measurements on healthy subjects and patients with obstructive airway diseases, assessing the agreement between the IP and a direct mouth airflow measurement. Thanks to our research on electrode locations and signal processing techniques, we have been able to produce highly accurate pulmonary flow-volume loops regardless of the subject body posture or presence of an obstructive airway disease. We also have produced a wearable cell phone size 24h IP recording device.
Conclusions: IP is accurate enough to produce diagnostic pulmonary flow-volume loops. It does not require any direct connection with the airways nor any proactivity from the measurement subject, unlike the conventional PFTs. This potentially enables continuous, long-term estimation of changes in lung function due to external agents and obstructive diseases like asthma. In combination with personal exposure monitors, IP could be used to assess the immediate real-time effects of air pollution on the lung function. This would be especially beneficial for preschool children and infants with whom the conventional PFTs cannot be used at all.
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EXPOSURE TO BISPHENOL A DURING PREGNANCY AND MATERNAL AND NEONATAL THYROID HORMONE LEVELS

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Background and Aims: Bisphenol A (BPA) is widely used in the manufacture of polycarbonate bottles, food packaging, can linings, and dental sealants. High detection frequencies in numerous environmental and human specimens indicate that BPA is a widespread contaminant. Animal and *in vitro* studies suggest that BPA may disrupt thyroid hormone (TH) but little human data are available, particularly in pregnant women and neonates. Normal thyroid function during these critical developmental periods is essential for normal brain development. Our aim was thus to determine whether maternal exposure to BPA is related to thyroid hormone levels in pregnant women and neonates.
Methods: We measured BPA in urine samples collected during the first and second half of pregnancy in women participating in the Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS). Pregnant women who were >=18 years, <20 weeks gestation, English or Spanish speaking, and qualified for Medicaid (health insurance for low-income families) were eligible for participation in the study. Free thyroxine (T4), total T4 and thyroid-stimulating hormone (TSH) was measured in 339 maternal serum samples obtained at ~27 weeks' gestation. Neonatal TSH levels were abstracted from medical records (n=371).
Results: The median BPA urinary concentration was lower in CHAMACOS women (1.1 µg/L) than in the general U.S. population (2.8 µg/L). Preliminary analyses suggest that every 10-fold increase in maternal BPA urinary concentration in the second, but not the first, half of pregnancy was associated with a 0.5 µg/dL decrease in total T4 (95%CI=-1.0, -0.1) after controlling for confounders. Associations were stronger when BPA was measured closer in time to total T4. BPA urinary concentrations were not associated with maternal free T4 or TSH, or with neonatal TSH.
Conclusion: Maternal exposure to BPA was inversely associated with total T4 during pregnancy. Findings may have implications for fetal brain development.

WORKING WITH NON-HEALTH SECTORS: A REVIEW OF EXPERIENCES WITH ECONOMIC APPROACHES TO PROMOTE CYCLING AND WALKING: THE HEALTH ECONOMIC ASSESSMENT TOOL (HEAT)

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Background and Aims: Walking and cycling are increasingly recognized as effective forms of physical activity, an important public health priority. Urban and transport planning are more influential for mobility behaviour than "classic" health promotion approaches. Therefore, the challenge is to reach out to these sectors to support interventions that promote walking and cycling. Economic appraisals are an established practice for transport projects but rarely take health effects into account. The WHO therefore coordinated an international project to develop a Health Economic Assessment Tool (HEAT) for cycling and walking.
Methods: Reviews of economic valuations of cycling or walking and of the epidemiologic literature were carried out to identify approaches and relative risk estimates for the health effects. International multi-disciplinary consensus meetings addressed methodological issues for the development of HEAT cycling and walking.
Results: HEAT is a transparent, robust, conservative and practice-oriented tool estimating the value from reduced mortality due to physical activity from cycling or walking, i.e.: if x people cycle (or walk) y distance on most days, what is the economic value of reduced mortality? For regular commuter cycling, the relative risk from a large study was used (RR 0.72, 95% CI 0.57-0.91). For regular walking, an aggregate risk for all-cause mortality of 0.77 (CI 0.63-0.95) has been calculated. HEAT cycling has been applied in several countries. E.g in Austria, it showed that the current bike modal share of 5% leads to 412 averted deaths per year, equating an economic value of over 400 mio. EUR. In Portland, USA, investments of over 40mio. EUR over 20 years lead to quintupling of cycling, with health benefits equating about 14 mio EUR per year. Results from the first applications of HEAT walking from Parnu/Estonia, Kuopio/Finland and Brighton-and-Hove/UK will also be presented.
Conclusions: The HEAT tools have shown to be effective in fostering the integration of health effects into economic transport appraisals.

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www.euro.who.int/HEAT

VALIDATION OF SIGNATURE BIOMARKERS BY HIGH-THROUGHPUT TAQMAN® LOW DENSITY ARRAY (TLDA) IN PCB-EXPOSED SLOVAK POPULATION

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Background and Aims: Valid biomarkers that link environmental exposures to the pathogenesis of human disease can enhance health risk assessment and contribute to effective new disease prevention policies in environmental and occupational settings. This presentation concerns results of a large scale evaluation of changes in gene expression in relation to body burdens of PCBs (polychlorinated biphenyl ethers) using microarrays, combined with a primary validation through high-throughput TLDA in a NIEHS project to SKD.
Methods: The microarray results of global gene expression in peripheral blood for individuals with varying levels of PCBs, and in PBMC cells (*in vitro*) with Slovak human median equivalence concentrations of PCBs were analyzed by GeneSpring GX 10.0. The Ingenuity Pathway Analysis retrieved the top biofunctions, networks, and major molecules to establish these signature biomarkers relative to disease and developmental processes occurring after exposure to these chemicals. The high-throughput qRT-PCR by TLDA studies were done on ABI platform. Data analysis was done through DataAssist™ and StatMiner®.
Results: The potential signature biomarkers **(RRAD, MYC, CD3, CYP1A2, PON1, CYP2D6, ARNT, BCL2, LEPR, LPR12, ENTPD3, ITGB1, NPPB,** and **TRAP1**) identified in the PCB-exposed population and in *in vitro* studies, involved relevant biological pathway signatures leading to major abnormalities and disorders in the PCB-exposed population (viz., Cardiovascular, Developmental Disorders, Neurobehavioral, Cancer). The analyses of global expression on validating the genes have indicated that the subjects are grouped into different clusters (high and low PCB exposure groups) depending upon the quantitative expression of the candidate genes. These gave a hint that these gene fingerprints could lead to identification of groups at risk through specific pathways based upon the PCB exposure.
Conclusion: Upon validation, this high-throughput biomarker-based method will be capable of identifying high-risk individuals with specificity & selectivity, through therapeutically relevant genomic classifiers, as a measure of biological responses to environmental stressors.

Comentario [IH1]: did you look at multiple samples from the same person? if not, then 'changes in' does not appear to be the correct description of what you did.

SHORT-TERM EFFECT OF FINE PARTICULATE MATTER ($PM_{2.5}$) AND OZONE ON DAILY MORTALITY IN LISBON, PORTUGAL

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Keywords: Ozone, Fine Particulate Matter, Acute Effects, Generalized Additive Modeling, Lisbon
Aim: Determine the exposure-response relationships of ambient ozone and fine particulate matter ($PM_{2.5}$) concentrations on daily mortality in Lisbon.
Abstract: Urban ambient air pollution exposures continue to be a global public health concern. Although air quality targets are often exceeded in Lisbon, the largest city in Portugal, there is currently no study that has assessed the quantitative impact of these pollutants on daily mortality.
In this study we conduct a time series analysis using generalized additive modeling to determine the exposure-response effect from ambient ozone (O_3) and fine particulate matter ($PM_{2.5}$) concentrations on daily mortality in Lisbon. The dataset used was limited to the Lisbon municipality and for the period 2004-2006.
For $PM_{2.5}$ exposures, we found that the relative risk for cardiovascular mortality in the population group ≥ 65 years is 2.39% (95%CI: 1.29%, 3.50%) for each 10µg/m^3 increase. A statistically significant cause-effect relationship for $PM_{2.5}$ and mortality was not observed in other population groups.
We also report O_3 exposures to be associated with an increase of 1.11% (95% C.I. (0.58, 1.64)) for all-cause mortality in the population group ≥ 65 years and an increase of 0.96% (95% C.I. (0.56, 1.35)) for the general population. When analyzing by cause of death, our results showed a stronger association between O_3 exposure and cardiovascular mortality.
Acknowledgements: This study was funded by project 2FUN, under EU contract n° FP6-2005-GLOBAL-4-036976.

Real-time Monitoring of Formaldehyde Concentrations in the Built Environment

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Background and Aims: Volatile organic compounds (VOCs) are a major concern in indoor air quality investigations and formaldehyde , in particular, is the subject of considerable environmental health and monitoring research[1,2, 3]. New regulatory standards are focused on reducing formaldehyde levels in both residential settings and building materials manufacturing. In order to develop new tools to meet lower national thresholds [4], there is need for research on the design, implementation and testing of a wireless formaldehyde monitoring systems. The objectives of this research are to 1) compare the performance of commercially available sensors within the network architecture, 2) identify fine scale spatio-temporal patterns in formaldehyde emissions, and 3) provide improved information integration models for the assessment of environmental and personal exposure events.
Methods: (Arial, 8pt, bold) The formaldehyde monitoring system consists of wireless sensor nodes, a base station, a Sensor Observation Service (SOS), a database system, and a web-based user interface. Sensor nodes collect data and then pass it to the Sensor Observation Service (SOS) that provides a web-based user interface to enable users to view the latest sensor readings and historical analysis results.
Results: (Arial, 8pt, bold) Although the full results of this prototype system will not be available until current testing is completed this spring, anticipated issues this research will be able to address include: efficient and effective wireless communication configurations, comparison of data storage and processing methods, representation of conceptual model that can adequately capture both personal exposure and general area exposures, and ensuring effective user interface design.
Conclusions: (Arial, 8pt, bold) Applications of this research will benefit manufacturing industry and wood composite researchers as they move towards producing materials with lower formaldehyde emissions as well as the environmental epidemiology community looking for new tools and methods for collecting and analyzing the longitudinal impact of formaldehyde exposure at lower levels.
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Adverse Effects of Arsenic Exposure on Motor Function among Children in Bangladesh

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ABSTRACT

Background and Aims: Several reports indicate that drinking water arsenic (WAs) and manganese (WMn) areassociated with children's intellectual function. Very little is known, however, about possible associations with other neurological outcomes such as motor function.
Methods: We investigated the associations of WAs and WMn with motor function in 304 children in Bangladesh, aged 8-11 years. In addition to water, we measured arsenic and manganese concentrations in blood, urine and toenails. We assessed motor function with the Bruininks-Oseretsky Test (BOT-2), which can be summarized with a total score of overall motor proficiency (TMC) or in four subscales: fine manual control (FMC), manual coordination (MC), body coordination (BC) and strength and agility (SA).
Results: Log transformed blood As (BAs) was associated with decreases in TMC (ß=-3.65, p<0.01), FMC (ß=-1.70, p<0.05) and BC (ß= -1.61, p<0.01), with adjustment for gender, school attendance, head circumference, mother's intelligence, plasma ferritin, blood Mn, Pb, and Se. Other measures of As exposure (water As, urinary As, and toenail As) demonstrated similar associations. We also have observed a strong positive association between square transformed blood selenium (BSe) and motor function, another novel finding. A significant association between BSe and TMC (ß=3.54, p<0.005), FMC (ß=1.55, p<0.005) and MC (ß=1.57, p<0.005) was found in the unadjusted models; the relationship between BSe and MC remained significant in the full model. Mn exposure was not associated with motor function.
Conclusion: Our research demonstrates an adverse association of As exposure and a protective association of Se on motor function in children.

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EXPOSURE ASSESSMENT OF CONSTITUENTS OF AIR POLLUTION: A POOLED ANALYSIS OF NINE VALIDATION STUDIES

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Background and Aims: Exposure error has long been a concern in chronic air pollution health effect studies, which generally assess exposures using measures of ambient concentrations. This study develops statistical methods to adjust for bias due to measurement error based on regression calibration de-attenuation factors, using monthly averages of personal fine particulate ($PM_{2.5}$) exposures and ambient concentrations, and assesses to what extent these factors vary by city and season.
Methods: Personal and ambient $PM_{2.5}$ data were compiled from validation studies performed in eight US cities (one in 1995, seven between 1998-2002) and one in the Netherlands (2004-2005), with 416 participants in total. Corresponding elemental carbon (EC) levels were also obtained from five of these studies (n=208). Personal measurements were assumed as the 'gold standard'. Linear mixed effects models were employed to estimate the association between monthly-averaged ambient and corresponding personal exposures. City-specific effects were estimated, adjusting for season. The homogeneity of effects between cities was assessed and the pooled effects were estimated using random effects models.
Results: Monthly-averaged personal and ambient concentrations were significantly correlated, with Spearman correlation coefficients of 0.43 for $PM_{2.5}$ and 0.56 for EC, adjusted for city and season. Significant heterogeneity was observed between cities, with city-specific, personal-ambient $PM_{2.5}$ slopes ranging between 0.32-1.64. Random effects meta-analysis yielded a de-attenuation factor of 0.59 (0.38, 0.80). For monthly EC, significant personal-ambient slopes were observed only in three cities, with slopes ranging between 0.39-0.89. The pooled de-attenuation factor for EC was 0.46 (0.12, 0.79).
Conclusions: Exposure measurement error of this magnitude is likely to lead to appreciable bias in estimates of the effect of chronic PM exposure on human health. These de-attenuation factors will be used to develop a regression calibration model to adjust for bias due to measurement error in studies of chronic PM health effects.

IMPACT OF AN IMPROVED BIOMASS STOVE (PATSARI) INTERVENTION ON CHILDREN´S HEALTH

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Background and Aims: In México, about 27 million people use wood as primary source of energy. One approach to decrease the health burden related to indoor air pollution has been implementation of improved wood-burning chimney stoves. The aim of this study is to assess the impact of the introduction of Patsari stoves on the respiratory health of younger than 4 years of age children in highlands Michoacán.
Methods: Households (n=668) in six rural communities in a fuel wood using region were selected and randomized to receive an improved stove (Patsari) early on or keep their traditional wood fire until the end of the follow up including 10 monthly visits. During each home visit, a questionnaire was applied to the mother asking for a two week recall of signs and symptoms of the index child and the field worker observed and measured signs and symptoms. Longitudinal data was analyzed using population averaged modified Poisson regression.
Results: More than half of the children were younger than 24 months of age. No severe cases of acute respiratory infections (ARI) were detected and only a few moderate cases of ARI were observed by field workers. During follow up, adherence to the intervention was low (50%) and an analysis according to the reported stove use was performed. The younger than 24 months of age children of mothers who reported using the Patsari stove most of the time compared to those using the open fire had a slightly lower risk of respiratory symptoms (nasal secretion RR=0.90, 95%CI 0.74, 1.09; wheezing and/or breathing difficulty RR=0.80, 95%CI 0.36, 1.77) adjusting for relevant confounders.
Conclusions: The intention to treat analysis showed no impact of the improved stove intervention on children respiratory outcomes, but considering the stove use reported by the children mothers' a small effect was observed.

NON-HODGKIN LYMPHOMA (NHL) LINKAGE WITH RESIDENCE NEAR HEAVY ROADS - A CASE STUDY FROM HAIFA BAY, ISRAEL

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Background and Aims: Some of the risk factors for Non-Hodgkin Lymphoma (NHL) are related to environmental exposure and occupations. However, studies into a possible linkage between NHL and residence near heavy traffic roads are lacking.
NHL rates of Israeli Jews are among the highest in the world while the highest NHL rate within Israel is in Haifa Metropolis. The study analyzed the possible linkage between NHL morbidity and residence near heavy traffic roads among the Jewish population in the Haifa Metropolitan Area.
Methods: Addresses of 1436 patients (94.5% of all cases, 1995-2004) were geocoded. Only patients residing in the metropolis at least 10 years prior to the diagnosis were included (gender, age). The density values were interpolated by the Inverse Distance Weighted (IDW) method. The number of NHL patients was calculated for buffer zones, extending by a 50-meter increment from a main road. By dividing the actual number of NHL patients (male/female) in each buffer zone by the value of the "density coefficient", we obtained the "density adjusted" number of patients in each zone. Testing for the statistical significance of the differences across buffer zones was performed using a non-parametric Chi-square test.
Results: The road distances for each NHL patient ranged from 0 to 700m, with the median distance of 56.5m. About half of the NHL' patients appear to live in a distance of less than 50m from a main road. The analysis indicates steady decline in the "density adjusted" numbers of patients as a function of increasing road distances ($P<0.01$). Differences between genders / age groups or socioeconomic levels were not found.
Conclusions: The much higher occurrence of NHL in areas near main roads may be indicative of disease risks. Future studies may compare the relative contribution of residence near traffic to other factors such as industrial air pollution.

PUBLIC HEALTH IMPORTANCE OF AIR POLLUTION AS TRIGGER OF MYOCARDIAL INFARCTION: A COMPARATIVE RISK ASSESSMENT

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Background and Aims: Acute myocardial infarction is triggered by various factors, such as physical exertion, stressful events, heavy meals, or increases in air pollution. However, the importance and relevance of each trigger are uncertain. We compared triggers of myocardial infarction at an individual and population level.
Methods: We searched PubMed and the Web of Science citation databases to identify studies of triggers of non-fatal myocardial infarction to calculate population attributable fractions (PAF). When feasible, we did a meta-regression
analysis for studies of the same trigger.
Results: Of the epidemiologic studies reviewed, 36 provided sufficient details to be considered. In the studied populations, the exposure prevalence for triggers in the relevant control time window ranged from 0・04% for cocaine use to 100% for air pollution. The reported odds ratios (OR) ranged from 1.05 to 23.7. Ranking triggers from the highest to the lowest OR resulted in the following order: use of cocaine, heavy meal, smoking of marijuana, negative emotions, physical exertion, positive emotions, anger, sexual activity, traffi c exposure, respiratory infections, coffee consumption, air pollution (based on a difference of 30 µg/m3 in particulate matter with a diameter <10 µm [PM10]). Taking into account the OR and the prevalences of exposure, the highest PAF was estimated for traffi c exposure (7.4%), followed by physical exertion (6.2%), alcohol (5.0%), coff ee (5.0%), a difference of 30 µg/m3 in PM10 (4.8%), negative emotions (3.9%), anger (3.1%), heavy meal (2.7%), positive emotions (2.4%), sexual activity (2.2%), cocaine use (0.9%), marijuana smoking (0.8%) and respiratory infections (0.6%).
Conclusions: In view of both the magnitude of the risk and the prevalence in the population, air pollution is an
important trigger of myocardial infarction, it is of similar magnitude (PAF 5–7%) as other well accepted triggers such as physical exertion, alcohol, and coff ee. Our work shows that ever-present small risks might have considerable public health relevance.

RELIABILITY OF MEASUREMENTS OF ANOGENITAL DISTANCE AND PENIS WIDTH IN BOYS AND ANOGENITAL DISTANCE IN GIRLS. MOTHER-CHILD COHORT IN CRETE (RHEA STUDY)

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Background and aims: In animal studies, different measurements of anogenital distance are indicators of *in-utero* exposure to androgens and chemicals with anti-androgen effect, though limited data exist for humans. There is little empirical evidence on the reliability of these measurements. We estimated the reliability of anogenital distance measurements in boys and girls.
Methods: The study included thirty 2-year-old children (13 boys and 17 girls) whose mothers participated in the Rhea study, Crete. Two experienced examiners performed 10 blind repeated measurements each (total 730 measurements for each examiner). Anogenital distance (AGD- from anus to upper penis), anoscrotal distance (ASD- from anus to scrotum) and penis width (PW) were measured in boys; anoclitoral (ACD-from anus to clitoris) and anofourchetal distance (AFD-from anus to fourchete) in girls. Ratios of anogenital distances divided by body weight were calculated. Mixed effect models were used to estimate the between-children, between- and within-examiner variance, as well as the reliability coefficient for each distance and ratio.
Results: In boys, mean (±SD) AGD, ASD and PW was 82(±6)mm, 44(±7)mm and 13(±1)mm, respectively. In girls mean (±SD) ACD and AFD was 49(±7)mm and 24(±4)mm, respectively. Mean differences between examiners varied from 0 to 4mm. Reliability coefficients for AGD, ASD, ACD and AFD ranged from 0.89 to 0.91 and were higher than for PW (0.75). Differences between children were the main source of variation for all anogenital distance measures. For AFD between examiner variation was also high (22%). Measurement variation for PW, within the same child and the same examiner was higher than for other measures (25%). Ratios by weight were stable and their main source of variation was the between-children variance.
Conclusions: Anogenital distance measurements and weight-ratios are highly reliable measures if conducted by experienced examiners and they are not affected by between- or within- examiner variation.

ARE SILICOSIS AND SILICA-RELATED ILLNESSES BECOMING DISEASES WITH ETHNIC DISPARITIES?

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BACKGROUND: In the U.S. and other industrial nations, the risk of silicosis mortality has declined. That is a function of improved practices in many dusty industries, including health surveillance, improved capture of silica dusts, use of wet methods, and regulation. However, this decline masks concerns about the burden of silica related diseases impacting minority ethnic groups in the U.S.

CURRENT SILICA DISEASE RISKS: African-American silicosis risks have been described by studies from the Michigan Silicosis Registry. Michigan silicosis risks have been 7 X more common among African-Americans than whites. That has been a function of black workers taking the dustiest jobs, including working as sand blasters after WW II. In the past decade, skilled and unskilled construction workers have tended to be recent immigrants from Latin America. The most serious problem was the finding of acute silicosis cases arising among Mexican men sandblasting near Midland-Odessa TX in the early1990s. Current construction practices can include very dusty cement sawing without using wet methods, and evidence has pointed to cases of silicosis arising from dry cement cutting. Uranium mining was a common occupation among the Navajo Indians and white miners in the southwestern U.S. Navajo workers have elevated risks for both silicosis and other pulmonary diseases, including lung cancer . The lung cancer excesses among Navajo men is more remarkable because they smoke much less than the general population of the U.S.

FUTURE SILICOSIS RISKS: Silicosis mortality risk is declining, but it remains a concern that the residual risk falls on the backs and lungs of minority workers. This means health leaders must educate workers about effective ways to prevent inhalation of silica. Furthermore, we need to expand our definition of silica-related illnesses to include scleroderma, rheumatoid arthritis, kidney disease, TB, as well as lung and other cancers.

CONCLUSION: The OEM communities must continue to pressure for improvements to reduce silica dust exposures. These efforts must include international programs so that developing countries and their workers will see effective prevention policies for silica-related diseases. Health advocates must continue to warn minority workers in the U.S. of the dangers of unprotected silica exposure.

RELATIONSHIP BETWEEN CADMIUM AND METALLOTHIONEINS IN BREAST TUMOUR PATIENTS

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Background and Aims: There is evidence that cadmium (Cd) may be related to breast cancer. Metallothioneins (MTs) are metal binding proteins that play an important role in eliminating toxic metals from the organism. The aim of the study was to assess relationship between Cd and MTs level in biological media of cancer and benign breast tumour patients.
Methods: Cd and MTs were determined in breast tissue and blood of 57 breast cancer and 51 benign tumour patients (controls). Two samples of breast tissue from each patient, i.e. tumour and healthy tissue were taken for the analysis. Cd was measured by atomic absorption spectrometry (Perkin-Elmer, Zeeman 3030), MTs were determined by spectrophotometry.
Results: Cancer patients had greater content of Cd and MTs in breast tumour tissue compare to healthy breast tissue (53.4 ng/g 95% CI 42.2–64.6 and 5.2 µg/g, 95% CI 3.6-6.7 vs. 20.1 ng/g 95% CI 14.4-25.9 and 1.7 µg/g 95% CI 1.2-2.3, respectively, $p<0.001$). In controls, there was no difference between Cd level, but MTs content was greater in tumour than in healthy breast tissue ($p<0.05$). Cd in blood of cancer patients did not differ from that in controls. However, there was significant difference between MTs level in blood of cancer patients and controls (3.0 µg/ml 95% CI 2.8-3.3 and 2.5 µg/ml 95% CI 2.2-2.7, $p<0.05$). In cancer patients, blood Cd levels and Cd in healthy and tumour tissue correlated significantly with MTs in healthy and tumour breast tissue with exception correlation between Cd and MTs in breast tumour tissue that was suggestive ($p=0.08$).
Conclusions: Cadmium and metallothioneins levels are greater in breast cancer than that in healthy breast tissue. Significant correlation is defined in breast cancer patients between cadmium and metallothioneins in breast tissue and blood.

HEALTH IMPACTS OF CLIMATE CHANGE IN CASCAIS, PORTUGAL

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In this study we present the potential health impacts of climate change in the Cascais municipality, Portugal. Current and future health impacts associated with heatstress and vector borne diseases are presented.
Heatstress impacts were assessed based on the local temperature and daily mortality relationship that was determined using Generalized Estimating Equations (GEE) modelling. The risk of transmission of vectorborne diseases was assessed based on biological temperature thresholds for disease transmission. For the future impact assessment we used daily climate data indicative of the period of 2020-2047 and 2070-2097 for IPCC SRES scenarios. The latter datasets were developed specifically for this study region by downscaling global climate scenarios.
Heatstress impacts: Our results show that increases of 1^{o}C in the maximum temperature above the threshold of 30^{o}C results in a 4.7% increase risk of mortality. Since all the future climate scenarios used in this study indicate significant increases in days with maximum temperatures above this threshold, we concluded that the risk of dying from heatstress will increase in the future.
Vector-borne disease Impacts: Diseases endemic to Cascais such as leishmaniasis and Mediterranean spotted fever were studied as well as those currently not endemic to the region such as malaria, dengue, West Nile fever, yellow fever, Chikungunya fever and murine typhus. Climate change may change the disease transmission risks of these diseases throughout the year. There is also a real risk that transmission risks of diseases currently not endemic will increase significantly under current as well as future climates if infected vectors are introduced to the region. It is therefore urgent that vector surveillance systems be developed and implemented in Cascais.

THE IMPACT OF TRAFFIC AIR POLLUTION ON CHRONIC LUNG REJECTION AND MORTALITY AFTER LUNG TRANSPLANTATION

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Background and Aims: Approximately half of all lung transplant patients suffer from Bronchiolitis Obliterans Syndrome (BOS), the clinical correlate of chronic rejection, within five years after transplantation. This prevalence is much higher than for other solid organ transplantations, possibly due to the lung's direct contact with the environment. We assessed the association of residential proximity to major roads with BOS and mortality in a cohort of lung transplant patients.
Methods: We calculated hazard ratios for BOS and mortality in relation to residential proximity to major roads, adjusting for relevant covariables, in 288 lung transplantations at the Leuven University Hospital between 1997 and 2009 and with follow-up until August 2009. Inflammatory parameters in plasma and bronchoalveolar lavage (BAL) were assessed in 207 patients.
Results: During follow-up 117 (41%) patients developed BOS and 61 (21%) died. Patients whose residence was within 171m of a major road (lowest tertile) were 2.06 (95% CI 1.39-3.05) times more likely to develop BOS and 2.20 (1.25-3.86) times more likely to die than those living farther away. The adjusted hazard rates (HR) of BOS and mortality were 0.57 and 0.72 for each tenfold increase in distance from major roads. Proximity to a major road was inversely associated with plasma CRP levels and neutrophil percentage and interleukin-6 concentration in BAL.
Conclusions: Living close to a major road represents a substantial risk of developing BOS and premature dying after lung transplantation. Overall, traffic-related air pollution appears to constitute a serious risk of BOS and mortality after lung transplantation.

SELF-REPORTED SUN EXPOSURE BEHAVIOUR AND SKIN REDNESS

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Background and Aims: Previous studies have shown that up to one-fourth of annual personal UVR exposure amongst European population can occur during sun holidays. Skin redness during sun holidays has been linked to higher risk of skin cancers. The study aim was to study sun exposure behaviour patterns during sun holidays and their effects on redness from received UVR.
Methods: A semi-experimental study was conducted with twenty sun worshipping Spanish volunteers taking part in a one-week holiday in Canary Islands (Spain) during March 2010. They were asked to fill in a personal diary every thirty minutes about their location, clothing and sunscreen application. Their redness was objectively measured twice a day by a UV-Optimizer (Chromo-light Co.).
Results: The median age of participants was 33 years with 70% of participants being female. Amongst study subjects, 30% had skin type II, 45%, III and 25%, IV. Median of days with sunscreen application was 3.5 (range 0 and 7 days). The median of number of sunscreen application during the high-risk hours (two hours around solar noon) was 0.7 times a day that was higher amongst women ($p=0.012$). On average, the study subjects exposed their arms for 95% of the days. The last day arms redness was correlated with the redness before exposure (Spearman correlation coefficient (rho) of 0.54 and $p=0.013$), number of days with clothes leaving arm exposed ($rho=0.49$ and $p=0.029$) and was inversely associated with number of sunscreen applications during high-risk hours ($rho=-0.49$ and $p=0.029$). However, it was neither correlated with number of hours out during whole day ($p=0.144$) nor during high-risk hours ($p=0.465$).
Conclusions: Skin redness during sun holidays is associated with redness before exposure, number of days with arm exposed and inversely associated with sunscreen use. Further work will include construction of models to explain redness after sun exposure.

AIR POLLUTION AND BLOOD PRESSURE IN BEIJING, CHINA

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Background: Particulate Matter (PM) air pollution is critical in Beijing, China, due to very high population density, rapid increase in the number of vehicles, and limited control of industrial emissions. PM effects on blood pressure (BP) have been investigated as a mechanism mediating cardiovascular risks, but results have been inconsistent.
Methods: The Beijing Truck Driver Air Pollution Study (BTDAS) was conducted shortly before the Beijing 2008 Olympic Games (June 15-July 27, 2008) and included 60 truck drivers and 60 office workers in Beijing. $PM_{2.5}$ measured during work hours using portable small-sized monitors and post-work BP measurements were obtained on two different days, separated by 1-2 weeks. We used ambient PM_{10} data averaged for the 5 days before the study from 27 monitoring stations operating in Beijing. Mixed-effect regression models were used to examine associations of exposures (occupational group, personal $PM_{2.5}$, or ambient PM_{10}) with BP controlling for age, gender, BMI, day of the week, smoking, pack-years and cigarette/day, work hours/week, tea, alcohol, and outdoor temperature.
Results: Mean personal $PM_{2.5}$ was 94.6 $\mu g/m^3$ (SD=64.9) in office workers and 126.8 (SD=68.8) in truck drivers ($p<0.001$). Systolic (SBP), Diastolic (DBP) and mean (MAP) BP was not different between the two groups ($p>0.14$). Also, personal $PM_{2.5}$ during work hours was not associated with BP. In all subjects combined, a 10 $\mu g/m^3$ increase in 5-day ambient PM_{10} was associated with BP increments equal to 0.63 (95%CI 0.09-1.16), 0.50 (95%CI 0.06-0.95), and 0.55 (95%CI 0.13-0.96) mmHg for SBP, DBP, and MAP, respectively.
Conclusions: Our study shows a delayed effect of ambient PM_{10} on BP. The absence of associations with the exposure group and with personal $PM_{2.5}$ measured during work hours indicates that the PM_{10} effects are related to the background levels of particulate pollution in Beijing, rather than to traffic exposure.

OXIDIZED-LDL AND CARBON LOAD OF LUNG MACROPHAGES

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Background and Aims: Epidemiologic studies indirectly suggest that air pollution accelerates atherosclerosis. We hypothesized that individual exposure to particulate matter (PM) derived from fossil fuel would correlate with plasma concentrations of oxidized low-density lipoprotein (LDL), taken as a marker of atherosclerosis. We tested this hypothesis in a susceptible population of patients with diabetes.
Methods: In a cross-sectional study of non-smoking adult outpatients with diabetes we assessed individual chronic exposure to PM by measuring the area occupied by carbon in airway macrophages, collected by sputum induction and by determining the distance from the patient's residence to a major road, through geocoding. These exposure indices were regressed against plasma concentrations of oxidized LDL, von Willebrand factor and plasminogen activator inhibitor 1 (PAI-1)..
Results: We could assess the carbon load of airway macrophages in 79 subjects (58 percent). Each doubling in the distance of residence from major roads was associated with a 0.027 µm² decrease (95 % confidence interval (CI): -0.048 to -0.0051) in the carbon load of airway macrophages. Independently from other covariates, we found that each increase of 0.25 μm^2 [interquartile range (IQR)] in carbon load was associated with an increase of 7.1 U/L (95% CI: 1.5 to 12.7) in plasma oxidized LDL. Each doubling in distance of residence from major roads was associated with a decrease of -3.1 U/L (95% CI: -5.3 to -0.93) in oxidized LDL.
Conclusions: The observed positive association, in a susceptible group of the general population, between plasma oxidized LDL levels and either the carbon load of airway macrophages or the proximity of the subject's residence to busy roads is compatible with a proatherogenic effect of traffic air pollution.

ARE AMERICAN CONSUMERS READY FOR FOOD NANOTECHNOLOGY?

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Background and Aims: Nanoscale materials have been used for decades and already appear in more than 1000 consumer products. Within the agriculture and food sectors, the adoption of nanoscale technologies is expected to have significant impacts on farmers and food. The current research was designed to examine the American public's perceptions of food-based nanotechnology, and to determine the parameters of public acceptance.
Methods: Data were collected by an Internet survey research firm during the month of April, 2010. A nationally representative sample of 1210 American adults enrolled in the company's existing online panel responded to the 20-minute survey (66% completion rate).
Results: Consistent with earlier surveys, reported familiarity with nanotechnology was very low. Initial levels [REV11]of acceptance of nanotechnology were also very low. For example, on an 11 point scale, where 0 represented "strongly disagree" and 10 was "strongly agree," the mean rating for "I would eat foods labeled as containing nanotechnology" was 2.5, and 74% of respondents gave the statement a rating of 4 or lower. However, the survey findings also indicate that a number of features of the product significantly affect Americans' expressed level of approval of nanotechnology in food products. These include: the specific product benefits (food safety and health benefits were the highest ranked), the congruence between product type and benefit type (health benefits were preferred in healthy foods rather than the same benefits in less healthy foods), the specific nanotech materials used (plant-based nanotechnology was preferred), and where the nanotech materials are located (nanotech packaging is preferred over having nanomaterials in the product or applied to the outside of the food).
Conclusions: The findings indicate that while overall acceptance of nanotech foods may be low, certain applications of nanotechnology to food products are seen as more acceptable than others.

DOT OR NOT — IS IT WORTH THE EFFORT IN THE MANAGEMENT OF TUBERCULOSIS

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Background: Prevention and control of TB necessitate a public health infrastructure that includes a well trained labor force.
Southern Africa contribute approximately 280 000 cases every year in Africa. Almost half of these come from South Africa.
A complication of tuberculosis has been the emergence of multi-drug resistant strains. Patients require prolonged chemotherapy with expensive medication which will at best cure only half.
In 1996 a new control programme based on DOTS were implemented.
The DOTS program was extended to include the treatment of MDR-TB. Resource limitations mean that DOTS-Plus may lead to the diversion of resources from DOTS programs and a decrease in overall standards of care.
An open-label, randomized study failed to show a lasting advantage for directly observed TB therapy over self-administered therapy.
Method: During a study conducted from 01 April 2008 to 30 September 2009, in the geographic area of Kimberley, Northern Cape, 86 pulmonary TB patients where evaluated to compile this hypothesis.
Results: By week 12, the rate of bacteriological success was 89% in the DOT group and 84% in the self-administration group - a difference insufficient to prove the superiority of DOT. At 24 weeks the success rates remained similar between the groups (80% and 73%).
Vast amounts of time, energy and money are spend on the promotion of DOT - the question remains, can't this resources be better utilized in an already overburdened health system.
Study results points to the fact that more energy should be spend on aftercare and relapse prevention. The present challenge is not the tuberculosis bacteria perse, but the under and overuse of medication.
Conclusion: Even with adequate financing, critical deficiencies in human resources will impede progress in Africa. Political commitment is required to support the overall structural and financial changes needed to improve the availability, distribution and motivation of competent health workers.

MATERNAL SERUM COTININE AS A SURROGATE MARKER OF EARLY CHILDHOOD EXPOSURE TO CIGARETTE SMOKE

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Background and Aims: Obtaining valid measures of past exposures is a challenge in population-based case-control studies. When bio-specimens are collected at study enrollment, measured levels may not reflect actual exposure levels at the sensitive period of development, particularly biomarkers with short half lives in the body. Studies of childhood diseases are further constrained when the collection of bio-specimens from child controls is not feasible. The possibility of using maternal bio-specimens to estimate early childhood exposures is, therefore, a provocative one, although not without significant methodologic considerations.
Methods: To evaluate the use of maternal sera with respect to a child's past exposure to tobacco smoke, we measured serum cotinine levels from a subset of 163 mothers of childhood leukemia cases (0-7 years of age) and matched controls enrolled in the California Childhood Leukemia Study (CCLS). Recorded information on demographic characteristics, lifestyle, and environmental exposures, as well as levels of nicotine in household dust samples was available for all subjects. Using multivariable linear regression, we evaluated the relationship between nicotine in household dust samples (ng/g) and maternal serum cotinine (ng/mL), as well as the modifying effects of various epidemiologic factors and sampling characteristics.
Results: Not surprisingly, the strongest predictor of maternal serum cotinine was current maternal smoking ($p<0.001$). When analyses were limited to current non-smokers, household dust nicotine was statistically significantly related to maternal serum cotinine ($p<0.001$). There was evidence that this relationship was modified by the interval between blood collection and dust collection ($p=0.04$); paternal smoking ($p=0.01$); and to a lesser extent maternal height ($p=0.07$) and household income ($p=0.09$).
Conclusions: Although further exploration of these data is warranted to fully characterize the potential use of maternal serum cotinine to estimate early childhood exposures to tobacco smoke, preliminary results suggest that maternal biomarkers are a useful complement to self-reports and environmental sampling.

BEDBUG, MICE AND RAT COMPLAINTS AND PESTICIDE USE AMONG WASHINGTON DC RESIDENTS BY NEIGHBORHOOD: GIS ANALYSIS

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Introduction: There are public health concerns about urban pests such as bedbugs, mice and rats. In 2008, GWU's Environmental and Occupational Health Department surveyed 789 Washington DC residents in order to elicit attitudes towards residential pests and pesticides. Participants needed to be DC residents, >18 years, with valid IDs. Responses to questions relating to bedbugs, treatments for bedbugs, mice, rats and treatments for mice and rats were analyzed by city wards in order to map the responses. This is the largest survey of pests and pesticide uses in any urban area, and we expected lower income wards 7 and 8 to have the most pest complaints and the most use of pesticide products.
Methods: Ward-specific results were compared to all responses for DC as a whole using the non-parametric Wilcoxon signed-rank test. Significant differences ($p<0.05$) were then displayed using Geographic Information Systems (GIS) to highlight findings for selected pest complaints and pesticide uses between individual wards and all of Washington DC.
Results: DC Ward 1 reported significantly ($p<0.05$) more bedbug problems than the city as a whole. Ward 1 reported significantly higher use of mattress powder/dust than DC. However, Ward 4 reported more bedbug treatments by pest control officials than DC as a whole. Wards 4, 5 and 8 reported significantly more frequent mice problems than DC as a whole, more frequent use of glue, sticky, and snap traps (both by the respondents themselves or someone in their home). Ward 1 also reported significantly more frequent rat problems than DC as a whole. Findings do not suggest that lower income Wards 7 and 8 in DC have the most pest problems/complaints.
Conclusion: Based on our survey, bedbug treatment and residential educational efforts should focus on Ward 1. Mice and rat intervention and educational efforts should focus on Wards 4, 5 and 8. After treatment and educational efforts are completed, DC residents should be resurveyed to test effectiveness.

DOES AIR POLLUTION TRIGGER INFANT MORTALITY IN WESTERN EUROPE? A CASE-CROSSOVER STUDY.

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Background and Aims: Numerous studies show associations between fine particulate air pollutants (PM10) and mortality in adults. We investigated short-term effects of elevated PM10 levels on infant mortality in Flanders, Belgium, and studied whether the European Union (EU) limit value protects infants from the air pollution trigger.
Methods: In a case-crossover analysis, we estimated the risk of dying from non-traumatic causes before the age of one year in relation with outdoor PM10 concentrations on the day of death. We matched control days on temperature in order to exclude confounding by variations in daily temperature.
Results: During the study period (1998-2006), PM10 concentration averaged 31.9 µg/m³ (SD 13.8). In the entire study population (N=2382), the risk of death increased by 4% (95% CI: 0-8%, P=0.045) for a 10 µg/m³ increase in daily mean PM10. However, this association was only significant for late neonates (2-4 weeks of age, N=372) in whom the risk of death increased by 11% (1-22%, P=0.028) per 10 µg/m³ increase in PM10. In this age class, infants were 1.74 (1.18-2.58, P=0.006) times more likely to die on days with a mean PM10 above the EU limit value of 50 µg/m³ than on days below this cut-off.
Conclusions: Even in an affluent region in Western Europe, where infant mortality is low, days with higher particulate air pollution are associated with an increased risk of infant mortality. Assuming causality, the current EU limit value for PM10, which may be exceeded on 35 days per year, does not prevent PM10 from triggering mortality in late neonates.

AMBIENT TEMPERATURE AND BIOMARKERS OF HEART FAILURE: A REPEATED MEASURES ANALYSIS

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Background and Aims: Extreme temperatures have been associated with increases in hospitalization and death from cardiovascular disease, and individuals with heart failure (HF) may be particularly vulnerable. We investigated associations between outdoor temperature (0-4 day moving averages) in the Boston area and biomarkers of inflammation and myocyte injury in a repeated-measures study of individuals with stable HF. We hypothesized that extreme temperatures would be associated with adverse effects, and that humidity would exacerbate these associations in the warm season.
Methods: We analyzed data from a completed clinical trial of 100 patients with HF randomized to 12 weeks of tai-chi classes or HF education control supplementing usual care. B-natriuritic peptide (BNP), C-reactive protein, and tumor necrosis factor-alpha were measured at 3 timepoints (baseline, 6 and 12 weeks). Endothelin-1 was measured at baseline and 12 weeks. We used mixed-effects models to evaluate associations with temperature**.** Models were adjusted for randomization arm, medical history and socioeconomic factors, weekday, and seasonality. We examined associations across all seasons and separately for the warm and cold seasons. Models of temperature and relative humidity were compared to models of apparent temperature, a marker of perceived temperature.
Results: The 100 participants provided 285 observations from 2005-2009. Significant associations were observed only with BNP levels. A 5 °C change in the 3-day moving averages of ambient and apparent temperature were associated with 12.4% (95% Confidence Interval (CI): (1.6,24.3)) and 13.5% (95% CI: 3.6, 24.3) higher BNP. Larger estimates were observed in the warm season (March – August). Apparent temperature was a more significant correlate of BNP than temperature and humidity together. Adjustment for ambient pollution did not substantially alter these associations.
Conclusions: We observed positive associations between temperature and BNP, a marker of HF severity. The magnitude and strength of these associations was greater in the warm season.

REPETITIVE ELEMENT METHYLATION EXTENT IS ASSOCIATED WITH INFANT GROWTH AND DEVELOPMENTALLY RELATED GENE METHYLATION

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Background and Aims: Fetal programming describes the theory linking environmental conditions during embryonic and fetal development with risk of diseases later in life. Environmental insults in-utero may lead to changes in epigenetic mechanisms, resulting in deleterious changes to overall placental function. In this study, we aimed to examine the impact of birthweight percentile on repetitive element methylation in placental tissue, and to determine if repetitive element methylation could be an indicator for changes in methylation of specific CpG loci.
Methods: Placental tissues were obtained from patients delivering at Women and Infants Hospital in Providence, RI. Birthweight percentile and levels of LINE1 and AluYb8 methylation were determined for 380 subjects; methylation profiling was performed using the Illumina Infinium27 Methylation BeadArray on 184 subjects. We used multiple linear regression to investigate the association between birthweight percentile and repetitive element methylation, and used model-based methods, such as gene set enrichment analysis, to test the association between repetitive element methylation and individual CpG loci methylation levels.
Results: Birthweight percentile was a significant predictor of both LINE1 and AluYb8 methylation levels, with maternal smoking during pregnancy predicting only AluYb8 methylation levels. Increasing levels of AluYb8 were associated with increasing average class methylation of individual CpGs found in polycomb group target sites. Developmentally related transcription factor binding sites and important cellular processes pathways were over-represented for differentially methylated loci associated with both LINE1 and AluYb8.
Conclusions: AluYb8 methylation status may be a biomarker for individual CpG loci changes occurring in polycomb group target sites, and for specific changes occurring in developmental pathways. It may therefore be a potential biomarker for epigenetic changes occurring during development.

RETROSPECTIVE SPATIOTEMPORAL AIR POLLUTION EXPOSURE ASSESSMENT FOR A NATIONAL CANADIAN LUNG CANCER CASE-CONTROL STUDY

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Background and Aims: Few epidemiological studies have used residential histories to conducted long-term retrospective exposure assessments of ambient air pollution, and even fewer have incorporating local exposures from vehicle or industrial sources. We conduct such an assessment for a Canadian national lung cancer case-control study of 8,353 individuals using self-reported residential histories from 1970 to study entry (1994-1998).
Methods: Annual ambient pollution concentrations were derived from fixed site monitors within 50km's of residential postal codes. For postal codes located farther than 50km's from a monitor, national spatial pollutant surfaces, created from recent satellite-based (for PM2.5 and NO2) and dispersion models (for O3), were calibrated with historical fixed site monitoring data to estimate annual ambient concentrations. Random effect models were developed from co-located PM10/PM2.5 and TSP monitors, along with geographic variables, to estimate PM10 and PM2.5 exposures back to 1970. In addition, proximity to highways and major roads, incorporating a temporal weighting factor based on Canadian mobile emission estimates, were calculated to assess vehicle emission exposures. A comprehensive inventory of approximately 16,000 geocoded industrial emissions sources from 1970 to study entry, representing fifty standard industrial classifications, was used to estimate exposure to industrial emissions.
Results: In total, 130,143 (65%) exposure-years occurred in urban areas and 70,755 (35%) in rural areas. No significant difference (p=0.43) was present for completeness of self-reported residential histories by case and control status. Mean (SD) exposures were PM2.5 15.7(3.3)ug/m3, NO2 16.7(9.3)ppb and O3 22.4(3.9)ppb. Study participants lived on average 3.8 years within 300m of a highway and 1.7 years within 1km of a major industrial source.
Conclusions: A spatiotemporal modeling approach was used to estimate air pollution exposures for a national Canadian lung cancer case-control study. Incorporating residential mobility was important for accurate exposure assessment.

MULTIMETAL EXPOSURE IN ADOLESCENTS FROM A SMELTER COMMUNITY IN NORTHERN MEXICO

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Background and Aims: The city of Torreon Coahuila, located in north central Mexico, is home to the largest Pb-Zn-Ag smelter complex in Latin America. The smelter has caused high concentrations of Pb in blood (PbB) in city residents. We examined environmental exposure to eight metals in adolescents in Torreon using exposure biomarkers.
Methods: Cross-sectional study conducted in 512 adolescents (age 12-15 years) who were under epidemiological surveillance due to environmental exposure to Pb and other metals. We measured PbB using atomic absorption spectrometry and the urinary concentrations of As, Cd, Mo, Sb, Tl, W, and U using ICP-MS.
Results: The median PbB (range) was 3.97 µg/dL (0.97 - 21.92). For urine metals, the medians (range; both in µg/L) were 40.8 for As (1.6 - 667.8), 0.24 for Cd (0.0 - 3.49), 73.15 for Mo (2.63 - 508.04), 0.13 for Sb (0.0 - 0.96), 0.33 for Tl (0.0 - 1.52), 0.16 for W (0.0 - 2.62), and 0.04 for U (0.0 - 1.74). The following metals were correlated: PbB and urine Cd; urine As and U; and urine Sb with PbB, urine Cd and As.
Conclusions: Children in Torreon showed a complex pattern of metal exposure. Urine uranium levels were high compared to the general US population. Uranium may have been introduced by re-suspension or dissolution of soil, but also by release of uranium from mining and milling activities, or by burning coal.

PRENATAL EXPOSURE TO OUTDOOR AIR POLLUTION IN RELATION TO RESPIRATORY HEALTH, ECZEMA AND OTITIS EARLY IN LIFE

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Background and Aims: Prenatal exposure to air pollution may effect respiratory health and increase the susceptibility towards infections during early childhood. We assessed the relationship between maternal exposure to traffic-related air pollution and respiratory health, eczema and otitis in infants from four areas within the Spanish INMA (Environment and Childhood) study.
Methods: Temporally-adjusted land-use regression models were developed to predict pregnancy exposures to outdoor NO_2 and benzene for 2,173 women. Information on chest infections (bronchitis, bronchiolitis and pneumonia), wheezing, eczema and otitis was obtained by questionnaire at 1-1.5 years old. Associations between air pollutants exposure and health outcomes were assessed with log-binomial regression models, controlled for potential confounders. Because of heterogeneity, the association between air pollution and otitis was assessed by area. Sensitivity analyses were performed for non-movers and for women who spent more time at home during pregnancy.
Results: Mean (sd) exposure during pregnancy was 28.85 (11.25) $\mu g/m^3$ for NO_2 and 1.56 (0.93) $\mu g/m^3$ for benzene. Adjusted relative risks (RR) associated with an increase of 10$\mu g/m^3$ in NO_2 exposure were 1.06 (95% CI=1.00-1.14) for chest infections, 1.01 (95% CI= 0.92-1.11) for eczema, and 1.05 (95% CI=0.99-1.13) for wheezing. NO_2 exposure was significantly associated with otitis in three out of the four areas, with RRs ranging between 1.23 and 1.31. An increase of 1 $\mu g/m^3$ in benzene exposure was associated with a RR of 1.07 (95% CI=0.99-1.16) for chest infections, 1.03 (95% CI= 0.93-1.14) for eczema, and 1.05 (95% CI=0.98-1.12) for wheezing. All the RRs were higher among the subset of infants whose mothers spent more time at home during pregnancy.
Conclusions: There is some indication that prenatal exposure to traffic-related air pollution may contribute to the development of respiratory effects and otitis in early life. To what extent these associations are influenced by postnatal exposures need to be elucidated.

A COUPLE OF SQUIRTS A DAY KEEPS THE DOCTOR AWAY. A CLUSTER RANDOMIZED CONTROLLED TRIAL OF ALCOHOL-BASED HANDRUBS FOR PREVENTION OF INFECTIOUS DISEASE IN CHILDREN

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Background and Aims: This first cluster randomized controlled trial in a developing country setting sought to investigate if the use of alcohol-based handrub (ABH) reduced the incidence of acute diarrhoea (ADD) and respiratory infection (ARI) in children under five years. Handwashing with soap and water is known to be effective to prevent these illnesses, but alternatives are needed for settings where it is impractical.
Methods: The trial was performed in childcare centres with limited tap water availability located in six Colombian towns. Participants were randomly assigned to use ABH as a complement to handwashing (intervention arm: 21 centres/794 children); or to continue previous handwashing practices (control arm: 21 centres/933 children). Cases were identified through teacher-reported signs and symptoms of illness. Adverse events were monitored. Hazard ratios were obtained using Cox proportional hazards multivariate regression shared frailty models.
Results: Child-days of surveillance totalled 336,038. Attrition rate was 14%. For both diseases the hazard ratio did not differ during the first trimester of the trial. However, after this period the hazard ratios favour the intervention arm. The respective estimated risk of ADD for the second and third trimesters among children in the intervention group was 55% and 44% of the risk in the control group ($p<0.001$). The respective estimated risk of ARI for trimesters two and three among children in the intervention group was 80% and 69% of the risk in the control group ($p<0.001$). No adverse events occurred.
Conclusions: Alcohol-based handrub gels effectively prevent acute diarrhoea and respiratory infection and are safe. These results corroborate the findings of studies done in more affluent societies. National public health policies for prevention of these diseases should consider use of gels. Further research about the cost-effectiveness of ways to facilitate long-term behaviour change and technology adoption in diverse cultural contexts is needed.

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LONG-TERM EXPOSURE TO TRAFFIC PARTICLES AND REPEATED MEASURES OF ATHEROSCLEROTIC PROGRESSION

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Background and Aims: Recent evidence suggests that long-term chronic exposure to ambient pollution may contribute to atherosclerotic progression, but evidence from human studies is limited. We investigated the association between long-term exposure to traffic particles and carotid intima media thickness (CIMT), a marker of atherosclerotic burden, with a repeated measures analysis of men residing in the Boston area.
Methods: We estimated individual-level exposure to traffic particles (black carbon) at home addresses for 1 year prior to the baseline using a validated spatio-temporal model. Predictions are based on meteorological factors, as well as measures of land use at a given location. We examined the association between CIMT and log-transformed black carbon using a mixed effects model with random subject intercepts and covariates including medical history, indicators of socioeconomic position and seasonality.
Results: A total of 380 participants provided a baseline visit between 2004 and 2008. There were 2 and 3 follow up visits on 340 (90%) and 260 (68%) study participants. The mean ± SD age and CIMT at baseline were 75.9 ± 6.4 and 0.99 ± 0.18, respectively. CIMT was log-transformed to improve the normality of the distribution. In our analyses, an interdecile difference (equivalent to 0.48 $\mu g/m^3$) of log-transformed black carbon at baseline was associated with a 5.6% (95% CI: 1.2 – 10.1) higher CIMT. A penalized spline for black carbon showed deviation from linearity on the log scale, particularly at higher black carbon exposures, which were associated with higher CIMT.
Conclusions: Long-term exposures to traffic particles are associated with longitudinal measures of CIMT in a community-dwelling population of older men. This study provides further evidence for the potential role of long-term exposure to particles in advancing atherosclerosis and we observed detectable differences in effect size across a range of low levels of exposure.

SOCIAL INEQUALITY AND ITS ENVIRONMENTAL HEALTH CONSEQUENCES AMONG 9-10 YEAR OLD CHILDREN

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Background and Aims: Socio-economic status (SES) determines the people's potentials and the most essential environmental related health effects from the moment of fertilization until death. During the data analysis of the Hungarian country-wide respiratory survey we often met the determining role of social inequalities in both the level of environmental exposure and the health status of the children. The poster presents some of these "dose-response" relationships using a complex SES variable.

Methods: Source of the analysed data was the database of the country-wide survey on the children's respiratory health (OGYELF) covering all children attending 3rd grade classes with at least 10 pupils. The parents-completed questionnaires containing questions on the presence of respiratory and allergic symptoms and their possible risk factors, including socio-economic status, were sent back from 2,160 schools (79.2%) out of the 2,726 ones approached. Altogether 62,711 questionnaires (76.4% of the ones sent to these schools) were evaluated. A complex SES variable was constructed from 4 questions (low level of the mother's education, one-parent family, regular state benefit and self-rated low level of subsistence). Associations were analysed by multivariate logistic regression using STATA/SE 10.0.

Results: Several environmental risk factors showed significant dose-response relationships with SES which are, even in themselves, significant risk factors of the studied respiratory symptoms (e.g. heating with coal or wood-fired stoves or with gas cooker, crowdedness, environmental tobacco smoke, smoking during pregnancy, waste dump site near the home). Out of the studied health outcomes the prevalence of both chronic bronchitic and asthmatic symptoms showed significant dose-response relationships with the disadvantageous socio-economic status, while the prevalence of allergic symptoms showed opposite tendency.

Conclusions: Besides decreasing the harmful effects of environmental risk factors, reduction of social inequalities is inevitable in order to improve the health status of the population.

INCREASED MITOCHONDRIAL DNA-CONTENT ATTRIBUTABLE TO CADMIUM EXPOSURE AMONG ELDERLY

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Background and Aims: Many lines of evidence suggest that mitochondria and oxidative DNA damage have a central role in ageing-related diseases and carcinogenesis. Cadmium is linked to increase cancer incidence but cadmium is not mutagenic by itself. Here we show, in a cross-sectional study of 143 elderly, a link between mitochondrial DNA (mtDNA) content, oxidative DNA damage (8-deoxyhydroxyguanosine) and urinary cadmium which is a biomarker of lifetime exposure.
Methods: In a case-crossover analysis, we estimated the risk of dying from non-traumatic causes before the age of one year in relation with outdoor PM10 concentrations on the day of death. We matched control days on temperature in order to exclude confounding by variations in daily temperature.
Results: We found that each doubling in urinary cadmium concentration was independently associated with a +0.10 (95% CI: 0.03 to 0.19;) increase in the ratio of mtDNA/nDNA content (COX-1, 3212/3319) and 8-deoxy-hydroxyguanosine increased substantially [+11.2% (0.85 to 22.2%; p=0.03)].
Conclusions: The observed association of an increased mtDNA/nDNA ratio in relation to urinary cadmium provides mechanistic plausibility to the hypothesis that carcinogenic metals like cadmium induce ageing related pathways.

ASSOCIATION BETWEEN LEAD EXPOSURE AND CARDIOVASCULAR RISK FACTORS IN AN ABORIGINAL POPULATION OF CANADA (JAMES BAY, QUEBEC)

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Background and aims: Lead exposure among Cree living in the eastern coast of the James Bay (Quebec) is related to hunting with lead shots and consumption of wildfowl and game. Exposure to lead has been associated with reduced heart rate variability (HRV) and increased blood pressure (BP), which are known cardiovascular risk factors. Low HRV is associated with sudden death while BP is a risk factor for ischemic heart diseases (IHD) and stroke. We aimed to assess the impact of lead on BP and HRV among Cree adults considering potential confounding factors.
Methods: Data were collected among 397 adults ≥ 18 years old living in three communities of the James Bay. Blood lead level was used as biomarker of recent exposure. BP was measured according to the WHO guidelines while HRV was derived from a 2-hour Holter monitoring. The relationship between lead and BP and HRV was studied using simple and multiple linear regressions in order to adjust for confounders (age, sex, fasting glucose, obesity, cholesterol, smoking, physical activity, antihypertensive/antiarrhythmic treatment, n-3 fatty acids, selenium and mercury levels).
Results: Mean age was 40±15 years and the sample was composed of 165 women and 232 men. Geometric mean of blood lead concentration was 0.12 μmol/L (95%CI: 0.11-0.13 μmol/L). Lead was negatively associated with HRV parameters such as low frequency (LF) (β= -0.22, p< 0.0001) and high frequency (HF) (β= -0.24, p= 0.0001) but these associations did not remained statistically significant after adjusting for confounders. In contrast, lead was positively associated with systolic blood pressure (SBP) (β= 2.66, p= 0.009) and diastolic blood pressure (DBP) (β= 1.77, p= 0.014) after adjusting for confounders.
Conclusion: Recent lead exposure seems to be associated with increased SBP and DBP among Cree of the James Bay.

INDIVIDUAL ACTIVITY CHANGE IN RESPONSE TO POOR AIR QUALITY

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Background and Aims: In the United States, several public health initiatives inform the general public about potential hazards of outdoor air pollution. Using National Health and Nutrition Examination Survey (NHANES) data, our aim was to evaluate the prevalence and characteristics of individuals who changed activities due to poor air quality.
Methods: This cross-sectional analysis included 5867 participants 16 years and older in NHANES 2007-2008 who were asked whether they changed activities in the past 12 months due to "bad" air quality. Descriptive statistics and logistic regression models including age, gender, race/ethnicity, smoking status, self-reported physical activity, and self-reported respiratory (asthma, emphysema, or chronic bronchitis) or cardiovascular (congestive heart failure, coronary heart disease, angina, heart attack, or stroke) conditions were evaluated using appropriate survey sample weights. Education, socioeconomic status, and body mass index were also considered.
Results: N=709 participants (12.3%, 95% confidence interval (CI): 10.4, 14.3) reported changing behavior in the past 12 months due to poor air quality. Based on an adjusted logistic model, older participants (≥ 45 years) and women were significantly more likely to change their activities. However, younger participants (<25 years), those reporting less physical activity, and smokers were significantly less likely to change their activities. Those with any respiratory condition (adjusted OR: 2.65, 95% CI: 2.01, 3.48) were also more likely to have changed activities. There was no association between those with any cardiovascular condition and activity change. Among those who changed activities, the most frequent change was spending less time outdoors (66.6%), whereas the least frequent was using public transportation (1.2%).
Conclusions: We present evidence that some individuals, including those with respiratory disease, reported changing activities in response to poor air quality. Public health initiatives should continue efforts to reach a broader population, particularly those with cardiovascular conditions.

SERUM AND FOLLICULAR FLUID CONCENTRATIONS OF POLYBROMINATED DIPHENYL ETHERS (PBDEs) AND *IN-VITRO* FERTILIZATION (IVF) OUTCOME

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Background and Aims: Human exposure to polybrominated diphenyl ethers (PBDEs) is widespread and body burdens in North Americans are particularly high. There is evidence of reproductive effects of PBDEs in animals, but human studies are limited. Our objective was to investigate the use of serum and follicular fluid as biomarkers of exposure to PBDEs and to explore the relationship between PBDE exposure and early pregnancy loss.
Methods: We measured PBDEs in serum and follicular fluid from 65 women undergoing *in-vitro* fertilization (IVF). Logistic regression models were used to estimate the odds of failed implantation associated with higher levels of PBDEs among the women in the study.
Results: There were moderate Spearman correlations between serum and follicular fluid concentrations of BDE 28, 47, 100 and 154 (r=0.36-0.51, all p-values<0.004), but BDE 99 and 153 were not correlated between the two matrices (r<0.2, all p-values>0.2). Women with detectable concentrations of BDE153 (39% had detectable levels) in follicular fluid had elevated odds of failed implantation compared with women who had non-detectable concentrations (adjusted OR=10.0; 95%CI: 1.9 to 52; p=0.006; adjusted by age and BMI). There was also evidence for a dose-response trend when the women were divided into equal groups (adjusted OR for non-detect, medium, and high BDE 153 groups =1.0 [reference], 6.7, and 18.7, respectively; p-value for trend =0.008).
Conclusions: PBDE exposure may be associated with failed embryo implantation, but this association may be congener specific. Serum PBDE concentrations may not be a good indicator of the more biologically relevant follicular fluid concentrations when studying early pregnancy loss in women undergoing IVF. However, our ability to determine relationships between serum and follicular fluid PBDEs may be hindered by low detection rates.

EFFECTS OF RADON EXPOSURE AND SMOKING ON LUNG CANCER RISK: RESULTS OF A EUROPEAN COMBINED ANALYSIS AMONG URANIUM MINERS

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Background and aims: Three case-control studies nested in the French, German and Czech cohorts of uranium miners were conducted in the frame of the Alpha-Risk European research project. These studies aimed at investigating the combined effects of radon and smoking on lung cancer risk. A pooled analysis of individual data of the three studies is presented.
Methods: The pooled data set includes 1476 cases and 3389 matched controls. Cumulated radon exposure during employment was obtained from measurements or a job exposure matrix. Smoking habits were determined from medical archives and questionnaires. Analysis was performed by conditional logistic regression using a linear excess relative risk model.
Results: Smoking status was established for 1046 cases and 2492 controls. Ninety four percent of cases and 76% of controls were ex- or current smokers. Mean five-year lagged cumulated radon exposure was 335 Working Level Months (WLM) for cases and 211 WLM for controls. The excess relative risk per 100 WLM adjusted for smoking was 0.79 (95% confidence-interval: 0.44-1.41). Lung cancer excess relative risk was higher among non-smokers than among smokers and the results suggest a sub-multiplicative interaction between smoking and radon exposure on lung cancer mortality risk.
Conclusions: This collaborative study is the largest uranium miner case-control study on lung cancer with smoking information in Europe. It confirms the persistence of radon effect on lung cancer risk when smoking is taken into account. The results are consistent with a sub-multiplicative interaction between radon and smoking and even among never smokers, the lung cancer risk is significantly associated with radon.

COMPARISON OF METHODS FOR ESTIMATING PERSONAL BLACK CARBON EXPOSURES IN URBAN SETTINGS

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Background and Aims: Epidemiological studies have demonstrated that black carbon (BC) exposures are associated with adverse health effects. To date, studies have primarily conducted exposure assessment based on fixed-site monitoring, or a single integrated 24-48 hr personal sample. This paper uses repeat personal BC measurements to explore the difference in distribution of personal BC exposure in a cohort of 9-10 years old urban children to fixed-site BC monitoring data.
Method: Personal sampling (PS) for each subject comprised carrying a microaethalometer (Magee Sci), for 5 weekday and 1 weekend 24hr periods, spread over a 3-4 weeks. Fixed-site BC sampling (FS) employed a rack mount Aethalometer® with the inlet located outside of a 5th floor window in Washington Heights, NYC. Here we start with comparing descriptive statistics and univariate correlations for 24 hr average data for P and F.
Results: Linear regressions between PS (as y) and FS (as x) on 24hr average displayed large variability in correlation, slope and intercept for 27 subjects that had 4 or more valid data for BC_P and BC_F. 9/27 subjects show poor correlation (R^2: 0.02~0.38, N≥4) and 8/27 subjects show moderate correlation (R^2: 0.51~0.69, N≥5) with FS. However, 10 of the subjects displayed high correlation between P and F (R^2: 0.72~0.94, N≥4) but displayed variable slopes (-19 to 1.0) and intercepts (near zero to ~38,000 ng/m^3).
Preliminary Conclusion: Based on our study, ~1/3 subjects' BC personal exposure could not be predicted by central site sampling, probably due to personal activities leading to BC exposures different from that of the fixed-site; Roughly, 1/3 subjects' personal measurements highly correlate with fixed-site data, though the relationships vary as a function of the subject, consistent with spatial variability in ambient BC. Time activity recall diaries and GPS data are being investigated to see if they support these preliminary conclusions.

DETERMINANTS OF INDOOR AND OUTDOOR LEVELS OF NO_2 IN A COHORT OF 4-YEARS-OLD CHILDREN

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Background and Aims: Home outdoor NO_2 has been used as a marker of personal exposure to traffic-related air pollution. However, recent studies suggest that exposure to indoor NO_2 may be a risk factor in itself for respiratory health and neurodevelopment. We aimed at assessing the relationship between indoor and outdoor NO_2 levels and their determinants in a subset of the INMA birth cohort of Sabadell, Spain.
Methods: Indoor and outdoor NO_2 levels were measured with passive samplers during two measurement campaigns of one week (1^{st} campaign in fall/winter, 2^{nd} campaign in summer) at home addresses of 96 children. Characteristics of the home surroundings (street configuration, building density, and traffic-related variables) were obtained by the field workers and by Geographic Information Systems (GIS). Information on sources of NO_2 indoor levels (gas appliances, tobacco smoke) and additional variables (e.g.use of extractor fan, air conditioning) were obtained through questionnaires in each campaign.
Results: Mean levels of outdoor NO_2 were 36.7 $\mu g/m^3$ in fall/winter and 34 $\mu g/m^3$ in summer, while mean levels of indoor NO_2 were 22.8 $\mu g/m^3$ in fall/winter and 26 $\mu g/m^3$ in summer. The correlation between indoor and outdoor levels was lower in fall/winter (r=0.35) than in summer (r=0.51). The main determinants of outdoor NO_2 were the street configuration (continuous buildings on both sides vs. other configurations) and traffic-related GIS variables. Indoor NO_2 levels were influenced by tobacco smoke, time using gas cooking, time opening windows to ventilate, house age, and an interaction between outdoor NO_2 levels and use of air conditioning.
Conclusions: The influence of traffic-related NO_2 pollution on indoor levels is higher in summer than in fall/winter, probably due to differences in ventilation patterns. Gas cooking and tobacco smoke are the main indoor sources of NO_2, whereas ventilation, use of air conditioning, and house age are additional determinants.

EXPRESSION OF PROTEIN HSP-70 IN HUMAN LYMPHOCYTES INDUCED BY NITRATE AND LEAD ACETATE.

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ABSTRACT

The effects of lead are involved almost the entire cellular environment, inorganic lead compounds as well as some non-essential metals for cell homeostasis may alter directly or indirectly the immune system due to its sensitive response to the presence of these and therefor exert immunosuppressive action. This response to the presence of the exhibition serves as a biomarker of contaminant through the expression of heat shock proteins (Hsp) and Hsp-70. **Objective:** The purpose of this study was to determine the amount of heat shock protein Hsp-70 expressed in human lymphocytes of de blood of healthy people, at be subject to concentration of acetate and nitrate of lead smaller to 10 µg/dl. **Materials and Methods:** The tissue was obtained through venous puncture of healthy volunteers. The lymphocytes were isolated by Ficoll–Paque gradient, experimental lots were subject to stress with a concentration of acetate and lead nitrate by 2.5, 5.0, 7.5, 10 µg/dl during 3 hours at 37 ^{0}C, like positive control to the expression of Hsp 70 protein was used two samples, a with concentration of 100 µg/dl under the same conditions and other positive control by heat at 42 ^{0}C during 3 hours, after of stress period the lymphocytes leave them in recovery with culture medium during 3 hours at 37 ^{0}C without the stressor agent. The cell protein extract were separated by SDS-PAGE, detected by immunoblotting and the quantification were done by densitometry. **Results:** The protein Hsp-70 was expressed in each different concentration of acetate and nitrate lead. **Conclusions:** It was found that the concentration used of acetate and nitrate of lead are biomarker of cellular stress to the lymphocytes expressing by increase in the expression of heat shock protein Hsp-70. **References:**Bozhkov A, Padalko V, DlubovskayaV and Menzianova N. Resistance to Heavy Metal Toxicity in Organisms under Chronic Exposure. Indian Journal of Experimental Biology2010;48:679–696.

PERSISTENT ORGANIC POLLUTANTS AND OVERWEIGHT AT AGE 6.5 YEARS; DO SEX OR HIGH-FAT INTAKES OF THE CHILD MATTER?

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Background and Aims: Recent experimental evidence suggests prenatal exposure to endocrine-disrupting chemicals may increase postnatal obesity risk, and that these effects may vary by sex or be enhanced when animals are postnatally placed on a high-fat diet. Little is known about these associations in humans. We explored whether prenatal exposure to organochlorine compounds (OC) (PCBs, DDE, DDT) is associated with overweight at age 6.5 years and whether children's sex or fat intakes modify these associations.
Methods: We studied 344 children from a Spanish birth cohort established in 1997/98. OC concentrations were measured in cord blood. Overweight at 6.5 years was defined as a BMI z-score • the 85th percentile of the WHO reference. Using a food frequency questionnaire of children's diet in the past year, a high-fat intake was defined as above median fat intakes as a percentage of energy. We estimated relative risks using generalized linear models.
Results: Third tertile PCBs exposure was found to be associated with overweight in girls (RR^{a}=2.13, 95%CI=0.99, 2.57), but not clearly in boys (RR^{a}=1.43, 95%CI=0.82, 2.38; p-interaction=0.04). Children with higher-fat intakes had an increased risk of overweight related to third tertile PCBs exposure (RR^{a}=1.95, 95%CI=1.00, 3.82), but the interaction was not statistically significant (p-interaction=0.63). Second tertile DDE exposure was associated with overweight (RR^{a}=1.67, 95%CI=1.10, 2.55), with a somewhat stronger association in girls than boys (p-interaction=0.20). No effect modification by fat intake was observed for DDE (p-interaction=0.93). Second tertile DDT exposure was associated with overweight only in boys (RR^{a}=1.96, 95%CI=1.06, 3.62; p-interaction=0.25) and among children with higher-fat intakes (RR=2.31, 95%CI=1.16, 4.58; p-interaction=0.20). For none of the OC, linear dose-response relationships were observed.
Conclusions: Though no clear evidence was found for a dose-response relationship, prenatal PCBs, DDE and DDT concentrations might increase the risk of overweight at 6.5 years in a sex-specific and diet-dependent way.

Con formato: Izquierda

TOENAIL ARSENIC CONCENTRATIONS AMONG RESIDENTS OF A COAL MINING AREA OF THE APPALACHIAN MOUNTAINS OF THE UNITED STATES: A PILOT STUDY.

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Background and Aims: Arsenic is an established lung carcinogen. Lung cancer rates in the Appalachian region of Kentucky are about twice the national rates in the U.S.A. The high rates of smoking in the area do not explain all the elevation in lung cancer risk. This area is also characterized by extensive coal mining activity. This pilot study explored a comparison of toenail arsenic concentrations in Appalachian Kentucky and another distant region of the state.
Methods: Toenail samples were collected for a population-based case-control study in Kentucky. A sub-group of the samples were selected and analyzed for trace elements, based on location of the study participants, who were included if they lived in the East Kentucky Coal counties in Appalachian Kentucky, or in the largest urban center of Jefferson County. For the assessment of population-based exposure, only the controls of the original study were included. Total elemental analyses were performed using inductively-coupled plasma- mass spectrometry. There were a considerable number of samples with arsenic concentrations below the method detection limit, due in part to inadequate sample mass. Therefore, a reverse Kaplan-Meier method was used for the statistical analysis of the left-censored data.
Results: A total of 88 toenail samples from Appalachian Kentucky and 155 from Jefferson County were analyzed for arsenic concentrations. The reverse Kaplan-Meier estimation indicated that the arsenic concentrations in the Appalachian counties were significantly higher than in Jefferson (75^{th} and 90^{th} percentiles were 0.13 vs. 0.03 and 0.29 vs. 0.04 ug/g, respectively).
Conclusions: The results of this study suggest that residents of the selected Appalachian Kentucky counties with high coal mining activity have higher exposure to arsenic than those in an urban, non-coal mining region of the same state. However, further studies are needed to elucidate the source of the arsenic exposure.

IMPORTANCE OF CAREFUL DISEASE PHENOTYPING IN STUDIES ON DEVELOPMENT OF ASTHMA AND ALLERGIES

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the GABRIELA study group

Background and Aims: The protection from childhood allergies and atopic sensitisation by farming environments has been shown in numerous studies. Reports on the 'farm-effect' on wheeze and asthma have been less consistent. We aimed to determine whether protection conferred by exposure to farming was different for various wheeze phenotypes and whether this protection was independent of atopic sensitisation.

Methods: The GABRIEL Advanced Studies are cross-sectional multi-phase surveys on exposure to farming environments and its effect on asthma and allergic disease among 79,888 children at age 6 to 12. Detailed data on wheeze, exposure to farming environments, and total and specific immunoglobulin E were collected from a stratified random sample of 8,023 children. A further stratified random sample of 895 children was invited for lung function including bronchodilator response and exhaled nitric oxide measurements. We used adjusted weighted stratified regression analyses to assess effects of farming exposure.

Results: We were able to confirm the protective farm-effect on prevalence of childhood atopy and showed also an influence on the degree of atopy. For atopic subjects, no further farm-effect on the prevalence of current wheeze was seen but an effect on exhaled nitric oxide and lung function. Exposure to farming led to decreased prevalence of transient early wheeze and among non-atopic children to decreased prevalence of current wheeze.

Conclusions: Exposure to farming environments may affect distinct mechanisms during the development of atopic sensitisation and wheeze. Besides the known effect on atopy, farming affects prevalence of current wheeze among non-atopic subjects, suggesting mechanisms independent of atopic sensitisation. Phenotypic heterogeneity may explain the previously less consistent reports of the farm-effect on wheeze.

LEAD CONCENTRATION IN FORAGE, FODDER, WATER AND BOVINE MILK IN SAN IGNACIO.

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Lead is widespread in the environment by a variety of exposure routes allow toxic heavy metals like lead to enter the food chain of farm livestock animals. Samples were taken during the fall, winter, spring and summer season in the region of San Ignacio located in the state of Zacatecas in Mexico were in the middle of agricultural fields is located a metal recycler facility. **Objective:** Samples of forage, fodder, water and bovine milk used to cattle feeding were taken in order to determine the lead concentration.
Materials and Methods: Samples were processed and prepared to be analyzed with Atomic Absorption Spectrometry, determinations were performed by triplicate obtained by of pool of the three sample of each season, that it was taken by each one having a relative error < 1% for all them.
Results: From fodder and forage samples it was found that in average the lead concentration is 4.16 µg/g, being the summer season where lead levels reach its maximum values. From water samples the mean lead concentration was 0.218 mg/L, the winter season where water reaches its larger concentration level. The average of cow´s milk concentration lead is 0.033 mg/L, being the winter season where lead levels reach its maximum values 0.0545 mg/L, during spring the level of lead reaches the lowest concentration 0.0179 mg/L. For the milk-forage correlation values it was (p= .430) and for the correlation milk-water was (p= 0.874).
Conclusions: The average lead concentration is below the limits defined by the European Union, the average lead concentration water samples was 22 times higher to levels recommended by the Mexican Norm, and the average lead concentration cow´s milk is above the limits defined by the European Union, Australian, FAO. The lead concentration in cow´s milk probably is due to the water lead concentration. Therefore, lead concentration in the water and bovine´s milk is a potential source contamination to the community habitants.
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THE ASSOCIATION BETWEEN BLOOD LEAD AND BLOOD PRESSURE VARIES BY RACE AND DEPRESSIVE SYMPTOMS

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Background and Aims: Previous work has documented that US Blacks exhibit a stronger positive association between blood lead (BL) and blood pressure (BP) than Whites. The reason for this disparity is unclear, but might be due to effect modification. We examine psychological factors as a potential modifier.
Methods: With data from the National Health and Nutrition Examination Survey 2005-2008, we use race-by-lead interactions with linear regression to estimate Black-White differences in the associations between BL and BP, adjusting for age, hypertension risk factors, and SES. To account for any differences in lead effect due to disparities in lead level, we employ Oaxaca-Blinder decomposition techniques. To examine the role of mood, as reflected by depressive symptoms (DS), we employ race-by-DS-by-lead interactions. We calculate BL-BP associations for each race-DS group. All analyses are stratified by gender.
Results: Black men show a 2.4mmHg (se=1.0, $p<0.05$) increase in systolic BP (SBP) for each doubling of BL while White men show no increase. Women show similar disparity patterns. Decomposition analyses indicate that Black-White disparities in mean BL levels do not explain the greater BL effect shown by Blacks compared to Whites. Black men with high DS experience an 8.0mmHg increase in SBP with each doubling of BL (se=3.4, $p<0.05$) while those with low DS show no association (b=1.0, se=0.7). Black women with high DS experience a 3.8mmHg increase in SBP (se=1.6, $p<0.05$) while those with low DS show no association. Whites show no association in either DS group.
Conclusions: Our analyses suggest a mechanism for the stronger relationship between BL and BP among Blacks than Whites observed in prior studies. The BL-SBP association appears limited to those Blacks who report high DS. Our results suggest that mood, a psychological factor potentially related to psychosocial stress, may enhance susceptibility to the harmful health effects of environmental hazards experienced by socially disadvantaged populations.
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CONCENTRATION OF DIOXINS (PCDD/F) AND PCBS IN FISH FROM THE TYNE RIVER ESTUARY, UK, WITH DIETARY INTAKE ESTIMATES

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Background and Aims: The River Tyne estuary is located in a densely populated conurbation of one million people with long standing but now largely historic industrial heritage resulting in significant contamination along the shores. Contemporary discharges are from some upstream industries and raw sewage during storm events. Angling takes place on the Tyne estuary and caught fish is consumed in part by deprived populations for whom it may represent a regular part of the diet. Building on work carried out by the UK Food Standards Agency, we aimed to investigate for the first time PCDD/Fs and PCBs in a range of wild fish species and sample types from an estuarine river and to estimate potential risk to consumers.

Methods: We determined the concentrations of contaminants in different fish species and sample types. We collected a minimum of two kg each of Codling (G*adus morhua*) n=8, Whiting (*Merlangius merlangus*) n=22, Flounder (*Platichthys flesus*) n=19 and Eel (A*nguilla anguilla*) (Jan to June 09) n=14. Laboratory analysis was carried out by the Food and Environment Research Agency.

Results: Concentrations varied many-fold with, for example, sums of WHO TEQ (upper) in ng/kg: composites of whiting 0.15, flounder: 0.28, eel: 3.71, cod: 0.17, cod liver: 51.5. Whiting and cod had marginally higher concentrations of PCDD/F and PCBs than previous UK studies, eel concentrations were within the range of earlier studies.

Conclusions: Based on the FSA recommendation for a daily intake of <2pg WHO-TEQ/kg bodyweight for girls and women of reproductive age and < 8pg WHO-TEQ/kg bodyweight for males showed that girls and women of reproductive age should be advised not to consume Tyne eel more than once a week and all persons should be recommended to consume Tyne cod liver only very occasionally.

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MODELING EXPOSURES TO THE OXIDATIVE POTENTIAL OF AMBIENT PARTICULATE MATTER IN LONDON

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Background and Aims: Differences in the toxicity of ambient particulate matter (PM) due to varying particle composition across locations may contribute to variability in results from air pollution epidemiologic studies. Though most studies have used PM mass concentration as the exposure metric, one which accounts for particle toxicity due to varying particle composition as well as PM mass may better elucidate whether PM from specific sources is responsible for observed health effects.
Methods: The oxidative potential (OP) of PM <10 um (PM_{10}) was measured as the rate of depletion of the antioxidant reduced glutathione (GSH) in a model of human respiratory tract lining fluid. Using a database of GSH OP measures collected in greater London from 2002-2006, we developed and validated a predictive spatio-temporal model of the weekly GSH OP of PM_{10} that included geographic predictors. Predicted levels of OP were then used in combination with those of weekly PM mass to estimate exposure to PM_{10} weighted by its OP.
Results: Using cross-validation, brake and tire wear emissions of PM_{10} from traffic within 50 m and tailpipe emissions of nitrogen oxides from heavy-goods vehicles within 100 m were important predictors of GSH OP levels. Predictive accuracy of the models was high for PM_{10} (cross-validation R^2=0.83) but only moderate for GSH OP (cross-validation R^2=0.47) when comparing weekly levels; however, the GSH OP model predicted spatial trends well (spatial cross-validation R^2=0.80).
Conclusions: Results suggest that PM_{10} emitted from traffic sources, specifically brake and tire wear, has a higher OP than that from other sources, and that this effect is very local, occurring within 50-100 m.
References:

PERFLUORINATED CHEMICALS AND ANOGENITAL DISTANCE: PRELIMINARY APPROACH

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Background and aims: Perfluorooctanesulfonate (PFOS) and perfluorooctanoate (PFOA) are man-made, widespread persistent organic pollutants. Although they have been related to deleterious effects towards fetal growth in animals, the evidence on human effects is scarce (1, 2).
Anogenital distance (AGD) is an anthropometric measurement that has been taken to the newborns, and it is widely known as a marker of exposure to hormonal disrupters for animals. AGD would be a sensitive quantitative marker of disruptors exposure and could eventually be used as a risk factor measurement for endocrine-related dysfunctions (such as sterility) (3). The hypothesis of this study is that PFOS/PFOA could act as hormone disruptors and therefore lead to a modified AGD.

Methods: 10 newborns with the lowest AGD mean (33.63±2.16mm) and the 10 newborns with the highest AGD mean (50.64±3.89mm) went through analysis of levels of PFOS/PFOA. Moreover, this preliminary study provided the opportunity to validate an automatic method for PFOS analysis, which consists on liquid chromatography associated with masses spectrometry.

Results: The mean levels were 2059 (±1567) ng/ml for PFOS and 914 (±3449) ng/ml for PFOA. When AGD was divided into lowest and highest categories, the lowest AGD group had higher levels (ng/ml) of PFOS (2517, 95% CI 1332 - 3702, versus 1600, 95% CI 594 - 2607, p 0.19). Unconsistent results were find for PFOA analysis (115±45.3ng/ml for the lowest versus 1802±5008ng/ml for the highest AGD mean group, p=ns).

Conclusions: These preliminary results suggest that PFOS levels could be associated to anogenital distance. Levels of PFOS/PFOA were comparable to those obtained in previous studies. The inconsistent findings for PFOS and PFOA in relation to AGD could be due to different mechanisms of action, as observed for other hormone related endpoints. Future analyses will be presented at the conference, evaluating a larger sample of 200 children participating in NewGeneris-Spain and will allow us evaluate the association of AGD with PFOS/PFOA.

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PRENATAL ENVIRONMENTAL EXPOSURE, SUPPLEMENTATION WITH OMEGA-3 FATTY ACIDS DURING PREGNANCY AND RESPIRATORY SYMPTOMS IN INFANT FROM CUERNAVACA, MEXICO

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Background and aims: Maternal consumption of omega 3 polyunsaturated fatty acid can to act as an adjuvant in the immune system and have effects on the neonatal inflammatory response**.** We conducted the present study to investigate the effect of prenatal docosahexaenoic acid (DHA) supplementation on respiratory symptoms and to identify the main prenatal environmental risk factors for these symptoms in infants.
Methods: We included 784 infants whose mothers were randomly assigned to receive daily supplement of 400 mg of DHA or placebo from week 18-22 of pregnancy until childbirth. During pregnancy we collect information on sociodemographics characteristics, past health history, maternal stress and environmental exposures. Also, we collected blood samples to determine maternal specific IgE levels in plasma. Child respiratory symptoms information was collected using a recall questionnaire at 1, 3, 6, 9, 12 and 18 months of age. Poisson regression models were used to identify the main prenatal risk factors for respiratory symptoms.
Results: The occurrence of respiratory symptoms did not differ significantly between groups; however, the occurrence of a combined measure of some symptoms was lower in the DHA group. We observed that the higher risk of respiratory symptoms were for the children whose mothers were randomly assigned to receive placebo. The main risks factors were use pesticides in home (OR= 1.18; 95%IC 1.08, 1.29) gender male (OR= 1.09; 95% CI 1.01, 1.18) and maternal atopy (OR= 1.03 95%CI 0.95, 1.12).
Conclusions: DHA supplementation during pregnancy decreased the occurrence of respiratory symptoms in infants and this study strengthens the evidence that the family history and prenatal environmental exposure in early stages of life increase the risk of respiratory symptoms in childhood.
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US TODDLERS EXPOSURE TO PBDE FLAME RETARDANTS: ASSOCIATIONS WITH HOUSE DUST, HAND WIPES, AND SOCIAL/ECONOMIC VARIABLES

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Background and Aims

Polybrominated diphenyl ethers (PBDEs) are persistent and bioaccumulative flame retardants associated with adverse effects on thyroid regulation and neurodevelopment. Little is known about children's exposure and body burdens. The objectives of this study were to determine if PBDE body burdens were associated with the following: house dust and/or PBDE residues on hand wipes collected from the children; gender, age, race, and education level of the parents.

Methods

Blood samples, hand wipes and house dust were collected from children 12-36 months old residing in central North Carolina between 2009-2010. A short questionnaire was administered which collected information on the child's physical and behavioral characteristics, breast feeding, and the parents race and education levels.

Results

PBDEs were detected in every serum sample and the most abundant congeners were those associated with the PentaBDE mixture. Concentrations ranged from 5.2-745 ng/g lipid with a geometric mean value of 46.7 ng/g lipid. PBDE levels were significantly higher ($p < 0.05$) in the oldest age group (>24 months) relative to the youngest (~12-18 months). PBDE concentrations were significantly higher in African Americans relative to Caucasians; lower PBDE levels were observed with higher maternal education levels. Significant correlations were observed between the serum BDE47 levels and BDE47 measured on hand wipes ($r = 0.60$; $p<0.0001$) and BDE47 levels in house dust ($r=0.40$; $p<0.001$). No associations were observed between PBDE levels and duration of breast feeding as an infant.

Conclusions

These data suggest that children's exposure to PBDEs from house dust appears to be the leading exposure pathway in toddlers, and not diet or breast milk exposure. Minorities and families with lower educational levels are also at higher risk to exposure to this class of contaminants.

PM2.5 CHEMICAL CONSTITUENTS AND MORTALITY IN 49 U.S. COMMUNITIES FROM 2001 TO 2005

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Background and Aims: Short-term exposure to ambient particulate matter less than 2.5 µm in aerodynamic diameter (PM2.5) is consistently associated with adverse health outcomes in population studies. The PM2.5 mass represents a chemically diverse mixture of pollutants and there is limited evidence on the health effects of PM2.5 constituents.
Methods: We conducted a national multi-site time series analysis to examine the association between daily non-accidental mortality (≥ 65 years of age) and ambient levels of seven major PM2.5 chemical constituents: sulfate, elemental carbon (EC), nitrate, organic carbon (OC), silicon, sodium ion, and ammonium ion. Average lag-specific relative rates of death associated with each constituent were estimated using a two-stage Bayesian hierarchical model to combine evidence across 49 U.S. communities from 2001-2005.
Results: In a single pollutant model controlling for weather and seasonality, an interquartile range (IQR) increase in 2-day lagged EC levels (0.46 µg/m3) was associated with a 0.41% [95% posterior interval (PI), 0.06–0.76%] increase in the relative rate of death. An IQR increase in 1-day lagged OC levels (2.47 µg/m3) was associated with a 0.64% (95% PI, 0.14–1.15%) increase in the relative rate of death.
Conclusions: These findings suggest that ambient levels of EC and OC were positively associated with all-cause mortality for the elderly population. However, further investigations are needed to elucidate the joint effects of the PM2.5 constituents and their sources.

This is abstract does not necessarily reflect the policies of the U.S. Environmental Protection Agency.

AIRWAY AND CIRCULATORY PRO-INFLAMMATORY EFFECTS OBSERVED IN HEALTHY VOLUNTEERS AFTER AMBIENT AIR POLLUTION EXPOSURE: RAPTES HEALTH EFFECT ASSESSMENT

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Background and aims: Despite the large amount of data available on the adverse health effects of ambient particulate matter (PM) there is limited information on the influence of which PM characteristics mainly drive these effects. The aim of RAPTES (Risk of Airborne Particles: Toxicological-Epidemiological hybrid Study) is to investigate which PM characteristics contribute to effects on the respiratory and circulatory system.
Methods: Thirty healthy volunteers were exposed to ambient air pollution at five different sites in the Netherlands: two traffic sites, an underground train station, a farm, and an urban background site. Sampling took place on 30 days from March-October 2009. Each subject visited at least 3 sites and was exposed for 5h per visit. Air pollution was characterized during this 5h-period, including measurements of PM_{10} and $PM_{2.5}$ mass and elemental composition, particle number concentration (PNC), PM oxidative potential (OP) and PM_{10} endotoxin content. Pro-inflammatory parameters were measured before and at 2h and 18h post-exposure, including cytokines and differential cell counts in nasal lavage (NAL) and blood.
Results: PM_{10} endotoxin content was associated with elevated NAL cytokine levels. Two hours post-exposure, we observed a significant increase over baseline in IL-6 and IL-8 (3.2% and 1.5% per endotoxin unit respectively), as well as 18h post-exposure (1.7% IL-6). PM_{10}, $PM_{2.5}$ mass concentration, PNC and OP were not associated with NAL cytokine levels. Furthermore, no changes in NAL differential cell counts were observed after ambient PM exposure. In blood, PM characteristics were not associated with IL-6 (IL-8 not measured). A significant increase (15%) of leukocytes was observed 2h post-exposure followed by a significant decrease 18h post-exposure (10%). This was predominately characterized by an increase in neutrophils, especially in relation to PM_{10} and $PM_{2.5}$ mass, organic and elemental carbon.
Conclusions: Increased expression of pro-inflammatory airway and circulatory markers was observed in healthy volunteers after five-hour exposure to ambient air pollution. These effects were particularly associated with endotoxin and organic carbon.

THE ATTRIBUTABLE COSTS OF US OCCUPATIONAL LEAD POISONING

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Background: Occupational standards for lead in the US have not been changed for decades, during which the knowledge about lead's health effects has grown substantially, and new health outcomes and lower exposures associated with those outcomes are a general pattern.

Objective: We estimated the health and economic benefits that would accrue from a reduction in occupational lead levels in the United States.

Methods: We reviewed the literature on both occupational and general population studies of the effects of lead, and found substantial evidence for multiple health endpoints. We took data from the cost of illness literature to estimate avoided costs by reducing these effects and estimated the benefits that might be expected. To estimate exposure, we used US government data on the number of workers exposed; this is likely to be a significant underestimate of actual exposures.

Results: Payer and private medical costs alone are estimated at $40 million (09US$) per year, and total direct and indirect costs are estimated at $117-142 million (09US$) per year for the 11,000 or so workers with occupational lead exposures. This does not include increased mortality, a valuation of all health effects associated with lead exposures and quality of life decrements.

Conclusions: Reducing allowable lead limits would result in benefits of approximately $10,000 per worker per year, suggesting that cost effective reductions are likely to be possible. Given underreporting of actual exposures and the omission of important health effects, this is likely a significant underestimate of the true benefits of reducing occupational lead exposures in the US.

SAVING LIFE THROUGH TEACHING FIRST AID SKILLS AND RULES OF THE ROAD

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Background and Aims: Prevention of accidents is one of the most important socio-economic problems for the development of the country, the life and health of people. In traffic accidents knowledge and skills on giving first aid is critical for saving the life and health of individuals. This study was carried out within the project "Saving life through teaching first aid skills and rules of the road" of the European Commission in partnership with the Dutch Red Cross. The aim of the study was to assess educational activities on road safety and first aid skills in traffic accidents.
Methods: Statistical data and reports on accomplished road safety projects in the country were reviewed. 500 respondents from 7 regions were surveyed on first aid giving in traffic accidents.
Results: Traffic accidents were found to be steadily increasing and associated with a high level of mortality and injury. Review of activities in various projects on road traffic safety showed that they are directed primarily at reducing the number of traffic accidents through promoting road safety measures. 7 training centres on first aid skills and road safety rules have been established to provide training to the population on a regular basis using modern educational methods.
Conclusions: The campaign on raising the first aid and road safety awareness covered a considerable number of young people (13,000 persons). State authorities and NGOs were involved in the project. The investigation of opinions of the population showed high efficiency of the educational methods and strategies used. 88% of respondents gave correct answers about first aid and road safety rules that should be observed for personal safety and the safety of people near you.

DO METEOROLOGICAL CONDITIONS PLAY A ROLE IN OCCURENCE OF PREECLAMPSIA ?

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Background: Preeclampsia is a major obstetric complication and a leading cause of morbidity and death among mothers and infants. Previous attempt to study influence of meteorological parameters on occurrence of preeclampsia yielded contradictory results, with some studies evidencing correlations with temperature or humidity.
Objective: To determine the influence of meteorological conditions near date of conception on the occurrence of preeclampsia .**Methods:** Maternal, obstetrical and neonatal data on all pregnancies occurring in the French department of Yvelines were prospectively recorded between January 2007 and June 2010. Daily temperature, humidity, rainfall and sunlight intensity were provided by the French meteorological agency (Meteo France) then averaged near the Estimated Date of Conception (EDC): ten days around the EDC, ten days and thirty days after the EDC. Associations between occurrence of preeclampsia in singleton pregnancies and meteorological parameters were investigated with Poisson regression models adjusted on maternal age; past history of preterm birth and caesarean section; previous pregnancy; gender of child ; urban/rural profile of place of living.
Results: Preeclampsia occurred in 353 of the 46339 singleton pregnancies recorded during the study period (0.8%). The incidence of preeclampsia was not different according to month of conception. Furthermore, no meteorological parameters seemed to influence occurrence of preeclampsia, whatever the timing considered. At last, place of living (urban vs rural) did not influence the risk of preeclampsia.
Conclusion: In our cohort study - adequately powered to detect OR as small as 1.5 – there was no evidence of any influence of temperature, humidity, rainfall nor sunlight intensity near the EDC on the risk of preeclampsia. However, incidence of preeclampsia was lower than incidences generally measured in other studies (from 1.8 to 7%). In order to understand the association between meteorological conditions and adverse events in pregnancies, outcomes and measures of meteorological factors must be more accurately defined.

REVIEW OF METHODS AND APPROACHES USED TO EVALUATE HEALTH INTERVENTIONS IN NATURAL ENVIRONMENTS: A CONTRIBUTION TO THE DEVELOPING GREEN SPACE AND HEALTH EVIDENCE BASE

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Background and aims: The University of Highlands and Islands led a UK initiative, the "Outdoors and Health Network" (OHN) funded by the UK's Economic and Social Research Council and Medical Research Councils in 2009/10. An emergent finding from the network was an identified gap in the critical review of the research approaches taken in evaluating health interventions in natural environments. The review aimed to provide recommendations for strengthening the research methods used to evaluate health interventions in the natural environment. Whilst the links between health and natural environments have been well documented, the most effective ways in which environments can be used to improve health remains largely elusive. By scrutinising intervention evaluations, the ways the natural environment can be utilised for health improvement will be clearer. More importantly the green space and health knowledge base will become more transparent and its current limitations and potential better understood.
Methods: A search strategy and inclusion criteria were developed. Data from each of the included evaluation reports was extracted into a pre-determined template, framed around five key review questions.
Results: Forty evaluations were reviewed. The review findings illustrate how current evaluation methods and approaches can be strengthened. Health interventions and natural environments are both complex and dynamic. The results suggest that evaluation methods are currently not complex and dynamic enough to capture and interpret the processes and outcomes relevant to health interventions in the outdoors.
Conclusions: Given the limitations of some methods and weaknesses in application within this area of enquiry, the review concludes that the developing knowledge base from evaluations of interventions is problematic, under-developed and under-utilised. The evidence base for green space and health could be strengthened by more effective use of mixed methods by multi-disciplinary teams; increased use of existing evidence, increased coordination of evaluation input and enhanced guidance and training.

VOLATILE ORGANIC COMPOUNDS AIR CONCENTRATIONS AND RESPIRATORY SYMPTOMS IN MEXICAN INFANTS FROM MOTHERS WHOSE PARTICIPATED IN A RANDOMIZED CLINICAL TRIAL DURING PREGNANCY

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Background and Aims: Early exposure to air pollution is crucial in the development of the immune response. Supplementation with omega-3 may be a protective factor for the development of allergic diseases. We realized the present analysis to determine the impact of air pollution on respiratory symptoms in infants and evaluate the interaction between supplementation with omega-3 fatty acids and air pollution exposure in this population.
Methods: We included 924 infants whose mothers were randomly assigned to receive daily supplement of 400 mg of DHA or placebo from week 18-22 of pregnancy until childbirth. During pregnancy we collected information on sociodemographics characteristics, past health history and environmental exposure. Also, we determine maternal specific IgE levels in plasma. Child respiratory symptoms information was collected using a recall questionnaire at 1, 3, 6, 9, 12 and 18 months of age. For environmental exposure, we conducted local monitoring of air pollution (NO_2 and Volatile Organic Compounds（BTX) in deferent city sites and the association between respiratory symptoms and air pollution exposure were analyzed using Poisson regression models.
Results: The occurrence of respiratory symptoms did not differ significantly between groups. However, the occurrence of a combined measure of some symptoms was lower in the DHA group. The heptane, hexane and xylene air concentrations were significantly related to respiratory symptoms (cough, nasal congestion and/or runny nose) ($p<0.05$). We did not observe a potential interaction between treatment groups and air pollution exposure.
Conclusions: Exposure to heptane, hexane and xylene (BTX) air concentrations in the general environment increase the respiratory symptoms in Mexican Infants.

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ASSESSING LITTLELEAF LINDEN (*TILIA CORDATA)* AND NORWAY MAPLE (*ACER PLATANOIDES)* LEAVES AS MEDIA FOR MONITORING HEAVY METAL AIR POLLUTION IN WINDSOR, ONTARIO, CANADA

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Background and Aims: Epidemiological studies have shown correlations between traffic-related and other air pollutants and medical conditions [1-3]. Health agencies routinely rely on a limited number of fixed active and passive monitoring devices to measure regional/local air quality over fixed times. Increasing the number of monitoring sites is beneficial yet cost prohibitive (equipment, personnel and analytical costs); novel monitoring strategies are required. We investigated Littleleaf Linden and Norway Maple leaves in Windsor, an industrial border city in southwestern Ontario, Canada, sharing the world's busiest trade route with industrial neighbour, Detroit, Michigan, U.S., as potential air quality monitors for heavy metals near roads with varying traffic/industrial sources.
Methods: Co-located trees were allocated using a geospatial random stratified approach: traffic counts, road type and a buffered distance of 200 m were the main selection criteria. Leaves were collected from these trees over eight two-week periods in 2010. Thirty-eight elements were analyzed using ICP-MS; 11, using ICP-OES. NIST standards were used for QA/QC. EDAX-SEM was used for forensic validation of particle composition of ICP-MS and ICP-OES analytics.
Results: At two expressway sites, Sr concentrations up to 2,000 ppm were observed. These leaves were placed under the EDAX-SEM; angular mineral fragments were found to contain K, Sr, Ca and Si. At three sites, concentrations of Pb up to 1.2ppm and Fe up to 350ppm were observed. Under the microscope, spherical, striated particles containing Pb, Fe, and Ni, potentially indicate a steel manufacturing source [4]. At the expressway and a residential area, concentrations of Ni up to 60ppm and Mo up to 30ppm were observed. Under the microscope, spherical particles indicated Mo, Ni and Co, potentially a localized mobile source.
Conclusions: In the pilot study, leaves from Littleleaf Linden and Norway Maple proved highly effective air quality monitors for heavy metals in Windsor, Ontario and effective media for elemental forensic analyses.
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MAPPING ENVIRONMENTAL HAZARDS AND BLACK CARBON MEASUREMENTS IN AN IMMIGRANT COMMUNITY

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Background and Aims: The Vietnamese population in the US is a rapidly growing immigrant group. This population shows increasing trends for many chronic health problems with increasing number of years in the US, which may be attributed in part to environmental stressors. The objective of this project is to use qualitative and quantitative methods to identify and characterize neighborhood-level environmental hazards for the Vietnamese population in California. Key to this work is the integrated participation and perspective of Vietnamese community members to identify and prioritize elements of their community that potentially impact their health.

Methods: Community members (N=35) from two counties in California were recruited and trained to conduct walking street audits of environmental hazards in neighborhoods where they live and work. Each street segment was approximately one city block long. Participants carried GPS devices, collected black carbon measurements using small real-time personal monitors, conducted five-minute car and truck counts and used Photovoice documentary methods.

Results: The walking audits were conducted on 144 street segments, of which 45% were in business areas and 55% in residential areas. The mean five-minute truck count was 2 (range: 0 -10) on business streets and 0.3 (range: 0-4) in residential areas. The median level of black carbon was 1.3 µg BC/m3 (range: 0-41). Observational audit survey data highlighted issues around litter and smoking, as well as traffic-related odors and noise. Qualitative data from Photovoice and written comments from auditors reflected concerns around neighborhood safety.

Conclusions: We successfully engaged community members in collecting qualitative and quantitative environmental data on their local neighborhoods. Comparisons between these community-collected snapshot data to governmental monitoring data for traffic and black carbon will help inform how well existing secondary data can capture perceived local environmental hazards and how the community-collected data can be used to enhance existing environmental measurement data.

Spatial patterns of personal exposure to particulate pollution in Accra neighborhoods

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Background and Aims

Spatial and temporal patterns of particulate matter (PM) pollution in cities of developing countries differ from those in high-income countries due to differences in sources. While recent studies have assessed the spatial patterns of PM pollution in developing country cities, little is known about personal exposure to PM and how it is affected by ambient concentration and time-location-activity budgets. Our aim was to characterize the spatial patterns of exposure to fine PM for students in four Accra neighborhoods.

Methods

We measured 24-hour integrated and continuous $PM_{2.5}$ exposure for 52 students in four neighborhoods of Accra. Exposure was measured by the subject wearing a backpack fitted with portable PM monitors and GPS units. We concurrently measured ambient $PM_{2.5}$ at fixed monitoring sites in the four neighborhoods. Questionnaires were used to collect additional information about kitchen characteristics, household fuel use and exposure behaviors.

Results

Mean personal 24-hr exposure concentration of the students was 94$\mu g/m^3$, ranging between 26 $\mu g/m^3$ and 283$\mu g/m^3$. Mean exposures by neighborhood were between 70 and 126$\mu g/m^3$. The correlation between average ambient concentrations and average personal exposure concentrations was 0.39.

Conclusion

School children's exposure to $PM_{2.5}$ in Accra neighborhoods is substantially higher than WHO Air Quality Guidelines. Epidemiological studies of air pollution health effects need to use exposure indicators that account for its spatial patterns.

ENVIRONMENTAL DISEASE DISPARITIES AMONG AMERICAN INDIANS

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Background: American Indians, like many indigenous communities throughout the world, have patterns of excess disease compared to society as a whole. In the US, the overall mortality risk for Indians is 1.56 times that of whites. This evaluation will examine the role of environment plays in disease disparities among American Indians, and the funding to address them. There are clear-cut mortality differences that Native Americans have in contrast to white Americans: unintentional injuries; suicide; homicide; alcohol related causes, including fetal alcohol syndrome; chronic liver disease/cirrhosis; and diabetes.
Environmental components: Defining "environment" broadly, all of the excess causes of death listed above, except suicide, are linked strongly with dietary or personal environment. There has been success in reducing the environmental disparity gap in tuberculosis by improving clinical control of TB among all Indian communities from the 1970s to recent years. But it is clear with regard to diabetes and alcohol-related illnesses that community primary prevention efforts, including improving diets and access to healthy foods, and alcohol abuse prevention are essential to reducing the disparities we now see.
Medical costs: In general, costs for treating excess environmental diseases such as unintentional injuries; suicide; homicide; alcohol related causes; chronic liver disease/cirrhosis; and diabetes are borne by individuals, by the tribes and their judicial systems, the Indian Health Service, and the Center for Medicaid and Medicare Services. Politics plays a significant role in securing resources for both prevention and treatment.
Conclusions: Community-based prevention programs and obtaining sufficient treatment resources are keys to reducing the disparities in environmental diseases in American Indian country.

FUTURE ENVIRONMENTAL HEALTH ALONG THE LINES OF FOOD, WATER, ENERGY AND CLIMATE: AN INTEGRATED MODELLING APPROACH

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Background Aims: Health can be considered as one of the most important constituents of quality of life. In many of the global assessments, the health dimension was underrepresented. The health module of the Population& health model PHOENIX has been refined and further developed to be able to explore how future health will evolve. The main purpose of it is to describe future health status using of the concept of the health transition, given changes in socio-economic and environmental conditions. The main purpose of the health model is to describe the burden of disease by sex and age.
Methods: The methodology is a multi-state modeling approach which largely follows the approach as described in the World Health Report 2002 (WHO, 2002), the Disease Control Priorities Project (DCPP) (Cairncross and Valdmanis, 2006) in combination with that Global Burden of Disease methodology (Mathers and Loncar ,2005). The states distinguished in the model are exposure, disease states and death. The dynamic and integrated character of the proposed methodology is represented by the risk factor-attributable mortality and morbidity. This component is strongly connected with the socio-economic and environmental domain.
Results: The most relevant health risk factors and the associated diseases have been included, with a special focus on environmental risks. Food and hunger, Water supply and sanitation, climate change and malaria, energy supply and indoor / outdoor air pollution are amongst the risk factors included, covering already a substantial part of the health-related Millennium Development Goals (MDG).
Conclusions: Exploration of existing consistent socio-economic and environmental baseline scenario shows that many of the health-MDGs will not be attained, given current MDG-policy targets. Additional analyses also show that health loss can be substantially reduced by various health policy packages, especially in South Asia and Sub Saharan Africa.

THE EFFECT OF DISINFECTION BY-PRODUCTS, WATER SOURCE, AND TYPE OF DISINFECTION IN PREGNANCY LOSS IN MASSACHUSETTS

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Background and Aims: Previous research suggests that exposure to different water sources, disinfection type (e.g., chlorinated surface water), and disinfection by-products (DBPs) may be associated with pregnancy loss. We assessed the potential risk of water source, disinfection type, and DBPs on pregnancy loss in Massachusetts.
Methods: We used birth and death certificate data on 510,264 pregnancies to examine this risk using 1998• 2004 data from 275 Massachusetts towns. Fetal loss was defined as losses after the 20th week of gestation, and was examined using logistic regression.
Results: Based on 2,488 pregnancy losses, preliminary unadjusted results indicate that mothers using public surface water systems had an increased risk of fetal loss (Odd Ratios (ORs) =1.37; 95% CI: 1.24,1.51) compared to mothers using ground water sources. Following adjustment for confounding by maternal risk factors (i.e., age, race, education, tobacco use), and disinfection type, this risk was attenuated (OR= 0.98; 95%CI: 0.85, 1.13). Compared to untreated water systems, mothers using chlorinated and chloraminated public water systems had an increased risk of fetal loss with ORs of1.15 (95%CI: 1.01, 1.33) and 1.36 (95% CI: 1.17, 1.58), respectively. ORs of 1.01 (95% CI: 0.85, 1.21) and 0.97 (95% CI: 0.79, 1.19) were found following adjustment for confounding by maternal risk factors and source water. No increased risk was found for the relationship between trihalomethanes (sum of chloroform, bromodichloromethane, dibromchloromethane, and bromoform) and fetal loss in any exposure category compared to the lowest (0 µg/L) category. Similarly, no increased risk was found for the relationship between haloacetic acids (sum of monochloroacetic acid, dichloroacetic acid, tricholoroacetic acid, bromoacetic acid, and dibromoacetic acid) and fetal loss in any exposure category compared to the lowest (0 µg/L) category.
Conclusions: Further analyses will include fetal loss data from 1996-1997 and will utilize other statistical approaches such as Poisson regression.

A Methodology to Estimate Canadians' Exposure to Tetrachloroethylene in Outdoor Air Using Industrial and Micro-Emitter Databases

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Eleanor Setton, *University of Victoria, Canada*
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Background and Aims: As part of Carex Canada, we developed a methodology for estimating tetrachloroethylene (PERC) concentrations in outdoor air at approximately 478,000 street block centroids in Canada. We combined five different databases in a Geographic Information System: PERC levels measured at National Air Pollution Surveillance (NAPS) monitors, large emitter data from the National Pollutant Release Inventory (NPRI), small emitter information from Environment Canada's Annual Report for Dry Cleaners (DC) and the Dunn & Bradstreet (D&B) commercial registry, and population information from Census Canada.
Methods: Concentration estimates were assigned to each of 478,000 block centroids in three steps: first, a background concentration (rural or urban) was derived using data from NAPS air monitors (n = 53); second, Screen3 (a dispersion model developed by the U.S. Environmental Protection Agency) was applied to known industrial and micro-emitters; third, concentrations derived from the dispersion model were added to the background value at those street blocks that fell within the model's distance of influence. Micro-emitter emission rates ranged from 0.01 to 0.7g/s and were approximated considering yearly amounts of PERC consumed and type of equipment used.
Results: Concentrations are very heterogeneous across Canada, (min=0.12 µg/m3, max=132 µg/m3, mean=1.12 µg/m3, std. dev= 3.62µg/m3). On average, Canadians live 11.3 kilometres (km) from a PERC emitter and 71 km from a NAPS monitor that measures PERC. However, almost 5.5 million people live within 500 meters of a known emitter and those are on average at 23 Km from a monitoring station. Our preliminary results suggest that approximately 15% of all street blocks in Canada, where 31% of the population live, have PERC concentrations 10 to 20 times higher than those reported by the NAPS network.
Conclusions: We describe a novel approach for calculating environmental exposure to PERC by incorporating spatial data sets of known emitters. Our findings confirm that utilizing only the measured concentrations from the NAPS network is insufficient and would likely underestimate population exposures.

LONG-TERM EXPOSURE TO AMBIENT AIR POLLUTION AND LUNG CANCER RISK IN CANADA

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Background and Aims: Previous studies have identified air pollution exposure as a risk factor for lung cancer incidence. We examine lung cancer risk in Canada from exposure to long-term ambient air pollution.
Methods: We utilize the lung cancer component of the National Enhanced Cancer Surveillance System, which includes 3280 lung cancer cases, with histology, and 5073 population controls collected between 1994 and 1998 in eight Canadian provinces. Cases were identified by provincial cancer registries and sent a research questionnaire (61.7 % response rate for contacted lung cancer cases). Questionnaires collected information on family income, education, marital status, BMI, smoking history, second-hand smoke exposure, alcohol use, dietary history, physical activity, and lifetime occupational exposures and residential histories (geocoded to 6-digit postal codes). Population controls, with an age/sex distribution similar to that of all cancer cases, received the same questionnaire (67.4% response rate for contacted controls).
A spatiotemporal modeling approach was used to estimate individual's annual air pollution exposures from 1970 to 1994 for PM2.5, NO2, and O3. Residential postal codes within 50km's of fixed-site monitoring stations were assigned annual average concentrations. Postal codes located farther than 50km's from a monitoring station were assigned predicted annual concentrations from national spatial pollutant surfaces, created from recent satellite-based (PM2.5 and NO2) and dispersion models (O3), calibrated with historical fixed-site monitoring data.
Results: Odds ratios (95%CI) for lung cancer incidence associated with a 10-unit increase in PM2.5 (ug/m3), NO2 (ppb) and O3 (ppb) were 1.31 (1.00-1.72), 1.14 (1.04-1.26) and 0.84 (0.67-1.06), respectively, after adjustment for 17 individual and 4 geographical covariates. Differences in risk were also found by lung cancer histology.
Conclusions: Long-term exposure to PM2.5 and NO2 air pollution was associated with increased lung cancer risk in Canada.

FUTURE PROJECTIONS OF THE DISEASE BURDEN OF URBAN AIR POLLUTION

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Background Aims:: Human health effects from exposure to outdoor air pollution, particularly ground level ozone and airborne particulate matter (PM), cause globally, 8% of lung cancer deaths, 5% of cardiopulmonary deaths and around 3% of respiratory infection deaths (Prüss-Üstü, A and C. Corvalán, 2009). These impacts can be expected to increase even further given increasing emissions, an ongoing urbanization and an ageing population.
Method: The Global Urban Air quality Model (GUAM) has been developed to estimate PM_{10} concentrations and their attributable effects on human health for the largest 3200 cities in the world. GUAM originates from the GMAPS model (World Bank, 2002) and links observed PM_{10} concentrations to a set of variables of economic activity, population, urbanization and meteorological information. The resulting concentrations lead to increased health effects of acute respiratory diseases, lung cancer, and cardiopulmonary diseases. These health impacts are derived using the global burden of disease methodology (Mathers and Loncar, 2005).
Results: Air pollution has been projected over the period 2000-2050 using a baseline scenario for emissions, population and urbanization. The concentrations will increase in many regions. The associated annual number of deaths will increase from 1 million in 2004 till 3.5 million in 2050 with the vast majority occurring in Asia. Next, uncertainty analyses have been performed to test the robustness of the methodology. These outcomes have been decomposed by changes in population, ageing, urbanization and emissions.
Conclusions: To a large extend increases in the future disease burden of air pollution are determined by trends that can not be influenced and relatively small fraction is due to increased emissions.

ESTIMATING THE EFFECTS OF LONG-TERM EXPOSURE TO AMBIENT PARTICULATE AIR POLLUTION ON BIOLOGICAL MARKERS OF CARDIOVASCULAR RISK IN A COHORT OF MIDLIFE WOMEN

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Background and Aims: Several studies have reported associations between long-term exposure to fine particulate matter ($PM_{2.5}$ or particles less than 2.5 microns in diameter) and cardiovascular mortality. However, uncertainty remains about the biological mechanisms underlying the disease process. We examined the effect of $PM_{2.5}$ on serum markers of cardiovascular disease risk in a cohort of midlife women.
Methods: Midlife women enrolled at six sites in the multi-ethnic, longitudinal Study of Women's Health Across the Nation (SWAN) had repeated measurements of several cardiovascular markers, including LDL, HDL, C-reactive protein, fibrinogen, tissue-type plasminogen activator antigen (tPA-ag), plasminogen activator inhibitor Type 1 (PAI-1), and Factor VIIc. These data were merged with ambient exposure data over 5 consecutive annual visits (1999-2004) using $PM_{2.5}$ monitors located within 20 kilometers of the geocoded residence. Monitor measurements were averaged for the preceding year, 6 months, 1 month and 1 day prior to each blood draw visit.
Results: A total of 2,191 women (990 Caucasian, 598 African American, 241 Japanese, 193 Chinese, and 169 Hispanic) were eligible for analysis; mean age at the beginning of the study period was 49 years. The $PM_{2.5}$ annual average across the SWAN sites for all visits ranged from 12.1 to 20.8 mg/m^3. Our analysis examined the association between $PM_{2.5}$ and the blood markers using longitudinal linear mixed regression models, taking into account other air pollutants, temperature, body mass index, race/ethnicity, age, smoking, socioeconomic status, menopausal status, health history, and medication use. Preliminary results for the association of $PM_{2.5}$ with the cardiovascular markers will be presented.
Conclusions: This is the first study to use repeated measures to examine the longitudinal association between blood markers of cardiovascular disease risk and $PM_{2.5}$ in a multi-ethnic, longitudinal cohort of women going through the menopausal transition.
Acknowledgements: The Study of Women's Health Across the Nation (SWAN) has grant support from the National Institutes of Health (NIH), DHHS, through the National Institute on Aging (NIA), the National Institute of Nursing Research (NINR) and the NIH Office of Research on Women's Health (ORWH) (Grants NR004061; AG012505, AG012535, AG012531, AG012539, AG012546, AG012553, AG012554, AG012495). The Air Pollution Study has grant support from the California Energy Commission (CEC) (Sub-award No. POB228-X86). The content of this abstract is solely the responsibility of the authors and does not necessarily represent the official views of the NIA, NINR, ORWH, NIH, or the CEC.

STUDY OF THE POSSIBLE IMPACT OF HOUSEHOLD USE OF PESTICIDES DURING PREGNANCY ON FETAL GROWTH, FROM THE PELAGIE MOTHER-CHILD COHORT

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Background and Aims: Some studies have shown that household pesticide use, indoor or outdoor, may entail significant exposure. Besides, some of these pesticides are suspected to be toxic for development. Our purpose was to determine whether household use of pesticides in early pregnancy was associated with impaired fetal growth of the babies.
Methods: A mother-child cohort (PELAGIE) was conducted in Brittany (France) and enrolled 3421 pregnant women before 19 gestational weeks between 2002 and 2006. Birth weight and head circumference were collected from maternity records. A questionnaire of self-reported household use of pesticides in early pregnancy was collected when the child reached 2 years for 44% of the cohort (n=1505). Scores of exposure to eight pesticide uses were built according to the user, frequency, type of products, and place of use, assuming that these differences in use corresponded to different exposure levels Adjusted means of fetal growth indicators were performed from multivariate linear models.
Results: A decrease in birth weight was observed with increasing score of exposure to pesticides used on outdoor plants (no use: mean=3387 g; score<median: mean=3351 g; score>median: mean=3278 g; p-trend=0.001). A decreased head circumference was observed with increasing score of exposure to insecticides used on paths and lawns (no use: mean=34.9 cm; score<median: mean=35.1 cm; score>median: mean=34.3 cm; p-trend=0.01), and to a lesser degree with increasing score of exposure to pesticides used to treat wood framework.
Conclusions: Our study observed a possible impact on fetal growth of household use of pesticides during pregnancy, in particular to treat plants. We proposed a scoring method to improve assessment of household pesticide exposure. This scoring method appears to be efficient, taking into account all details reported in the questionnaire, and allows to assess dose-response relationships.

FREQUENT USE OF HOUSEHOLD CLEANING SPRAYS AND DECREASES IN HEART RATE VARIABILITY IN SAPALDIA

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and SAPALDIA-Team

Background and Aims: Household cleaning products are an indoor source of exposure to volatile organic compounds and toxic air contaminants. We investigated if non-professional use of household cleaning and air freshening sprays, and scented products was associated with reduced heart rate variability in the Swiss Cohort Study on Air Pollution and Lung and Heart Diseases in Adults (SAPALDIA).
Methods: In a cross-sectional survey, 24-hour electrocardiograms were recorded in 580 randomly selected SAPALDIA participants • 50 years of age, who also reported cleaning activities in their homes. Of the 580 participants, 515 reported use of any household spray or scented product, and 65 did not report use to any product and were considered unexposed. Adjusted average percent changes in standard deviation of all normal-to-normal intervals in 24-hours (24-hr SDNN), total power (TP), low frequency (LF), and high frequency (HF) were estimated in association with frequency (< 1, 1-3, and 4-7 days/week, unexposed as reference) of using cleaning sprays, air freshening sprays, and scented products in separate multiple linear regression models after adjustment for potential confounders. Smoking status, markers of systemic inflammation, and presence of chronic airways disease were evaluated for effect modification.
Results: Statistically significant ($p<0.05$) decreases in 24-hr SDNN and TP were observed in association with frequent use of all products of interest. Relative to unexposed subjects, the strongest reductions in 24-hr SDNN (-12.2%, 95%CI: -20.6 – -2.0%) and TP (-28.8%, 95%CI: -45.7– -7.7%) were observed in subjects who used air freshening sprays 4-7 days/week. The inverse effects from using cleaning and air freshening sprays, and scented products on 24-SDNN, TP, LF, and HF were observed mainly in subjects present with chronic airways disease.
Conclusions: Chronic use of household cleaning spray products may affect autonomic dysfunction in older adults, and those with pre-existing pulmonary conditions may be more susceptible.

AIR POLLUTION EXPOSURE AND TELOMERE LENGTH IN HIGHLY EXPOSED SUBJECTS IN BEIJING, CHINA

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Background and Aims. Shortened leukocyte telomere length (LTL) is a marker of cardiovascular risk that has been recently associated with long-term exposure to ambient particulate matter (PM). However, LTL is increased during acute inflammation, allowing for rapid proliferation of inflammatory cells. Whether short-term ambient PM exposure increases LTL has not been evaluated.

Methods. The Beijing Truck-Driver Air Pollution Study was conducted shortly before the 2008 Olympic Games (June 15-July 27, 2008) and included 60 truck drivers and 60 office workers. Personal $PM_{2.5}$ and Black Carbon (BC, a tracer of traffic particles) measured during work hours using portable monitors, and post-work blood samples were obtained on two different days separated by 1-2 weeks. Blood LTL was measured by real-time PCR and expressed in relative units. Ambient PM_{10} was averaged from 27 monitoring stations operating in Beijing. We have regressed log-transformed LTL over exposure variables (occupational group, personal $PM_{2.5}$, personal BC, or ambient PM_{10}) in mixed-effect models adjusted for age, gender, BMI, day of week, cigarettes/day, central heating, commuting time/day, outdoor temperature, and dew point.

Results. Mean personal $PM_{2.5}$ was 126.8 µg/m^3 (inter-quartile range[IQR]:73.9-160.5) in drivers and 94.6 µg/m^3 (IQR:48.5-126.6) in office workers (p<0.001). Covariate-adjusted LTL means were higher in drivers (0.87, 95%CI:0.74-1.03) relative to office workers (0.79, 95%CI:0.67-0.93; p=0.001). In all subjects combined, we estimated a 5.2% (95%CI:1.5-9.1, p=0.007) increase in LTL per an IQR increase in personal $PM_{2.5}$. LTL was also positively correlated with personal BC (+4.9%, 95%CI:1.2-8.8, p=0.01), and with average ambient PM_{10} on the study day (+7.7%, 95%CI:3.7-11.9, p=0.001) and over the two days before (+8.1%, 95%CI:3.1-13.3, p=0.002). Longer PM_{10} averages (e.g., 5-day) were not associated with LTL.

Conclusions. Our study showed that short-term exposure to ambient PM is associated with increased LTL. LTL may favor leukocyte proliferation and sustain the inflammatory mechanisms associated with PM health effects.

Word Count. 300

INDUSTRIAL EXPOSURES AT BIRTH ARE ASSOCIATED WITH REDUCED FORCED VITAL CAPACITY IN CHILDHOOD

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Background and Aims: Previous studies have focused on particulate air pollutant exposures , we examined the impact of other early life exposures on pulmonary function in childhood.
Methods: In Detroit and Dearborn, MI in 2007, we examined children aged 7 to 13 years in a clinical cohort (241 with asthma and 365 without asthma). We collected pulmonary function and exhaled nitric oxide measurements using standard ATS/ERS protocols. Using information on traffic and local point sources coupled with passive monitoring of nitrogen dioxide and petroleum-related volatile organic compounds (benzene, toluene, ethylbenzene, and xylenes), we developed land-use regression models to estimate the long-term, outdoor exposures of these children at their current residence and at their birth residence. Forced vital capacity (FVC) and other measures of pulmonary function were modelled as the natural logarithm adjusted for a random neighborhood effect; sex; race; the natural logarithms of weight, height and the interaction of height and sex; parental education; home ownership; and environmental tobacco smoke in the home.
Results: In this population, 43 percent of the children had different residences at birth. Based on their birth residence, a 100-ppt increment in modelled o-xylene was linearly associated with a 2.6 percent decrement in FVC (95% CI -4.7, -0.5) and this decrement was stronger among the 365 children without asthma (-3.2 percent, 95% CI -6.0, -0.5). Proximity to a specific industrial site was associated with a 2.2 percent decrement in FVC (95% CI -3.4, -0.1) for a 5 km increment. Other estimated petroleum-related compounds at birth residence showed similar associations, but weaker associations at their current residence.
Conclusions: Early life exposures as indexed by modelled outdoor concentrations of petroleum-related compounds for the residence at birth appear to be associated with persistent decrements in lung volumes.

This abstract of a proposed presentation does not necessarily represent EPA policy.

Regular Breakfast and Blood Lead Levels among Preschool Children

Abstract

Background

Previous studies have shown that fasting increases lead absorption in the gastrointestinal tract of adults. Regular meals/snacks are recommended as a nutritional intervention for lead poisoning in children, but epidemiological evidence of links between fasting and blood lead levels (B-Pb) is rare. The purpose of this study was to examine the association between eating a regular breakfast and B-Pb among children using data from the China Jintan Child Cohort Study.

Methods

Parents completed a questionnaire regarding children's breakfast-eating habit (regular or not), demographics, and food frequency. Whole blood samples were collected from 1,344 children for the measurements of B-Pb and micronutrients (iron, copper, zinc, calcium, and magnesium). B-Pb and other measures were compared between children with and without regular breakfast. Linear regression modeling was used to evaluate the association between regular breakfast and log-transformed B-Pb. The association between regular breakfast and risk of lead poisoning (B-Pb≥10 μg/dL) was examined using logistic regression modeling.

Results

Median B-Pb among children who ate breakfast regularly and those who did not eat breakfast regularly were 6.1 μg/dL and 7.2 μg/dL, respectively. Eating breakfast was also associated with greater zinc blood levels. Adjusting for other relevant factors, the linear regression model revealed that eating breakfast regularly was significantly associated with lower B-Pb (*beta*=-0.10 units of log-transformed B-Pb compared with children who did not eat breakfast regularly, p=0.02).

Conclusion

The present study provides some initial human data supporting the notion that eating a regular breakfast might reduce B-Pb in young children. To our knowledge, this is the first human study exploring the association between breakfast frequency and B-Pb in young children.

ABSTRACT ISEE Barcelona 2011

Title: Respiratory health in firefighters

Background The aim of the present study w as to determine associations betw een respiratory health and exposure to smoke of fires.

Methods

The studies comprised 3 subsequent stages. First, all active firefighters of the municipal fire brigades of 3 provinces in the Netherlands were invited to fill in a web-based questionnaire. Second, a randomly chosen subset of 402 firefighters underwent spirometry and methacholine provocation, and blood samples were taken to assess atopy and serum pneumoproteins. Third, 51 exposed subjects of the second stage were enrolled in the third stage of the study when they were exposed to fire smoke and a blood sample could be obtained within 24 hours post-exposure. Sputum was induced within 5 days following exposure, and after at least 24 hours more spirometry and bronchial responsiveness testing was carried out and a second blood sample was taken. After three months a third blood sample was taken. In serum pneumoproteins and cytokines were assessed.

Results

Significant positive associations were found between exposure to fire smoke and respiratory health parameters (respiratory symptoms, bronchial hyperresponsiveness, serum pneumoproteins and cytokines) with and without adjustments for smoking, sex, atopy, age and main job exposure.

Conclusions

The results suggest that the risk of health consequences of exposure to fire smoke is underestimated in public and occupational health. From a practical point of view, reduction of exposure to fire smoke could be achieved relatively easy when first responders are instructed about these health consequences and how to reduce fire smoke exposure.

The Construction of Healthy Environments in Ceilândia, Brasilia, Brazil, 2011.

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Antônio da Silva Matos – *University of of Brasilia*
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Ryckardo Rodrigues – *University of of Brasilia*
João Paulo Rodrigues – *University of of Brasilia*
Maria Madalena Torres– *Communitie of Ceilândia*

Background and Aims: Ceilândia is one of the most populated areas of Distrito Federal having around 350,000 residents. Originated from the Campaign for Eradication of Invasions (CEI), it was born during the process of the social space segregation plan that guided the construction of Brasilia, Brazil's capital. An important part of the over 60.000 workers who built Brasilia in the 60s were reallocated to Ceilândia, turning it into one of the largest slums (favelas) in Brazil in the 80s. Even in an inappropriate place, the organization and struggle of its population resulted in access to public policies such as sanitation, energy, telecommunications and, more recently, the creation of a new campus of the University of Brasilia. **Methods:** This study aims to understand and analyze social environmental risks which might compromise the quality of life of vulnerable population groups living in Ceilândia. Moreover, it is expected to contribute to the transformation of this reality through the proposal of sustainable actions involving social networks, the brazilian public health system (SUS) and other related sectors (environment, education, culture, work). The chosen methodology to cope with these objectives involved a mapping of the existing local organizations and actors which work in health promotion of the quality of life and construction of healthier environments. This mapping resulted in a database of the contacts and profiles of these groups that can be used to promote networking and strengthening of common projects. **Results and conclusions:** Thirteen sessions of Cinema Club were an important strategy to meet and discuss problematizing subjects with residents of the city related to the promotion of healthy environments. At the end were set priorities for the development of demonstration projects in partnership with society.

A SCREENING TOOL FOR CLIMATE CHANGE POPULATION VULNERABILITY ASSESSMENTS

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Background and Aims: Conducting vulnerability assessments is one of the key tools for adaptation for climate change. Population vulnerability screening is needed to guide policy makers in planning efforts to address climate change impacts. California has proceeded in implementing cap and trade as a regulatory method to mitigate greenhouse gas (GHG) emissions. Decision-makers need to determine whether there are ways to target GHG mitigation schemes in ways that maximize community-level health benefits from co-pollutant reductions and minimize the likelihood that market-based approaches produce or exacerbate disparities in health benefits.

Methods: We utilized an existing environmental justice screening method and targeted it for two areas in California which are likely to experience climate change impacts, Fresno and Los Angeles counties. This method maps cumulative impacts and vulnerability to air pollution and models the locations of pollutant sources as well as vulnerable populations. We further adapted this method with metrics that are associated with adaptation capacity such as population sensitivities (e.g. , elderly living alone and senior housing), air conditioning ownership, green space, co-morbidities, and flood and wildfire risk.

Results: A cumulative climate change vulnerability score was computed for each census tract for the two counties. A separate score for the climate change vulnerability and environmental justice layers, and a combined score, was computed. The predictive power of the scores was validated by examining the sensitivity to emergency room and hospitalization data for heat-related illness.

Conclusions: We developed a geospatial mapping resource that identifies climate change vulnerable populations in two major metropolitan areas of California. This tool can be used by multiple stakeholders to identify locations of high cumulative exposures to environmental hazards and social vulnerability that may require targeted efforts to promote adaptation to climate change impacts, and increase the likelihood that mitigation strategies will yield maximum decreases in localized co-pollutants.

TRAFFIC RELATED AIR POLLUTION AND REGIONAL AIR QUALITY ARE ASSOCIATED WITH AUTISM

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Background and Aims: Autism is a developmental disorder with rising prevalence. Examination of regional pollutants has suggested the importance of air toxics in autism etiology, yet little research has examined local level air pollution exposure beyond measures of roadway proximity. In this study we investigate the relationship between traffic related air pollution (TRP), regional air quality, and autism.
Methods: This study analyzed data on 303 autism cases and 259 typically developing controls enrolled in the Childhood Autism Risks from Genetics and the Environment (CHARGE) Study. Autism diagnosis was confirmed from evaluations conducted at the M.I.N.D. Institute. The mother's address from the birth certificate and addresses from a residential history questionnaire were geo-coded and used to determine residential location for the first year of life and each trimester of pregnancy. TRP estimates were assigned to each location using the CALINE4 line-source air-quality dispersion model. Regional air pollutant measures were assigned using the EPA's Air Quality System data. Logistic regression models were fit comparing estimated first year pollutant levels for autism cases vs. typically developing controls.
Results: Cases were more likely to live at residences with the highest quartile of TRP exposure as compared to controls (OR 2.02, 95%CI 1.25-3.28). Measures of regional $PM_{2.5}$ and PM_{10} also increased autism risk (2.10, 1.18-3.76 per 8.8 $\mu g/m^3$ $PM_{2.5}$ and 2.15, 1.22-3.84 per 12.4 $\mu g/m^3$ PM_{10}). Results were relatively unchanged after including covariates.
Conclusions: Exposure to both regional and local air pollutants was associated with autism risk. Further examination of specific air pollution measures is needed to better understand this association.

SAFE NEIGHBORHOODS MAKE CHILDREN MOVE; RESULTS FROM THE SPATIAL PLANNING AND CHILDREN'S EXERCISE (SPACE) STUDY

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Background and Aim: The effectiveness of urban planning interventions for physical activity (PA) levels and obesity is largely unknown. This study aimed to examine the effect of changes in the built environment on walking and cycling in children.
Methods: The population involved 448 children (aged 6- 12 years) in 2004 and 292 children in 2008 from five Dutch neighborhoods that were partially restructured between 2004 and 2008, and five control neighborhoods. In 2004 and 2008, walking and cycling behavior was assessed by a 7-day physical activity diary, and built environmental characteristics were assessed by neighborhood observation. Anthropometric values were also collected. Multilevel linear regression analyses were conducted to identify environmental determinants of children's walking and cycling behavior. Analyses were adjusted for age, sex, parental education level, and ethnicity.
Results: In 2004, children made on average 13.3 walking and 6.6 cycling trips per week for transportation; 3.6 walking and 1.5 cycling trips per week to school; and 0.7 walking trip per week for recreation. Cross-sectional analyses showed that in 2004 both commuting modes were positively associated with the frequency of pedestrian crossings and parallel parking spaces in the neighborhood. About 30% of the variance in walking and cycling for transportation could be explained by the number of recreation facilities in the neighborhood and the walking and cycling infrastructure of the neighborhood. Longitudinal analyses indicate that improving the traffic infrastructure (slower traffic, less traffic crossings) have a positive effect on PA in children.
Conclusions: Built environmental correlates of children's walking and cycling behavior differ by purpose and by commuting mode implying a behavior-specific approach for interventions. Physical activity in children may be improved by traffic safety measures.

IMPACT OF AN INDOOR COOK STOVE INTERVENTION ON MEASURES OF SYSTEMIC INFLAMMATION

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Background and Aims: Approximately three billion people use inefficient and poorly-vented indoor cook stoves, which can result in high indoor air pollution concentrations. Few studies have evaluated the cardiovascular effects of indoor biomass burning. Evidence from ambient air pollution research suggests that systemic inflammation plays a central role in the biologic pathway linking air pollution exposure and cardiovascular disease.
Methods: We conducted a pilot-level cook stove intervention in 123 Nicaraguan households. Forty women provided finger-stick dried blood spot samples at baseline and one year following the improved cook stove introduction. We measured several markers of systemic inflammation in the dried blood spots. Additionally, we measured 48-hour indoor particulate matter ($PM_{2.5}$) concentrations in a subgroup before and after improved stove introduction.
Results: Approximately half of the population reported continued use of the traditional open fire (solely or in conjunction with the improved stove) during the follow-up year. A 68% reduction in $PM_{2.5}$ was observed among the entire sample with exposure data (n=34); a larger reduction (78%) was observed among those not reporting any open fire use in the follow-up year (n=16). Among participants adopting the improved stove (n=18), we observed a 36% mean reduction (95% confidence interval: 1-71%) in C-reactive protein from baseline to follow-up; less consistent associations were observed for other inflammatory markers. We generally observed larger reductions in inflammation among obese participants.
Conclusions: This study incorporated a novel method for measuring systemic inflammation in dried blood. Mixed use of traditional and improved stoves may have limited our ability to detect consistent reductions in inflammatory markers. Given the ubiquity of traditional cook stove use combined with increasing cardiovascular disease and obesity in developing countries, cook stove research should evaluate a broader range of health effects.

This abstract does not necessarily reflect the policies of the U.S. Environmental Protection Agency.

BLOOD LEAD LEVELS IN SCHOOLCHILDREN LIVING NEAR TO AN INDUSTRIAL ZONE IN CALI, COLOMBIA: THE SYNERGISTIC ROLE OF SOCIOECONOMIC CONDITION

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Background and Aims: In developing countries, distribution of health effects associated to lead sources could be differential, in particular, because greater exposure and susceptibility occur among people with lower socioeconomic condition(SEC). Northern Cali-Colombia limits with a large industrial zone producing steel, batteries and metals. According to previous reports, high concentrations of airborne lead (1.77µg/m^3) may reach population living in the area. We determined blood lead levels (BLL) in schoolchildren 6-14 years old exposed to industrial sources of lead and to evaluate the synergistic role of SEC.
Methods: A cross-sectional study was conducted in an area exposed to industrial pollutants in northern Cali. A control area was also studied and children in two schools at corresponding study areas were selected. Venous samples (5 mL) were collected in heparinized, evacuated tubes to determine BLL by graphite furnace absorption spectrometry. Using regression models we assessed risk factors for high BLL, controlling for potential confounders and evaluating the potential effect modification of socioeconomic condition.
Results: We enrolled 350 schoolchildren, 44.5% living in the exposed area. Schoolchildren in this area had higher BLL (4.7±1.6 vs. 2.9±1.2) and prevalence of BLL • 5 µg/dl (44.2% vs. 8.2%, p:0.000) than those in control area. An independent association was found between exposure and BLL • 5 µg/dL (OR:16.3; CI95%:6.7-30.1), younger age (OR:2.1; CI95%:1.1-4.1), male gender (OR:;2.7 CI95%:1.4-5.3), lower socioeconomic condition (OR:2.5; CI95%:1.2-5.0), middle/low parent´s attained education (OR:2,3; CI95%:0.97-5.9) and black ethnicity (OR:4.7 IC95%: 1.8-14.9). Additionally, synergistic effects on greater risk of BLL were observed between low socioeconomic condition (P for interaction: 0.000).
Conclusions: Residence in an urban area exposed to industrial lead emissions is associated to higher levels of BLL. Socioeconomic conditions and male sex modify observed BLL, with a greater risk of exposure. Given that higher disease susceptibility is also expected among those children, health effects could be potentiated in these children.
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THE FRENCH SURVEY ON BLOOD LEAD LEVEL IN CHILDREN, SATURN-INF 2008-2009

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Background and Aims: Children's exposure to lead has decreased in recent years, thanks to the ban of lead in gasoline. It remains however of public health concern because of evidence of cognitive effects even at low levels, without toxicity threshold. The last survey about lead burden was carried out in France 15 years ago. A national survey was conducted in 2008-2009 1/ to estimate the current prevalence of elevated blood lead level (BLL) among children aged 1 to 6 years, 2/ to determine the distribution of BLL by French region and 3/ to measure the contribution of various environmental sources of lead.
Methods: This cross-sectional survey included 3,255 children, recruited at hospital. A two-stage probability sample, stratified by hospital and French region was conducted. The data collected included blood samples, socio-demographic characteristics, environmental and parent's occupational exposure. We used small area estimation techniques based on empirical bayesian approach to derive specific mean on each region. Quantile regression models were used to quantify the association between BLL and environmental risk factors.
Results: The overall prevalence of elevated BLL was 0.11% (95%CI [0.02-0.21]): i.e. 5,333 children [784-9,882] in France. The BLL geometric mean was 15.1 • g/L (95%CI [14.7-15.5]). Levels were slightly higher in males.. A difference of 9 • g/L on geometric mean was observed between French regions. Factors significantly associated with BLL mean were leaded water supply pipes, tap water consumption, old housing with chipped paint or recent renovation, parent's occupational with lead exposure, child behaviour, passive smoking. The regression on 95th percentile of BLL (34.5 • g/L) has showed an association with chipped paint in old housing, passive smoking and child behaviour.
Conclusions: In the last 15 years, the prevalence of elevated BLL decreased from 2.1% (95%CI [1.6-2.6]) to 0.11% (95%CI [0.02-0.21]). This highlights a substantial decrease in exposure of children in France, as it occurs in adult population. The distribution of BLL was quite similar to that observed in US and in other European countries.

THE IMPACT OF RESIDENTIAL SOURCES OF LEAD ON BLOOD LEAD LEVELS OF YOUNG CHILDREN IN MONTRÉAL, QUÉBEC (CANADA)

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Background and Aims: Lead sources in the general environment have reduced dramatically but the importance of domestic sources in Canada remains unknown. This study evaluated the contribution of residential sources of lead to blood lead levels (BLLs) of young children.
Methods: We conducted a cross-sectional survey from September 2009 to March 2010. A total of 306 children aged 1-5 yrs, selected at random in old sectors of Montréal, participated in the study. Only participants who drank tapwater and had lived at least one year at the same residence were included. During home visits, the following environmental samples were collected: 5 kitchen tap water samples (1 liter after 5 minutes flushing and 4 liters after 30 minutes stagnation), 3 house dust floor and one windowsill samples. Paint content for lead was also evaluated by XRF. Parents answered questionnaires regarding dietary and general habits. A venous blood sample was drawn from the child. All laboratory analyses were done using established or slightly modified USEPA methods and included internal and external quality control. Multiple linear regression analyses of the log transformed BLL were used for statistical analysis.
Results: The geometric mean (GM) of BLLs was 0.065 µmol/dl (95% Confidence Intervals: 0.061-0.069). There was a positive relationship between BLLs and the arithmetic mean (AM) of lead concentrations in tapwater treated in tertiles or as a continous variable ($p < 0.05$). There was also a positive relationship with window dust with significant interaction with season and daycare at home ($p < 0.05$). The predictive model explained 22.2% (R^2) of the variation of BLLs. Both regression models were adjusted for co-variates and other residential exposures.
Conclusions: Despite low BLLs in young children living in old sectors of Montréal, tapwater and house dust are still responsible of some increase of BLL during fall and winter.

PERFLUORINATED COMPOUND LEVELS IN UMBILICAL CORD BLOOD AND CHILD BEHAVIOR AT 2 YEARS OF AGE

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Background and Aims: The perfluorinated compound (PFCs) is persistent organic pollutants with global distribution. Their adverse impact on neurobehavior had been reported in animal studies with high dose exposure. Yet, the evidence in human studies is inconclusive. The aim of this study was to explore the association between child behavior at the 2 years of age and the concentration of PFCs in umbilical cord blood plasma.
Methods: A prospective cohort study was conducted among 238 mother-infant pairs between 2004 and 2005 in northern Taiwan. Structured questionnaires were used to obtain demographic data including exposure history during pregnancy. Cord blood was collected for PFOA and PFOS analysis by using UPLC-MS/MS method. Children's behavior problems at 2 years of age were obtained through maternal reported Child Behavior Checklist/1.5-5. PFCs levels in cord blood plasma were $\log_{10}$ transformed to fit normal distribution. Multiple linear regression models were used to assess the effects of PFCs exposure on child behavior
Results: The average concentration of PFOA and PFOS levels in cord blood plasma were 2.48 ng/mL (standard deviation, SD: 2.53) and 6.90 ng/mL (SD: 2.53), respectively. We found no association between scores of Child Behavior Checklist and cord blood levels of PFOA or PFOS.
Conclusions: Our data suggest no significant associations between prenatal PFOA and PFOS in general population and child behavior problems at the age of 2. However, other developmental problems or effect of higher exposure could not be concluded.
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BETA BLOCKERS MODIFY THE EFFECT OF ULTRAFINE PARTICLES ON VAGAL TONE IN SUBJECTS WITH ISCHEMIC HEART DISEASE – RESULTS FROM THE PMCARE STUDY

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Background and Aims: Particulate matter exposure has been associated with increased cardiovascular morbidity and mortality, and several studies showed that exposure to fine particles may influence vagal regulation of heart rhythm. We studied the effect of exposure to ultrafine particles (UFP) on heart rate variability (HRV) in subjects with ischemic heart disease.
Methods: Personal exposure to UFP (number concentration) was continuously monitored during 24-hr, in the warm and in the cold season, in 37 non-smokers individuals with ischemic heart disease. Simultaneously, a 24-hr ambulatory ECG was recorded to measure the standard deviation of normal-to-normal intervals (SDNN), a marker of overall HRV, and two HRV markers of vagal modulation, i.e. the percentage of intervals that vary more than 50 ms from the previous interval (pNN50) and the power in high frequency (HF). The associations between UFP exposure (lag0 and 1-hr to 4-hr moving averages, MA) and HRV indices were assessed with mixed effects models.
Results: A negative association was observed between UFP exposure and all investigated HRV indices only in subjects not taking beta-blockers. This effect was greater on pNN50, with a -6.2% decrease (95% confidence interval (CI) -8.6 to -3.7) and on SDNN with a -3.1% decrease (95%CI -4.9 to -1.2) for an interquartile increase in 1-hr average UFP ($13.59*10^3$ #/cm^3). The interaction with beta-blockers was significant for pNN50 ($p<0.001$) and SDNN ($p<0.002$), and marginally significant ($p=0.052$) for HF.
Conclusions: Our results suggest an acute effect of UFP on vagal tone modified by beta-blockers use, and confirm previous findings for fine particles (de Hartog et al 2009).
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EXPOSURE TO METALS AND GENE-SPECIFIC METHYLATION IN COMMUNITY-DWELLING ELDERLY MEN

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Background and Aims: Methylation changes in promoter regions of genes have been linked to gene expression changes and subsequent human disease. Heavy metals are known to trigger oxidative stress, changes in immune response, and inflammation throughout the body. DNA methylation is a potential pathway through which heavy metals exert their toxicity. We aimed to evaluate the association between exposure to arsenic, cadmium, mercury, manganese and lead and DNA methylation in nine different genes related to inflammation, immune response, and endothelial function in a population of environmentally exposed elderly men.
Methods: Our study population was 773 participants from the Normative Aging Study cohort in Boston, USA, with repeated visits between 1999 and 2009. Our associations of interest were explored in a minimum of 423 and a maximum of 611 participants depending on the availability of the exposure and outcome measurements. We measured the concentration of metals in toenails (in mcg/gr) while DNA methylation (in % of 5methyl cytosine) in promoter regions of the IL6, IFN-gamma, iNOS, ICAM, CRAT, OGG, TLR2, F3 and GCR genes was measured in blood leukocytes. The toenail metal concentrations were natural logarithm-transformed. We used multivariable linear mixed effects models to evaluate the associations of interest.
Results: Toenail arsenic and manganese concentrations were negatively associated with the iNOS gene methylation [b=-0.2, 95%CI: -0.3 to -0.1 for ten percent increase in toenail arsenic; b= -0.1, 95%CI: -0.1 to -0.01 for ten percent increase in toenail manganese). We did not find any statistically significant associations between the other metals and gene-specific methylation.
Conclusions: Both arsenic and manganese concentrations were associated with decreased iNOS methylation which can potentially lead to increased iNOS gene function and subsequent increased nitrogen oxide production, a process involved in inflammation. Our results indicate that heavy metal exposures may exert their effects through epigenetic mechanisms.

LUNG INFLAMMATION AMONG CHILDREN WITH ASTHMA EXPOSED TO INDUSTRIAL AND TRAFFIC POLLUTION

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Background and Aims: Children with asthma are susceptible to the effects of ambient air pollution, including increased symptoms and lung inflammation. Industrial emissions are an important source of air pollution in many areas. Oil refinery emissions are of particular concern as they comprise a complex mixture of organic and inorganic pollutants. We examined associations between fractional exhaled nitric oxide (FeNO), an indicator of airway inflammation, and exposure to oil refinery and traffic emissions on the health of children with asthma in Montreal, Canada.
Methods: We recruited 69 children (age 8-13 years) with a physician diagnosis of asthma from schools and an asthma clinic. Subjects participated in the panel study for 10 consecutive days between October 2009 and April 2010. We measured personal exposures to sulphur dioxide (SO_2) using Ogawa passive samplers (Ogawa & Company, Pompano Beach, FL, USA) and fine particulate matter ($PM_{2.5}$) using Harvard Personal Environmental Monitors (HPEM, BGI, MA, USA) and continuously using the personal DataRAM (pDR-1200, MIE Inc, Bedford, MA). Filters were also analyzed for metals associated with oil refinery emissions. We recorded online FeNO daily using the NIOX MINO monitor (Aerocrine, Solna, Sweden) and collected participants' reports on health, medication use, and activities. Linear mixed-effects regression models with autoregressive correlation structure were used to estimate the association between FeNO and pollutant exposure.
Results: The geometric mean of FeNO was 20.9 ppb (geometric standard deviation: 2.2). Mean (SD) personal exposure to $PM_{2.5}$ was 9.5 (13.4) $\mu g/m^3$, while for SO_2 it was 0.81 (3.21) ppb. Preliminary models indicate that an increase of 10 $\mu g/m^3$ in previous 8-hour personal exposure to $PM_{2.5}$ was associated with a 1% (95% CI: 0.1-2.0%) increase in FeNO, adjusted for corticosteroid use, age and sex.
Conclusions: Preliminary results indicate an association between personal exposures to $PM_{2.5}$ and increased airway inflammation in children with asthma.

USE OF REMOTE SENSING ESTIMATES OF NO2 AND PM2.5 EXPOSURE IN A STUDY OF HOSPITAL AND EMERGENCY ROOM VISITS IN ONTARIO, CANADA

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Background and Aims: Remote sensing (RS) offers an alternative to ground based air pollution monitoring that provides broad, cost-effective coverage. However, the use of RS estimates in epidemiological studies has not been thoroughly studied, especially for acute health effects. We examine the use of RS to estimate exposure in a case-crossover study of acute myocardial infarction (MI) and asthma hospital visits in Ontario, Canada.

Methods: Daily estimates of NO_2 and $PM_{2.5}$ levels were developed by combining retrievals from the OMI, MODIS and MISR instruments with daily profiles from a chemical transport model for the summer of 2005 (June-September). For comparison, ground-based measurements were obtained from Environment Canada's National Air Pollution Surveillance (NAPS) network. Hospitalization and emergency room visit data, including individual level data on main cause of admission/visit (ICD-10 code), age, sex, and three-digit postal code of home residence, were obtained from databases maintained by the Canadian Institutes for Health Research. Individual exposure was estimated by linkage of residential postal code centroid to the RS estimate (at approximately 10 km resolution) and the nearest NAPS station within 40km. We will use a case-crossover analysis with full-stratum bidirectional control selection as well as a sensitivity analysis with two-week bidirectional control selection to examine the acute health effects of air pollution exposure as estimated by both RS and ground-based methods.

Results: There were 7,562 hospitalizations for MI and 26,962 emergency room visits for asthma in Ontario in the summer of 2005. Preliminary analyses show RS estimates were available for $PM_{2.5}$ on 36% of days and for NO_2 on 24% of days over this time period. RS estimates of $PM_{2.5}$ were highly correlated with daily-average ground-based NAPS measurements ($r=0.73$), while daily NO_2 measurements were moderately correlated ($r=0.48$).

Conclusions: RS estimates of $PM_{2.5}$ and NO_2 are well correlated with ground-based measurements and offer a promising alternative for estimating exposure in a study of acute health effects.

DERMAL TRANSMISSION OF BISPHENOL A IN HUMANS FROM THERMAL RECEIPT PAPER

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Background and Aims: Bisphenol A (BPA) is a known endocrine disrupting chemical that can be found in > 90 % of Americans. BPA exposure is often from sources of polycarbonate water bottles, dental sealants and canned food products. Pharmacokinetic data in humans do not account for all of the circulating BPA levels that are present. Recent reports suggest that dermal absorption of BPA through contacting thermal paper could be contributing to circulating BPA levels in people. We hypothesized that a single handling of thermal receipt paper leads to trans-dermal exposure to BPA and that there will be measurable amounts in blood and urine.
Methods: Our specific objectives are to 1) examine the amount of BPA in thermal receipt paper, 2) evaluate how much is transferred onto the skin and 3) determine whether human dermal exposures to BPA lead to an increase in serum and urine BPA. BPA (unconjugated and conjugated) will be measured in serum of 25 males and 25 female volunteers before and one hour after touching receipt paper.
Results: The preliminary findings suggest that thermal receipt paper is coated with milligram amounts of free BPA in a 2-inch sample strip. Observations made after touching a receipt for a mere 10 seconds concluded that the skin adsorbed BPA. Additionally, exposure increases with length of time. There appears to be a direct relationship based on the time held and amount an individual is exposed.
Conclusions: Our preliminary findings show that there could be significant trans-dermal exposure to BPA that might escape rapid first pass metabolism. Leaching of BPA from receipts should be researched further because BPA is a ubiquitous endocrine disrupting chemical that can pass through the skin. We expect that results from this study will show that dermal exposure is a major pathway of human exposure, especially for cashiers.

EXPOSURE ASSESSMENT OF SPECIFIC CHEMICAL COMPONENTS AT STREET, URBAN AND REGIONAL SITES IN FOUR EUROPEAN LOCATIONS OF THE ESCAPE STUDY

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Background/Aim: The ESCAPE study is a large EU-funded study on long-term health effects of outdoor air pollution. In 21 European locations the study adds air pollution exposure assessment to health data available from European cohort studies. The goal of the present study was assessment of PM2.5 specific components and oxidative potential in four European locations to test hypotheses about the effect of these components on health.
Methods: In four ESCAPE locations (The Netherlands, Oslo, Barcelona, Munich/Augsburg): (nitro/oxy-)PAH, hopanes/steranes, levoglucosan, EC/OC and oxidative potential were measured. This is in addition to NOx, PM2.5 and PM10 mass and reflectance, and metals measured at all ESCAPE locations. Three two-week average samples were taken at 20–40 street, urban and regional background sites in each study area. A T60A20 filter was used for the GC/MS measurement of (nitro/oxy-)PAH and hopanes/steranes. A quartz filter was used for thermal-optical EC/OC determination, GC/MS levoglucosan analysis and DTT assay. For each site the annual average was calculated using continuous measurements at one background site as a reference.
Results: We will present an analysis of the temporal and spatial variability of concentrations including the correlation with 'standard' components (PM2.5, soot, NO_2) for four study areas. The Dutch results showed that for most components the concentrations at the street locations were highest. However, levoglucosan has comparable concentrations in street and regional background locations. Spatial correlations between components were investigated. PAH's sum correlates high with levoglucosan (r=0.85) and moderate but significant with PM2,5 (r=0.721). Hopanes/steranes sum correlates moderately with soot (r=0.694), NOx (r=0.656) and EC (r=0.635).
Conclusions: The results of chemical composition show different correlations between measured components. It indicates that the chemical components may also have other sources than motorized traffic, including wood combustion. This could potentially help to correlate the health effects to specific components and/or their origin.

ARSENIC EXPOSURE AND DNA METHYLATION WITHIN REPETITIVE ELEMENTS IN ELDERLY MEN

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Background and Aims: Arsenic (As) exposure has been linked to epigenetic modifications such as DNA methylation in *in vitro* and animal studies. This association has also being explored in highly exposed human populations, but studies among populations environmentally exposed to low As levels are lacking. We aimed to evaluate the association between As exposure and DNA methylation changes in repetitive elements in a population of community-dwelling elderly men. We also explored the possibility of effect modification by plasma folate, cobalamine (B12), and pyridoxine (B6).
Methods: We measured toenail As levels by inductively coupled plasma mass spectrometry and DNA methylation in Alu and Long Interspersed Nucleotide Element-1 (LINE-1) repetitive elements by quantitative polymerase chain reaction-pyrosequencing of blood leukocytes. The study population was 581 participants from the Normative Aging Study in Boston, USA, with 434, 140, and 7 of them having 1, 2 and 3 visits, respectively, between 1999-2002 and 2006-2007. We used mixed effects models and included interaction terms to assess potential effect modification by plasma folate, B12, and B6.
Results: There was a trend of increasing Alu and decreasing LINE-1 DNA methylation as arsenic exposure increased. In subjects with plasma folate below the median (less than 14.1 ng/ml), As was positively associated with Alu DNA methylation (b=0.08; 95%CI, 0.03 to 0.13 for one interquartile range [0.06 mcg/g] increase in As) while a negative association was observed in subjects with plasma folate above the median
(b=-0.08; 95%CI, -0.17 to 0.01).
Conclusions: In our study, the association between As exposure and DNA methylation in Alu repetitive elements varied by folate level, a factor that participates in one-carbon metabolism. This suggests a potential role for nutritional factors in As toxicity.

ASSOCIATION BETWEEN PARTICULATE MATTER(PM), O3 AND NOX AND EMERGENCY ROOM(ER) VISITS AND HOSPITAL ADMISSION FOR RESPIRATORY AND CARDIOVASCULAR DISEASES IN CALI-COLOMBIA

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Background and Aims: Studies have found a higher risk of respiratory and cardiovascular morbidity associated with PM exposure. Cali is the third largest city in Colombia, showing a rapid urban growth and multiple sources of air pollutants. Despite this, little is known about air quality and health effects in this developing country. We assess the association between short-term variations in PM10, O3, NOx and ER visits, hospital admissions and mortality for respiratory(RD) and cardiovascular diseases(CVD) in Cali-Colombia.
Methods: We developed an ecological time series study between 03/2010-06/2011. Daily concentrations of PM10, NOx, 8-h average of O3, and daily measures of meteorological variables were obtained from Air Quality Monitoring System. Records of hospital admissions and ER visits for RD and CVD were collected directly from health care institutions. Admissions were summarized into daily counts and diagnostics were based on ICD-10. Using a Generalized Additive Model with natural splines, we determined the association between daily counts of ER visits, hospital admissions and daily pollution levels.
Results: The daily average concentration of PM10 was 29.1 $\mu g/m^3$ (4.9-55.9); NOx, 0.02 ppm (0.001–0.05); and the maximum 8-h average O3, 0.02 ppm (0.008–0.05). We observed a daily average of 12 ECV and 132,8 RD admissions. The maximum admission for ECV and RD per day was 28 and 246, respectively. ECV diseases accounted for about 6% of total respiratory and cardiovascular disease admissions, while RD admissions were more than 90%. After controlling for potential confounders, we found a potential association between daily variation in PM10, O3 and NOx and ECV, RD admissions.
Conclusions: Although not showing high levels of air pollution on air, the results suggest an association between daily variations in the concentration of air pollutants and respiratory and cardiovascular health, mainly by increasing hospital admissions and ER visits.
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AIR QUALITY IMPACT ON RESPIRATORY MORTALITY RISK IN SÃO PAULO

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Introduction

Sao Paulo is one of most populous cities in the world. Air pollution caused by automobile traffic, coupled with industrial features in a subtropical climate create special atmospheric conditions that have a particular impact on population health.

Objective

This study aimed to evaluate the impact of the air quality and meteorological conditions on respiratory mortality (RM).

Methodology

This paper follows the design of ecological time series study using as dependent variable, the RM causes, by the government registers (CID 10ª Revison) and independent variables: the daily pollutants concentration and air temperature (AT) and average relative humidity (RH), from 2004 to 2006. Poisson Regression with generalized linear models was used to treat the variables.

Results

RM were shown to be directly related to the pollutants CO (1 day lag, 0.0190, $p<0.05$), NO_2 (5 days lag, 0.0006, $p<0.0131$) and O_3 (1 day lag, 0.0005, $p<0.05$; 3 days lag, 0.0004, $p<0.05$) and AT (minimum) (2 days lag, 0,0063, $p<0.05$) and inversely with RH (-0.0020, $p<0.05$). The Poisson Regression Analysis (PRA) showed O_3 (3 days lag) 0.0004, $p<0.0448$, that means 2% (95% CI, 0.004; 3.94) increase in the mortality.

Conclusion

The respiratory diseases for the period studied appear to be directly related to temperature and some pollutants. This indicates that when temperature and pollutants increases the number of cases so increases. The decrease in temperature is commonly coupled with the arrival of cold fronts in the region under study. With the arrival of cold fronts occurs increasing cloudiness followed by rain. The RH is an important element in human comfort in a subtropical climate and the precipitation in the removal of most tropospheric pollutants. Therefore, mortality from respiratory disease decreases when the relative humidity increases and the risk of death increases with increasing pollutants concentration.

Key words: Air pollution, Respiratory Mortality, Sâo Paulo

MAPPING THE COMFORT ZONE ACROSS THE UNITED STATES

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Background and Aims: The risk of death increases on both cold and hot days. The "comfort zone" is the range of moderate temperatures where the risk of death is lowest. The comfort zone has previously been defined using the indoor temperatures at which people feel comfortable. We aimed to define empirical comfort zones by finding the cold and hot temperature thresholds beyond which the risk of death increases.
Methods: We estimated the comfort zone in 97 US cities for 14 years (1987–2000). We assumed a U-shaped association between daily mean temperature and risk of death in each city by using a linear spline with movable cold and hot thresholds. We controlled for dew point temperature and season. A Bayesian geostatistical model was used to map the thresholds and comfort zone over the contiguous US.
Results: The average cold threshold was a surprisingly low 34 °F, the average hot threshold was 74 °F, giving an average comfort zone width of 40 °F. The cold threshold was lowest in Wisconsin and Michigan, and highest in Florida. The hot threshold was lowest in Maine and Washington, and highest in Florida. The comfort zone was widest in South Dakota and its neighbouring states (over 60 °F), and was narrowest in California and Florida (under 15 °F). There was little difference by age group, with the under 65 year age group having an average comfort zone width only 2.5 °F wider than the over 74 year age group.
Conclusions: The comfort zone is highly variable across the United States, with cold climate states coping with the widest ranges in temperature. The warmest states had the narrowest comfort zones suggesting that populations in these areas will struggle most with the increase in extreme temperatures expected under global warming.

COMMUNITY EXPOSURES TO INDUSTRIAL POLLUTION AND WASTE: ETHICS DISCUSSION

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Background and aims: Epidemiologic studies in communities with residential exposure to hazardous pollutants from industrial production or waste facilities can be affected by many ethical, legal, and social issues. In this presentation, and as part of the ISEE Ethics and Philosophy Committee contribution, we consider ethical issues associated with research on community exposures to industrial pollution and waste and facilitate discussion with session participants.
Methods: We use information on past problems in studies of community exposures to identify problems that are relevant to recent and on-going research. Analysis of past problems will be used to promote examination of ethical, legal and social challenges in research presented at this ISEE meeting.
Results: Residents in communities with sources of industrial pollution may be distrustful of researchers associated with the government agencies that regulate and permit polluting facilities, hampering recruitment. Industry officials may be distrustful of research that could find evidence of harm for which industry could be held responsible, which may lead them to try to prevent access to data on releases or alter releases during times that measurements are being made. Additionally, industries may directly or indirectly attempt to obstruct research or intimidate community members or researchers. Other methodological challenges in conducting research in these situations include the absence of measurements needed to address research questions of most interest, such as whether community residents have been exposed to particular pollutants and whether those exposures have been a cause of disease. Epidemiologists trained to write for scientific journals may be expected to present study findings and limitations without reliance on technical jargon and in an adversarial context. Confidentiality of both individuals and neighborhoods may be compromised by legal proceedings.
Conclusions: Analysis of these issues could be helpful for improving the design, interpretation and communication of epidemiologic studies.

APPLYING A MULTI-SITE APPROACH TO ESTIMATING RELATIVE RISKS TO HEALTH ASSOCIATED WITH AIR POLLUTION EXPOSURE AT CITY LEVEL: A CASE STUDY IN MELBOURNE

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Background and Aims: In time series studies of the health effects of ambient air exposure, multi-site approaches designed to overcome limitations of single-city and meta-analysis studies have increasingly gained popularity. Past studies applying such approaches have mainly estimated pooled relative health risks at national level. We used this approach to obtain a more reliable pooled relative health risk at city level. This can be achieved through an integrated technique to provide information on spatial meteorological and air quality gradients across a city.
Methods: Daily concentration fields of common air pollutants and meteorological variables at 3-km spacing in the area around Melbourne, a large city in Australia, for the period 1999-2008 were simulated by The Air Pollution Model - Chemistry Transport Model. The gridded data were subsequently blended with observations and then assigned to statistical local areas (SLAs) on the basis of distance and population density. In each SLA, log-linear Poisson models with smooth functions adjusting for potential confounders were used to estimate relative risks of air pollution on cardiovascular and respiratory mortality and morbidity. Hierarchical models further combined the relative risk estimates to derive overall values.
Results: Preliminary findings suggested increases in air pollution exposure attributable to increases in risk rates of most of the health outcomes examined, similar to results found in previous studies undertaken in Australia. Compared to previous single-city studies in which air pollution concentrations and weather variables were averaged uniformly across a city and a city was treated as a single location, the multi-site approach potentially provided better statistical power.
Conclusions: As long as estimating location-specific health risks remains necessary for policy and planning development, applying the multi-site approach at the city level has potential to improve statistical power and increase opportunities for exploring heterogeneity in health outcomes.

CONTRIBUTIONS ON THE SPACE PLANNING OF THE NESTINGS OF THE AGRARIAN REFORMATION AND THE ORGANIZATION OF THE HOUSING

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Background and Aims: This work has intention to present contributions on the space planning of the nestings of the Agrarian Reformation and the organization of the housing. Due to diversity of existing situations in all the country, one is about the reality of the DF.
Methods: One consists two-piece: first with the presentation of the state of the art and the theoretical reflections on the subject and,second with the practical aggravations of the reality of the Federal District and some contributions on the organization of the housing.
Results: In the planning of a nesting, the productive aspects and the use of existing natural resources are considered to define the forms and models of division.
Conclusions: However, in the nestings of the MST, one searchs to think the space in "sistemic" way, or either, the life in the center it project. Between the employed strategies they meet the stimulaton to the conviviality and the social participation and new forms to relate production and exploitation of the natural resources.

THE ASSOCIATION BETWEEN EXPOSURE TO PARTICULATE AIR POLLUTANTS FROM FIRECRACKERS AND OUTPATIENT VISITS FOR CARDIOVASCULAR AND RESPIRATORY DISEASES

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Background and aims: Fireworks are used worldwide for the celebrations. In Taiwan, the largest firework is held at a southern Taiwan township, and thousand pounds of firecrackers are fired in the township during the Lantern Festival. The aim of this study was to investigate the impact of exposure to particulate firework pollutants on the occurrence of outpatient visits for cardiovascular and respiratory diseases.

Methods: This study applied case-crossover study design to investigate the association between exposure to particulate firework pollutants emitted from the firecrackers and the outpatient visits for cardiovascular and respiratory disease. The information on outpatient visits were abstracted from National Health Insurance database. Environment exposure data were secured from the Taiwan Environmental Protection Agency.

Results: The results indicate that the concentrations of air pollutants were high on the evening of Lantern Festival, when most of the firecrackers were fired. It was increased on the first, second, and third day following the Festival. Firecracker particulate exposure (per 10 • g/m^3 increase) was significantly associated with outpatients visits for cardiovascular diseases (OR 1.41, 95% CI 1.37-1.45), hypertension (OR 1.47, 1.43-1.52), ischemic heart Disease (OR 1.25, 1.14-1.37), respiratory diseases (OR 1.42, 1.40-1.44), upper respiratory infection (OR 1.42, 1.40-1.43), asthma (OR 1.42, 1.31-1.55), COPD (OR 1.54, 1.50-1.58), and pneumonia/bronchiolitis (OR 1.54, 1.50 -1.58).

Conclusions: The results indicate that air pollutants emitted from firecrackers increase the risk of outpatient visits for cardiovascular and respiratory diseases. Prevention measures are needed to reduce the adverse health effect incurred by particulate firework pollutant exposure.

Land use regression application to predict the PM_{10} in São Paulo, Brazil

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Background and Aims: land use regression is a method able to predict air pollution concentrations in a specifically location, combining variables related to the concentration and dispersion of pollutants that can influence the exposure. Therefore we aimed to construct a land use regression model to predict the environmental concentration of PM_{10} in São Paulo, Brazil.
Methods: The study was based on the 2007 average of PM_{10} measured in monitoring stations in São Paulo, southeast Brazil. We used GIS applications to obtain geographic, demographic, roads and land use data to compose the regression model of the monitoring locations vicinity in buffers from 250 to 1.000 meters. First we calculated linear regression between each independent variables and PM_{10}. We selected most robust variables ($p \leq 0.2$) without collinearity to compose the multivariate linear regression. The final model was used to predict particulate matter in the city and mapping using interpolation method.
Results: The municipality has 12 PM_{10} monitoring stations, but in 2007 only 09 stations had sufficient valid measurements to construct the model. The annual average of PM_{10} was 40.1 $\mu g/m^3$ (±4.6 $\mu g/m^3$). For each location we obtained 113 independent variables. Four variables remained in the multiple regression model. The final model explained 63.8% of the MP_{10} variance with only one predictor variable, which was the average of mild traffic until 250 m from the monitoring stations. The model was applied in a grid of points 1 x 1 km and interpolation to mapping the dispersion of PM_{10} in the city.
Conclusions: This method is fast and easy to develop and may be used to predict air pollution in epidemiological studies in São Paulo when there is no available data from measurements. However, the results must be interpreted with caution because the model was based on measurements of only nine monitoring stations.

ARSENIC METABOLITES IN HUMAN URINE AFTER INGESTION OF SASHIMI TSUNA FISH

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Background and Aims: The consumption of seafood including tuna is increasing in the world. Seafood contains large amounts of various arsenic compounds but the risk from seafood ingestion is not clear. After the development of arsenic speciation analysis of seafood, we examined sashimi-grade tuna fish ingestion experiment using volunteers.

Methods: Arsenic content of tuna was measured after bead-beating treatment and 50% methanol extraction. Four volunteers ingested 300 g of sashimi-grade tuna fish, after refraining from eating seafood for 5 days. Arsenic metabolites in urine were monitored over 5-day period after the ingestion. Speciation analysis of arsenic in tuna and urine was performed by high-performance liquid chromatography and inductively coupled plasma mass spectrometry (HPLC-ICP-MS).

Results: Total arsenic (T-As) concentration of the tuna was 8.6 mgAs/kg. The compounds detected were arsenobetain (AsBe) and two unidentified arsenic compounds, but dimethylarsinic acid (DMA), monomethylarsonic acid, trimethylarsine oxide, arsenocholine, and inorganic arsenics (iAs) were not detected in 50% methanol extract. In 2.6 mg of arsenic ingested, 1.4 mg (54%) was AsBe and 0.4 mg (16%) of arsenic was insoluble arsenic. Approximately 40% of the ingested T-As was excreted in the urine during 5 days of the observation. The major urinary arsenics were AsBe and DMA, and the excreted total amounts were 948 ± 201 μg and 94 ± 38 μg, respectively. Approximately 70% of the ingested AsBe was excreted into the urine. Urinary AsBe excretion rate reached to 66.5 μg/h at 4 h after ingestion and that of DMA was 1.47 μg/h at 9 h.

Conclusion: Tuna, one of the most popular seafood, contains not only AsBe but also at least two kinds of soluble organic arsenic compounds and 16% of insoluble arsenic. Since neither DMA nor iAs detected in tuna, urinary DMA may be produced metabolically from unidentified arsenics or insoluble arsenic compounds.

THE CAUSAL ROLE OF AIRBORNE NANOPARTICLE ACTIVATED ONCOGENE EXPRESSION IN THE PROGRESSION OF LUNG ADENOCARCINOMA

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Background and aims: Studies have suggested that exposure to nanoparticles is associated with the increased respiratory morbidity and mortality. Our epidemiological study has shown that exposure to traffic air pollution is associated with the risk of lung cancer. Oncogene activation and enhanced cell proliferation plays an important role in tumor initiation and progression. In the study, we aimed to explore whether c-Met oncogene activation is involved in the cell proliferation of lung adenocarcinoma following nanoparticle exposure.

Methods: Ultrafine carbon black (ufCB; 14 nm in diameter) was applied as a representative airborne nanoparticle. Cell proliferation assay with the use of pharmacological inhibitors were used to delineate the pathways involved in nanoparticle-induced tumor cell proliferation. Western blotting for c-Met oncogene phosphorylation, Met kinase activity assay and immunofluorescence staining were carried out to provide the mechanistic evidence for the involvement of c-Met signaling in ufCB-induced lung adenocarcinoma cell proliferation.

Results: The results demonstrate that ufCB at 50 • g/mL and 100 • g/mL induced dose- and time-dependent increases in the proliferation of lung adenocarcinoma cells. Met kinase inhibitor SU11274 and ERK1/2 inhibitor PD98059 significantly reduced cell proliferation incurred by ufCB exposure. Western blotting demonstrated that ufCB exposure triggered the phosphorylation of c-Met and ERK1/2. In accordance, ufCB significantly increased Met kinase activity. Moreover, SU11274 successfully suppressed ufCB-induced ERK1/2 phosphorylation, indicating that c-Met oncogene activation is responsible for the phosphorylation of ERK1/2 and cell proliferation.

Conclusion: The present results demonstrate that c-Met oncogene signaling plays an important role in nanoparticle-induced proliferation of lung adenocarcinoma cells. This has great implication on the role of airborne nanoparticle exposure in promoting tumor progression.

Estimation of the burden of home injury due to housing conditions in Europe

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Background and Aims: The authors recently undertook a study for the World Health Organisation estimating the European burden of injuries occurring in the home that can be attributed to remediable structural hazards in the house. In Europe, almost 110,000 people die each year as a result of a home/leisure injury and an estimated 32,000,000 are hospitalised. The 2003-2005 home/leisure fatal injury rate is 22 per 100,000 people Europe-wide, which is more than twice the rate of road fatalities
Methods: We undertook a review of existing literature on studies that have estimated injury risk associated with features of the home. Using data on the burden of home injury in the WHO European Region, we estimated the impact of two modifiable features of housing on injury incidence, deaths, and disability adjusted life years (DALYs) from fire and falls.
Results: There were considerable limitations in the safety issues of housing that could be encompassed by this burden of disease estimate due to inadequate surveillance data on both injury and exposures to given housing conditions, and a paucity of adequate studies examining the relationship between housing conditions and injury occurrence. The two aspects of housing conditions we were able to examine were estimated to cause about 7,500 deaths and about 200,000 DALYs per year in the WHO European Region.
Conclusions: Despite limitations in surveillance data and evidence linking housing exposures and injury risk, our estimates of home injury burden imply that improving housing quality and the prevalence of the two safety features smoke detectors and window guards would significantly reduce home injury levels in Europe.

AN ALTERNATIVE SPATIAL ANALYSIS OF BREEDING SITES DISTRIBUTION TO SUPPORT CONTROL ACTIVITIES FOR DENGUE.

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Background/aim Dengue is an urban re-emerging infectious disease. In Cali-Colombia the disease is endemic and during the last years it has shown and increasing trend to larger outbreaks and more severe dengue cases. Control programs carry out actions to reduce populations of *Aedes aegypti* mosquitoes by detecting areas with high indexes of infestation (i.e.; more than 5% of recipients with *Aedes* pupae or larvae) and, subsequently, eliminating positive breeding sites. However, evaluations have not been developed about the role of negative, but potential, breeding sites in the dynamic of transmission. The objective of this study was to evaluate the distribution of positive and potential breeding sites inside households and in peri-domiciliar spaces.
Methods A geographic information systems(GIS) was implemented at a high space scale for storing, processing and analyzing data by using geo-statistical techniques(Kriging). We determined the spatial relationship between positive and potential breeding sites distributions.
Results Only 56%(R-squared) of the spatial variability of positive breeding sites distribution was associated to variability of potential breeding sites. 15,2% of the study area comprises zones with a simultaneous presence of high potential-high positive breeding sites and 64,2% of the area presented low potential-low positive breeding sites. However, 20,6% of the area presented a differential distribution of these types of breeding sites (5,1% high potential-low positive and 15,5% low potential-high positive). Maps were built to identify areas showing this lack of agreement in the distribution.
Conclusion Our results suggest that focusing interventions in areas only presenting high infestation with positive breeding sites might fail because they do not take into account the variability in breeding sites from potential to positive. Elimination and education activities could be better implemented taking into account the distribution of potential breeding sites.

THE SENSITIVITY OF TIME-SERIES HEALTH EFFECT ESTIMATES TO FINE PARTICULATE MATTER (PM2.5) CHEMICAL COMPONENTS SAMPLING SCHEDULES

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Background and Aims: The U.S. EPA Speciation Trends Network (STN) is a resource used to investigate the association between PM2.5 chemical components and health in time-series studies. However, the temporally-sparse sampling on every third or sixth day reduces the number of days available for analysis and may influence resulting associations and interpretations. The Denver Aerosol Sources and Health (DASH) study obtained daily speciated PM2.5 data over five years allowing us to examine the impact of less than daily monitoring data on health effect estimates.
Methods: We performed a time-series analysis using daily PM2.5 chemical component concentrations and daily hospitalization counts from 2003 through 2007. Three every third-day sets of time series data for component concentrations were created from daily data, imitating the STN monitoring schedule. A fourth scenario was created using DASH data limited to the actual valid sampling days reported at the closest STN monitor. Four PM2.5 chemical components, elemental and organic carbon, sulfate, and nitrate, measured in the DASH study were examined. Relative risks (RRs per interquartile range increases) of hospitalizations for PM2.5 components at day lags 0 to 3 were estimated for each of the four systematically-missing and for the complete time-series using the Generalized Additive Model. Estimated RRs were compared across sampling schedules.
Results: The estimated RRs often varied between limited and complete sampling schedules and between the four limited sampling schedules, depending on PM2.5 components and hospitalization diagnoses. For example, the association of asthma hospitalization and of nitrate at lag0 using complete time-series data (RR = 0.999; 95 % confidence interval (CI) = 0.998, 1.010; 0.86 $\mu g/m^3$ increase) was elevated and statistically significant in one of the every-third-day scenarios (RR = 1.024; 95 % CI=1.005, 1.043).
Conclusions: Estimated effects of PM2.5 components on hospitalization in time-series studies were sensitive to the completeness of daily sampling and the selection of sampling days.

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Disclaimer: This abstract does not necessarily reflect the policies of the U.S. EPA.

IN UTERO EXPOSURE TO ARSENIC IS ASSOCIATED WITH ALTERED DNA METHYLATION IN UMBILICAL CORD BLOOD LEUKOCYTES

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Background: Arsenic (As) can cross the placenta and is a suspected epigenetic toxicant.
Objectives: Investigate the effect of prenatal As exposure at *LINE-1, Alu, p16* and *p53* using data from a prospective birth cohort recruited in Bangladesh.
Methods: Women whose gestational age was ≤28 weeks were recruited. At enrollment, water samples were collected from the tubewell the participant identified as her primary source of drinking water and analyzed for As using inductively-coupled plasma mass spectrometry (ICP-MS). DNA was extracted from fresh whole umbilical cord blood (N=114). DNA methylation was quantified using pyrosequencing at *LINE-1, Alu,* and seven and four CpG positions in the promoter region of *p16* and *p53*, respectively.
Results: Infants were categorized as exposed (53.1%) or unexposed (46.9%) using maternal water As concentrations. General linear regression models were used to compare DNA methylation between exposed (As ≥ 1 µg/L) versus unexposed (As < 1 µg/L) infants. In adjusted models, DNA methylation in exposed infants was significantly higher at *LINE-1* (81.5% vs 80.6%, p-value=0.01) and at *p16* position 2 (3.1% vs 2.4%, p-value=0.009) position 5 (2.3% vs 1.9%, p-value=0.01) position 6 (1.4% vs 1.1%, p-value=0.02) and position 7 (2.6% vs 2.1%, p-value 0.02) compared to unexposed infants. No difference was observed at *Alu* or *p53.*
Conclusions: These results suggest that *in utero* exposure to As was associated with DNA hypermethylation in umbilical cord leukocytes at both global and loci specific markers. Additional studies are needed to confirm these results and determine whether changes in DNA methylation of umbilical cord leukocytes are associated with health outcomes.

INFLUENCE OF NETWORK DESIGN ON HEALTH EFFECT ESTIMATES FROM PREDICTED EXPOSURES

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Background and Aims: Estimated health effects for long-term air pollution exposure predictions vary across cities in cohort studies. This may be due to features of network designs. In this simulation study, we hypothesized that distributions of land use characteristics in networks affect health effect estimation and investigated the impact on estimates of relative risks (RRs) of cardiovascular event occurrences for PM2.5 exposures in 29 U.S. cities as a function of monitor and subject distributions.
Methods: We explored the impact of assumed distributions for a land use variable in hypothetical cities and then considered the existing distributions in 29 Women's Health Initiative (WHI) study cities. We chose a land use variable that is spatially rough and assumed it was associated with PM2.5. Given distributions of this variable in each city, PM2.5 exposures were simulated using underlying geostatistical models also incorporating spatial correlation at subject and monitoring locations. Then, we predicted PM2.5 at 1500 subject homes given PM2.5 exposures at 30 monitoring locations. Survival times to cardiovascular events of subjects were simulated using underlying models conditional on simulated exposures. RRs of cardiovascular event occurrences for true and predicted PM2.5 were estimated in Cox proportional hazard models. Finally, we assessed the relationship between standard deviation of the land use covariate and properties of RR estimates across cities.
Results: We found improved performance of health effect estimates with increasing standard deviations of our spatial covariate in hypothetical networks. As variability in the spatial covariate at monitoring locations increased, bias and variance decreased, and coverage approached 95 percent. This pattern was similar but less clear in WHI cities.
Conclusions: Our simulation study showed that network designs determining distributions of a land use characteristic associated with air pollution exposures affected performance of health effect estimates of predicted exposures.

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PREDICTORS AND TEMPORAL VARIABILITY OF URINARY PARABEN CONCENTRATIONS IN MEN AND WOMEN BEFORE AND DURING PREGNANCY

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Background and Aims: Parabens are used as antimicrobial preservatives in personal care products, pharmaceuticals, and food products, and are considered endocrine disruptors. There is widespread paraben exposure among the US population. To our knowledge, no studies have investigated variability in urinary paraben concentrations among men and women, as well as during pregnancy. Our objective was to evaluate the temporal variability and predictors of paraben concentrations.
Methods: Using on-line solid phase extraction-high performance liquid chromatography-isotope dilution tandem mass spectrometry we measured urinary concentrations of methyl-(MP), propyl-(PP), and butyl-paraben (BP).
Results: Between 2005 to 2010, 2218 urine samples were collected from 575 patients from the Massachusetts General Hospital Fertility Center: 356 women (1724 samples) and 219 men (494 samples). Eighty-one women became pregnant during the follow-up period and provided a pre-pregnancy urine sample and one during each trimester. For all participants, median concentrations were 117µg/L (range: < 1-23200µg/L; detection frequency: 99.7%) for MP, 25.5µg/L (<0.2-2550µg/L; 96.5%) for PP, and 0.70µg/L (<0.2-595µg/L; 67.0%) for BP. Adjusting for specific gravity (SG), MP concentrations were 5.2 fold higher among women compared to men ($p<0.0001$), 3.2 fold higher among African Americans compared to Caucasians ($p<0.0001$), and 27% lower during pregnancy compared to the woman's pre-pregnancy samples ($p=0.001$). The correlation of SG-adjusted MP concentrations was stronger between trimesters 1 and 2 ($r=0.33$; $p=0.003$) and 2 and 3 ($r=0.42$; $p=0.0001$) compared to between 1 and 3 ($r=0.26$; $p=0.02$). The intraclass correlation coefficient (ICC) for SG-adjusted MP was 0.51 for men and 0.43 for women. Similar results were found for PP.
Conclusions: Urinary paraben concentrations were significantly higher among women, and among African Americans compared to Caucasians, while concentrations decreased in women while pregnant compared to their pre-pregnancy samples. Finally, ICCs were higher for men compared to women suggesting lower temporal variability among men than women.

COMPARING METHODS FOR CLASSIFYING 'DANGEROUS HEAT' IN HEAT HEALTH WARNING SYSTEMS

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Background and Aims: Heat waves have been linked to excess mortality and morbidity, and are projected to increase in frequency and intensity with a warming climate. Several proposed weather-related triggers for activating heat health warning system (HHWS) triggers exist, including simple temperature or heat index (HI) thresholds and the synoptic (air mass) approach. This study compares methods to trigger HHWS, and introduces a new flexible data-driven method that combines the air mass approach with a more transparent procedure.
Methods: A novel multi-level hybrid clustering method (HCM) was developed to identify extremely hot days. The number of levels subjects to users' demand. Two-level and three-level HCM as well as common indices, including spatial synoptic classification (SSC), 90th, 95th and 99th percentile minimum heat index (HI) methods lasting for at least two days, were calculated using a historical summer time (May 1st to September 30th) weather dataset in Detroit from 1976 to 2006.
Results: The HCM, SSC, and minimum heat index methods differed greatly. The 90th minimum HI tended to define more potentially dangerously hot days (405 days over 31 years) than SSC (355 days), two-level HCM (189 days), three-level HCM (69 days), 95th and 99th minimum HI (180 and 22 days). SSC tended to include the days with lower daily minimum temperature and dew point. The average minimum temperature and dew point of SSC-identified heat wave days were 2.6 and 5.3 ^{o}C lower compared to those days identified by other methods. The overlapping days between SSC and other methods were small or moderate, ranging from 21 to 151 days.
Conclusions: Our proposed clustering framework shows some advantages such as flexibility and relatively transparency compared to the current synoptic classification methods. It can be applied in HHWSs, epidemiological studies and public health interventions to protect vulnerable populations from extreme heat events.

LIGHTS OUT: IMPACT OF THE AUGUST 2003 POWER OUTAGE ON MORTALITY IN NEW YORK, NY

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Background and Aims: In the United States, energy use is increasing, which stresses the aging power grid, creating frequent possibilities for power outages. Energy infrastructure is critical for national security, and power outages could increase from global climate change because of increased demand for energy on hot days and more frequent extreme weather. However, little is known about how power outages affect human health, despite the potential of such information to improve emergency planning.
Methods: Here we investigate all-cause mortality in New York, NY, during the August 14-15, 2003, blackout. We modeled mortality in New York, NY, 1987-2005, using a generalized linear model and modeled daily mortality rates using a Poisson distribution with overdispersion, based on methods used to study health effects of air pollution, temperature, and heatwaves. We used an indicator to model the days of the blackout and controlled for time-varying factors including day of week, weather, and long-term and seasonal mortality trends.
Results: Mortality spiked for both accidental deaths (122.1% increase; 95% confidence interval: 27.6%,286.8%) and non-accidental deaths (25.3%; 11.7%,40.5%), resulting in approximately 90 excess deaths. Increased mortality did not result from deaths being advanced by a few days; rather, for the remainder of August 2003, mortality risk remained slightly elevated.
Conclusions: To our knowledge, this is the first investigation of the effects of a power blackout on non-accidental mortality. Understanding impacts of power outages on human health is important, given that increased energy demand and climate change are likely to strain power grids, and terrorist attacks on power grids remain a security concern.

ASSOCIATION BETWEEN SOLAR LIGHT EXPOSURE AND TOTAL MORTALITY AMONG RENAL TRANPLANT RECIPIENTS

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Background: Vitamin D deficiency is prevalent among renal transplant recipients (RTRs). Vitamin D may play a role in reducing inflammation and slowing disease progression. Solar light is an essential component in initiating events resulting in the active form of vitamin D within the human body. This study evaluated the association between solar light and survival among RTRs.
Methods: This retrospective cohort study included 38,102 subjects identified through the US Renal Data System (USRDS), included adult, RTRs, transplanted between 1997-2002, and living in the continental U.S.A. Solar radiation data was obtained from the National Solar Radiation Database (NSRDB). Annual average values based on monthly concentrations of solar radiation data for the year 2000, were interpolated to ZIP code centroids according to the residence of the RTR population. Cox Proportional Hazard models used to estimate effect of solar radiation (<3600 reference, 3600-<4000, 4000-<4400 and 4400+ Wh/m^2 categories) on risk of total mortality, while adjusting for confounders.
Results: The relative risk (RR) for total mortality among RTRs residing in areas with 3600- <4000 Wh/m^2 of solar radiation was 1.14 (95% CI, 1.01-1.28) in the multivariable adjusted model. For subjects residing in higher solar radiation areas with 4000 – <4400 Wh/m^2 and for areas equal to or greater than 4400 Wh/m^2 the RR for total mortality was 1.08 (95% CI, 0.95 - 1.24) and 1.03 (95%CI, 0.91 -1.16), respectively in the adjusted models. When excluding subjects with prevalent heart disease at time of transplant, the strongest association between solar radiation and total mortality was RR=1.21(95%CI, 1.05-1.39) and found for subjects within the lower solar radiation area of 3600-4000 Wh/m^2.
Conclusion: The findings indicate that for RTRs, living in areas with lower levels of solar radiation may negatively impact survival and increased solar light exposure may be warranted among RTRs in areas with less intense solar radiation.

EXPOSURE TO AMBIENT NITROGEN OXIDES AND RESPIRATORY DISEASES IN CHILDREN BELOW FIVE YEARS

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Background and Aims: Acute lower respiratory illness causes more deaths in children below five years than any other disease and recent studies suggest a possible link between air pollution and respiratory illnesses. In this study, we investigated the association between ambient NOx with increased episodes of bronchitis and croup.
Methods: This longitudinal study was conducted in Teplice and Prachatice districts of the Czech Republic, between 1994 and 2003. Children were followed-up from birth to four and half years of age. Data were compiled from medical records at delivery and at follow-up, and from self-administered questionnaires from the same two time points. Ambient monitoring data for NOx was used as exposure averaged over five periods ranging from three – 45 days prior to an episode. To quantify the association between exposure and outcome, while accounting for the correlation between repeated measures we conducted logistic regression analysis using generalized estimating equations. Selection of covariates was facilitated by using a directed acyclic graph.
Results: The adjusted rate ratio (RR) for bronchitis in children <two year old associated with inter-quartile range increase (approximately 35 $\mu g/m^3$) in the 30-day average NOx was 1.31 (95% CI: 1.07, 1.61) and the same for two to 4.5 year olds was 1.23 (95% CI: 1.01, 1.49). Interestingly, the association between bronchitis and NOx increased with child's age in the <two years group. The RR for bronchitis associated with 30-day average NOx exposure in children ≤3 months was 0.61 (95% CI: 0.35, 1.07), >3 to ≤6 months, 1.17 (95% CI: 0.77, 1.79), >6 to ≤12 months, 1.32 (95% CI: 1.02, 1.71) and >12 months, 1.48 (95% CI: 1.11, 1.97). The association between NOx and croup was slightly smaller than bronchitis.
Conclusions: The evidence, if causal, can be of serious public health concern because the current regulatory air standards are much higher than the levels demonstrated to be associated with increased rates of respiratory illnesses in preschool children in this study.

BRAIN CANCER AMONG AGRICULTURAL WORKERS FROM RIO DE JANEIRO, BRAZIL: A DEATH CERTIFICATE-BASED CASE-CONTROL STUDY

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Background: Several studies indicate that agricultural workers are at greater risk to develop some specific types of cancer, such as brain cancer. The underline hypothesis for such increased risk is the intense exposure to pesticides experienced by these workers.
Objectives: To estimate the magnitude of the association between brain cancer mortality and agricultural activities, as well as ethnicity, education, and place of residence.
Methods: In this death certificate-based case-control study, cases were defined as any resident of Rio de Janeiro State, 18 years or older, male, whose basic cause of death was registered as brain cancer. For each case, 2 controls were randomly chosen among any male individual, 18 years or older, whose basic cause of death was registered as any disease different from neoplasms and diseases of the Nervous System.
Results: Agricultural workers were at higher risk to die by brain cancer, when compared to non-agricultural workers (OR: 1.41; CI95%: 1.09-1.85). Adjustment by age, ethnicity, and residence, increased the magnitude of this risk (OR: 1.83; CI95%: 1.26-2.65). In addition, the brain cancer mortality risk was higher among those individuals of higher education, white, and residents of Nova Friburgo region.
Conclusions: In agreement with international evidences, the present study suggests an association between brain cancer mortality and agricultural activity in the State of Rio de Janeiro, Brazil. Our results reinforce the hypothesis that environmental exposures experienced by this group of workers may play a role in the development of type of cancer.

SOURCE APPORTIONMENT OF AIR POLLUTION IN AN URBAN AREA INFLUENCED BY LOCAL INDUSTRIES IN CALI, COLOMBIA

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Background and aim: Cali is the third largest city of Colombia, and is located in the southwest of the country. The northern city limits with Yumbo, a town with a large industrial area that includes smelting factories and battery recycling and production. Previous measurements did by environmental authorities showed air concentration levels above standards limits for PM2.5 and lead. As part of a study designed to assess the impact of this industrial area in air quality and health of scholars in northern Cali, we estimated source apportionment to PM2.5 using Positive Matrix Factorization(PMF).
Methods: We collected 90 air samples for PM2.5 on Teflon filters and analyzed them for 57 elements by X-ray Fluorescence(XRF), organic carbon(OC) and elemental carbon(EC) by Termogravimetry, and ions by Ion chromatography. After selection of species by number of samples over detection limits, duplicates species, signal to noise ratio, PMF where modeled with 24 species, including lead, which we used as Yumbo industrial activities tracer as Colombia have green gasoline(lead-free).
Results: The largest component of pm2.5 was the carbonaceous fraction, accounting for 53-83% total mass. 3 factors profiles were identified and their contribution estimated. The principal factor was industrial emissions(53.7% contribution), identified by presence of Pb(91.4%) in its profile, and others heavy metal like Ni(47.62%) and Cd(63.82%). Second factor was mobile sources and associated dust(27.7% contribution), identified by the large presence of OC(72.59%), EC(8683%) and V(51.71%) for mobile; and Fe(25.68%), Ti(36.22%), Ca(48.43%) and Si(38.91%) for associated dust. Third factor was from industrial sources(18.6% contribution) unrelated to lead generating activities, and was identified by presence of Zn(91.49%) and Fe(44.67%).
Conclusions: Industrial activities in the municipality of Yumbo have an impact on air quality in the northern area of Cali and this should lead to joint actions for pollution control.

EXPOSURE ASSESSMENT AND HEALTH EFFECTS ASSOCIATED TO PESTICIDES BURIED NEAR AN URBAN COMMUNITY IN COLOMBIA

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Background/aims: Organophosphate and organochlorine pesticides have been associated with neurological and respiratory effects in agricultural communities, but few studies have been conducted in buried pesticides deposited close to human settlements. An urban neighborhood and a school with >1,500 children was settled in a former agricultural area of 44ha in Cartagena-Colombia. During construction, several containers with pesticides were found. Contaminated soils and containers were removed and confined to an area close by. Our objective was to evaluate exposure to and potential health effects of these buried pesticides on surrounding communities.
Methods: Concentrations of pesticides in soil and air were determined. A health risk assessment was done modeling soil concentrations found at the pesticides confined area. Respiratory diseases data was obtained, and tests for pulmonary and neurological function were applied in children(n=389) and adults(n=440) at the exposed and a control area. Levels of pesticides in serum and their metabolites in urine were determined in a subsample of children.
Results: Presence of DDT isomers and metabolites were found in one soil sample and chlorpyrifos was reported in one air sample. Risk modeling suggests risk inside the confined area by different routes of exposure. Although individuals at the exposed area reported more frequently severe dyspnea(children OR:2.97; IC95%:1.0-8.97) and wheezing (adults OR:2.10; IC95%:1.13-3.90) evidence of lung function effects was not demonstrated by spirometry. There were not differences in intellectual performance. Pesticides in blood serum were mostly below detection limits, and only significant levels of pp-DDE were found, although at concentrations similar to non-exposed populations.
Conclusions: A confined area with buried pesticides but not direct contact with population is a potential source of risk. However, no evidence of exposure to pesticides was found in this area. Increased reports of respiratory symptoms could be explained by increased risk perception or other environmental exposures in the area.
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STUDY ON THE RELATIONSHIP BETWEEN THE APPARENT TEMPERATURE AND POPULATION MORTALITY IN BEIJING, CHINA

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Background and Aims: The relationship between air temperature and population mortality were more and more concerned by the researchers in recent years. However, the association of the population mortality with ambient apparent temperature which integrated air temperature and relative humidity was scarcely studied in China. The aim of our study is to explore the potential relationship between the apparent temperature and daily population mortality in Beijing, China.

Methods: Time series study design. The cause-specific mortality data and the data of meteorology and the ambient pollutants in 2004-2008 were collected from local CDC of Beijing and the website of the related local authorities of Beijing, respectively. Generalized additive model (GAM) with poisson regression were used to analyze the association between the daily apparent temperature and the counts of all cause death, cause-specific death of Chronic Ischemic Heart Disease (CIHD), myocardial infarction, intracerebral hemorrhage (ICH) and cerebral infarction (CI) of the exposed population in Beijing respectively, after adjusting relative humidity, air pressure, wind speed, influenza, time trends, week day with cubic spline function, etc.

Results: The cumulative general relative risk (RR) of all cause death was 1.0046 (95% CI= 1.00807 • 1.00133) for 1°C increase of daily mean apparent temperature, the strongest effect was occurred by the lag one day. The RR values for circulatory diseases were 1.00511 • 95% CI 1.00121 • 1.00511 Ž per 1°C increase, stratified analysis of age group showed that the effect of apparent temperature was stronger to the aged above 75. A V-shaped or U-shaped curve was found for the relationship between the apparent temperature and cause-specific death of the exposed population.

Conclusion: The apparent temperature was positively associated with the population mortality, which the subpopulations aged above 75 yrs were the most susceptible to the change of apparent temperature.

EXPOSURE ASSESSMENT OF PHTHALATES IN CHINA USING GEOGRAPHIC INFORMATION SYSTEMS

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Background: As one kind of environmental endocrine disruptors, phthalates are widely used as plasticizers in a number of day-life products, exerts both short-term and long-lasting effects on reproduction and development of organisms. With increasing data of phthalates exposure and their relationship with human diseases, there is an emerging need for a thorough exposure assessment of phthalates in China.

Methods: Geographic information system (GIS) was used to map phthalate levels and distributions in China based on published data of environmental phthalates exposure during the past twenty years. The total daily intake (TDI), inner absorbed level and blood lipid concentration of phthalates was calculated by different models to evaluate human body burden of phthalates in China.

Results: Phthalates exposure in Chinese environment varied in geographical patterns. Mean levels of phthalates in atmosphere ranged through 300 ng/m^3 in winter and 600 ng/m^3 in summer, while those levels in water were in range of 5-50 μg/L. Severer phthalates pollution were found in soil and food samples, with concentrations of up to 100 mg/g d.w. TDI of phthalates was 103.9mg/d for people residing in Pearl River Delta area, significantly higher than those residing in Yangtze River Delta area (6.8mg/d).

Conclusions: Phthalate are ubiquitous in China. Food is the main source of phthalate intake for humans. DEHP accounts for over 70% of phthalate body burden in humans. People residing in Pearl River Delta area have relatively higher body burden of phthalate than those in other areas, which suggests that decision-maker in China be considering the potential health effects of phthalates on humans, especially children and elders, in this area.

Key words: phthalate; exposure assessment; GIS; body burden; DEHP

ASSOCIATION BETWEEN AIR POLLUTION AND GLUTATHIONE S-TRANSFERASE (GST) P1 ON ASTHMA AND WHEEZING AMONG CHILDREN IN TAIWAN

AIR POLLUTION AND GSTP1ON ASTHMA AND WHEEZING IN CHILDREN

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Background and Aims: There are limited studies on the role of interaction between exposure to ambient air pollution and glutanthione-S-transferase (GST) P1 on the risk of asthma and wheezing among children, which provided suggestive, but inconclusive results. The present study was to assess the joint effect of air pollutants and *GSTP1* on the risk of asthma and wheezing in Taiwan Children Health Study

Methods: We conducted a nationwide cross-sectional study of 5,049 Taiwanese children in 2007. The studied determinants were three *GSTP1* Ile105Val (rs 1695) genotypes (Ile-Ile; Ile-Val and Val-Val) and expoure to abmient air pollutants.We used routine air-pollution monitoring data for sulphur dioxide (SO_2), nitrogen dioxides (NO_2), ozone (O_3), carbon monoxide (CO), and particles with an aerodynamic diameter of 2.5 μm or less ($PM_{2.5}$). The exposure parameters were calculated using community annual average concentration. The effect estimates were presented as odds ratios (ORs) per interquartile changes for NO_2, CO, SO_2, $PM_{2.5}$ and O_3.

Results: In a two-stage hierarchical model adjusting for confounding, the risk of asthma was decreased with $PM_{2.5}$ (adjusted odds ratio (OR) 0.60; 95% confidence interval (CI) 0.45, 0.82), and O_3 (OR 0.74; 95% CI 0.60, 0.90) among ile105 homozygotes, but not among those at least one val105 allele (interaction p value=0.001 and 0.03, respectively). A similar tendency of effect modification between $PM_{2.5}$ and O_3 and GSTP1 on the risk of wheezing was found.

Conclusions: Children who carried ile105 variant allele may be protected from the increased risk of asthma and wheezing of ambient air pollutants, especially in $PM_{2.5}$ and O_3.

IMPACT OF AIR POLLUTION AND PARKINSON'S DISEASE ON MORTALITY

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Background and Aims: Preliminary studies suggest that traffic or air pollution may increase the risk of Parkinson's disease (PD). We sought to examine how exposure to ambient air pollution and Parkinson's disease are associated with mortality.
Methods: Study subjects were participants in the Parkinsonism Epidemiology at Kaiser (PEAK) case-control study. Patients with PD (n=470) were diagnosed in 1994-1995 and matched to sex- and age-matched controls (n=498); both groups were followed annually for mortality. Residential location for each individual was geocoded at time of diagnosis (cases) or reference date (controls) and assigned the mean level of air pollutants in the year prior to this date based on ambient air pollution data geospatially interpolated from air quality monitoring data. A four-level variable was created based on case-control status and exposure (as above and below mean for the pollutant) and was analyzed using proportional hazard models to estimate the hazard ratio (HR) with the case-exposure classifications variable entered indicator variables and mortality (all-cause) as the outcome, while adjusting for age, sex, race/ethnicity, BMI and smoking.
Results: Compared to controls with low (below mean) exposure, the mortality HR for PD cases with low NO_2 exposure and with high NO_2 exposure were 1.34 (95% CI 0.93-1.95) and 1.58 (95% CI 1.12-2.22), respectively. For ozone exposure, mortality was significantly elevated for PD low exposure and PD high exposure groups (HR=1.64; 95% CI 1.17-2.31; and HR=1.78; 95% CI 1.25-2.53, respectively). PM_{10} exposure, mortality was similarly elevated for PD low exposure and high exposure groups (HR=1.29; 95% CI 0.92-1.80; and HR=1.28; 95% CI 0.92-1.78, respectively). There were no significant associations for controls above the median relative to controls below the median for any of these pollutants. No associations were observed for exposure to CO.
Conclusions: These data suggest that air pollution may have an adverse mortality effect among individuals with Parkinson's disease.

CADMIUM INDUCED RENAL TUBULAR DAMAGE AMONG RESIDENTS LIVING NEAR THE COPPER REFINERY PLANT IN KOREA.

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Background/Aims: Cadmium (Cd) is the most potent nephrotoxic heavy metal, with a long biological half-life in human body. This study aimed to assess the effect of environmental Cd exposure on kidney dysfunction.
Methods: The study subjects composed of 687 individuals who reside within 4 km area from a copper refinery plant. We analyzed the concentrations of Cd in blood and urine, renal tubular damage markers [urinary • $_2$-microglobulin (• $_2$-MG), N-acetyl-• -D-glucosaminidase (NAG) activity, and total protein], and kidney function markers [blood urea nitrogen (BUN) and serum creatinine]. Renal dysfunction rates were estimated and compared according to the hematologic and urinary Cd level.
Results: The blood Cd ranged from 0.21 to 16.12 • g /L (geometric mean; 2.56 • g/L) and the urinary Cd, from 0.14 to 22.42 • g/g creatinine (geometric mean; 2.72 • g/g creatinine). The urinary NAG activity was significantly correlated with urinary cadmium level (r=0.103, p=0.021). As blood or urinary Cd level increased, the prevalence of renal tubular damage (defined as U-NAG > 11.5 U/g creatinine, or U-• $_2$-MG > 300 • g/g creatinine) increased in a dose-response way. The odds ratio (adjusted for age, gender, smoking status, history of diabetes and hypertension) for abnormality of U-NAG according to U-Cd level showed a linear increase, but for U-• $_2$-MG was not. The prevalence of abnormal serum creatinine level (defined as serum creatinie > 1.3 mg/dL) was significantly increased in subjects with moderately elevated blood cadmium level (B-Cd; 2.0 ~ 5.0 • g/L) (odds ratio; 9.60, 95% CI; 1.23-75.17). There were significant differences in the prevalence of renal tubular damage and in that of abnormal serum creatinine level between individuals whose blood Cd level was 2.00 • g/L or higher and those with blood Cd level lower than 2.00 • g/L.
Conclusion: These results suggest a possibility that Cd as low as 2.00 • g/L for blood or 2.00 • g/g creatinine for urine can cause renal tubular or glomerular damage.

Keywords : copper refinery plant, cadmium, renal tubular damage

SOURCES OF INDOOR AIRBORNE CD AND PB IN A COHORT OF PREGNANT WOMEN IN CALI, COLOMBIA

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Background and aim: As part of the exposure assessment to heavy metals in a cohort of pregnant women in Cali, we evaluated presence and levels of Cd and Pb in food, water and air. Previous exploratory evaluations have been made in food(fish and vegetables) and water(Cali River and water distribution net) showing presence in moderate levels. Although environmental measurements of pm2.5 and its elemental composition shown presence in air of these metals and industrial activities have been identified as the main source, little is known about sources in the indoor. Although air is not the main source for these heavy metals, some practices may increase exposure levels and therefore become an important exposure media. The aim of this research was to identify sources of Cd and Pb in the indoor and immediate neighborhood.
Methods: Based on blood levels of lead and cadmium measured in the first trimester of pregnancy, we selected 50 women with detectable levels of one or both metals. We visited their houses and collected information about practices that could increase exposure to PM2.5, Pb and Cd; developed a peri-domicile assessment, registered sources in the outdoor, and determined distance to industrial areas or other source o fair pollution. Teflon filters were analyzed by X-ray fluorescence(XRF) for Cd and Pb.
Results: Main practices found associated with increased PM2.5 exposure were everyday sweeping, use of curtains for dividing rooms, and opened windows during the day. Practices in the immediate neighborhood like recycling and outdoor burning were also found associated to presence of Pb(max:0.09,min:0.04ug/m3), we did not found Cd in these measurements.
Conclusions: Many of the practices increasing likelihood of exposure in this population are related to poverty. There is a need to develop a complete exposure assessment to identify sources contributions, exposure routes and pathways.

THE RATE OF BONE DEMINERALIZATION WITH AGE DEPENDS ON THE URINARY CADMIUM CONCENTRATION

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Purpose: Janghang Refinery which was built in 1936 and operated for 50 years had emitted great amount of pollutants including cadmium (Cd), a heavy metal which has been reported to be associated with decrease in bone mineral density (BMD). This study was aimed to evaluate the relationship between urinary cadmium concentration and decrement in bone mineral density in residents having lived in the vicinity of Janghang Refinery.
Materials and Methods: The study subjects included 450 males and 619 females who were living within 20 km from Janghang Refinery. Bone mineral density was measured with ultrasonic method at the calcaneus area. Urinary cadmium concentration was evaluated using an atomic absorption spectrophotometer and adjusted with urinary creatinine concentration. The correlation between urinary Cd level and BMD was statistically tested according to age group (<50 yrs, 50 – 59 yrs, 60 – 69 yrs, >70 yrs) and sex, and the decreasing rate of BMD as age was estimated according to urinary Cd level (< 2, 2 – 5, 5 – 10, > 10 • g/g creatinine).
Results: As the age increased, BMD decreased and urinary Cd concentration increased. Urinary Cd concentration was significantly correlated with BMD in young males aged less than 60 years, and in females aged less than 50 years after controlling effects of age and menopause using multiple regression models. Neither in males aged 60 years or more, nor in females aged 50 years or more, were those correlations found. BMD was more strongly correlated with age in females than in males and, it decreased more rapidly as the urine Cd increased in female subjects.
Conclusion: These results suggest that cadmium exposure increases the rate of bone demineralization, especially in women.

HEALTH OF POPULATIONS EXPOSED TO CONTAMINATED AREAS, AN EPIDEMIOLOGICAL SURVEILLANCE PROPOSAL FOR STANDARDIZED PERFORMANCE IN AREAS WITH CONTAMINATED SOIL AND WATER IN BRAZIL

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Introduction: The world changes geographic characteristics of populations, associated with industrial actions, triggering an intense urbanization in this process, areas of environmental degradation and consequent contamination of the environment is increasing. In Brazil, several areas were identified. The state of Sao Paulo, more than 2.900 areas has been identified as contaminated soil. The Center for Epidemiological Surveillance of São Paulo State, structured practical handbook of Health Surveillance of Populations Exposed to Contaminated Soil with participation of various sectors, completed in a workshop that describes guidelines.
The manual was prepared by technical staff of the Division of Disease caused by environment, with employees and consultants.
This paper describes all the process and the present the Manual.
Objectives: The main objectives are:

1. Develop guidelines on epidemiological surveillance for action in promoting the health of populations exposed to areas contaminated
2. Promote surveillance actives to the population exposed to contaminated areas.

Methodology: The manual was prepared with discussion involving: Pan American Health Organization, Ministry of Health, institutions of the Department of Health of Brazil, Department of the Environment (CETESB) and especially regional and local health activities in the area with environmental health at the SP state. Discusses: Definitions used in the area; Legal Grounds - Epidemiological Surveillance of people exposed to soil contaminated; Structure Footsteps - Epidemiological Surveillance of people exposed to soil contaminated:
Step 1: Creation of the Technical Group
Step 2: Removal of contaminated areas
Step 3: Register of contaminated areas
Step 4: Initial investigation of population exposed to contaminated soil
Step 5: Epidemiological investigation
Step 6: Protocols for monitoring of population exposed to soil contaminated
Conclusion: Front vast number of people exposed to contaminated areas, it is necessary foundations for health promotion, which can be initiated through the use of tools for epidemiological surveillance.

INTERACTION BETWEEN AIR POLLUTION AND BMI OVER LUNG FUNCTION AND EXHALED NITRIC OXIDE IN A COHORT OF ADOLESCENTS OBESE IN MEXICO CITY

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Background and Aim. Both, obesity and asthma are common conditions. Air pollution has been associated with decreased lung function and higher inflammation. The combined effect of weight loss and air pollution on lung function and inflammation had not been evaluated. We conducted a study to evaluate the effect of air pollution and weight-loss on lung function and airway inflammation in obese adolescents with and without asthma.
Methods: We studied a cohort of 121 asthmatic and 226 non-asthmatic adolescents with obesity, followed by 12 months average during a weight loss intervention program. Spirometric tests and measurements of FeNO were conducted each month during follow-up. Exposure was estimated from outdoor PM2.5, concentrations recorded by the Mexico City government at fixed-site central monitoring (RAMA). Data were analyzed using linear mixed effects models.
Results: PM2.5 concentrations ranged 4.6 to 56.8 • g/m3 during study period (mean=25.8 ug/m3). Mean BMI (kg/m^2) decreased from 30.2(SD=4.8) to 27.5 (SD=4.4) after 5 months of follow up average (2-22 months), 76 participants (22.4%) lost weight at 5% or more. At baseline, FeNO was higher among asthmatics than non asthmatics (41.7 vs 33.7 ppb, p<0.05); but not difference were observed for FEV1, FVC and FEF2575. Days with high exposure (PM2.5>25 • g/m3) were associated with 1.06 ppb increase in FeNO, and inversely associated with FEV1 (• =-73.7 ml, p= 0.004) and FVC (• =-125 ml, p=0.033). FEV1 and FVC increased when lost weight 79.9 (95% CI:23.0, 136.8)ml and 69.4 (95% CI:-19.2,0.158.0) ml respectively, and fef2575 increased 131.0(IC95%:12.9,149.2) ml. FeNO decreased by 15 % (6.2 ppb) significantly, p<.05). However the improvement in lung function was different on days with low and high pollution.
Conclusion: Weight reduction in obese adolescents is associated with improved lung function and reducing inflammation of the airways, this change might be altered by exposure to environmental pollutants.
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Socioeconomic and Racial Disparities in Cumulative Phthalates Exposure Among U.S. Reproductive-Aged Women From NHANES

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Background and Aims: Prenatal phthalates exposure is associated with increased risk of adverse male reproductive outcomes. The National Academy of Sciences (NAS) recommends chemical risk assessments account for exposure to multiple phthalates affecting the same common adverse health outcome. However, few, if any studies have characterized cumulative burdens of environmental contaminants in potentially vulnerable populations or attempted to identify high-risk subpopulations. We used NAS recommendations to develop cumulative metrics for phthalates exposures among a representative sample of U.S. reproductive-aged women, and examine racial/ethnic and socioeconomic differences.
Methods: We analyzed urinary phthalate data in 2324 women (aged 15 to 44 years) from National Health and Nutritional Examination Survey, 2001-2008. We analyzed metabolites of di-n-butyl phthalate (DBP), diisobutyl phthalate (DIBP), butyl benzyl phthalate (BBP), and di(2-ethylhexyl) phthalate (DEHP) (all anti-androgens). We summed concentrations of 6 metabolites (∑phthalates). We also created a weighted phthalate score (∑phthalates_BMD) using theoretical benchmark dose (BMD) values provided by the NAS.
Results: Metabolites of BBP and DEHP generally decreased during the study period whereas DIBP metabolite significantly increased. African American women had higher ∑phthalates_BMD scores than their White or Mexican-American counterparts ($p = 0.04$) after controlling for education, income, age, and creatinine levels. Education was not a significant predictor but in models stratified by race, lower educational attainment was associated with higher ∑phthalates_BMD scores among African American women ($p=0.04$). Women with less than a high school education had approximately 20% higher ∑phthalates_BMD scores than those with more than high school education (least square geometric means (± standard error): 3.70 ± 1.09 versus 2.97 ± 1.07, respectively). Similar socio-demographic trends were observed for ∑phthalates.
Conclusions: African American women in the US, particularly those with less education, may be at increased risk of phthalate-induced health risks, and further research is warranted to identify drivers of environmental health disparities.

DEVELOPING A LAND USE REGRESSION MODEL FOR ULTRAFINE PARTICLE CONCENTRATIONS IN VANCOUVER, CANADA

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Background and Aims: Epidemiologic studies have associated adverse health outcomes with exposure to traffic-related air pollutants, principally NO_2, at levels below those showing effects in controlled exposure studies. (1) This suggests the importance of related contaminants in the traffic exhaust mixture such as ultrafine particles (UFP) (<0.1µm in diameter). Presently, no routine monitoring for UFP exists in North America and little information is available regarding UFP spatial distribution.We measured particle number concentrations (PNC) in Vancouver to develop a land use regression (LUR) model for use in epidemiologic studies and to identify important factors influencing concentrations.
Methods: During a three-week sampling period in spring 2010, PNC were measured with portable condensation particle counters (CPC3007, TSI®, Shoreview, MN) for one hour at eighty locations previously used to characterize spatial variability in nitrogen oxides. PNC was measured continuously at four additional locations to assess temporal variation.
LUR modeling was conducted using geographic predictors, including: road length, vehicle density, intersection and bus stop density, land use type, fast food restaurant density, population density and elevation.
Results: The range of measured (one-hour median) PNC values was highly variable, 1500 - 105000 particles/cm^3, (mean [SD] = 18200 [15900] particles/cm^3). Pearson correlations of PNC with two-week average NO, NO_2 and NO_x concentrations at the same sites were 0.59, 0.61 and 0.65. A preliminary LUR model (R^2 = 0.44) for temporally-adjusted PNC included ln-distance to nearest major road, area of industrial land within a 750m radius and density of bus stops within 100m.
Conclusions: Measured PNC was highly correlated with measured nitrogen oxides. However, geographic predictors explained a smaller proportion of variability in PNC levels than found previously for nitrogen oxides, suggesting some common sources and additional unknown factors accounting for PNC spatial variability. (2) A subsequent UFP LUR model will incorporate wind speed and direction.
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AIR POLLUTION AND ADVERSE BIRTH OUTCOMES: AN INTERNATIONAL ANALYSIS OF WORLD HEALTH ORGANIZATION GLOBAL SURVEY ON MATERNAL AND PERINATAL HEALTH

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Background and Aims: Inhaling fine particles ($PM_{2.5}$), one component of air pollution, into the deep regions of the lung can induce oxidative stress and inflammation, and may contribute to onset of preterm labor. The aim of this research was to examine the relationship between $PM_{2.5}$ and adverse birth outcomes among 22 countries in the World Health Organization Global Survey on Maternal and Perinatal Health from 2004-2008.
Methods: Global $PM_{2.5}$ estimates from remote sensing data were developed to produce long-term average values (2001-2006). Clinics were geocoded, and $PM_{2.5}$ levels were generated in 50 kilometer radius circular buffers around each clinic. We used generalized estimating equations to determine the relationship between clinic-level $PM_{2.5}$ levels and preterm birth and low birthweight at the individual level, adjusting for seasonality and potential confounders at the individual, clinic and country levels. Region-specific and country-specific associations were also investigated.
Results: When looking across all countries and adjusting for seasonality, $PM_{2.5}$ was not associated with preterm birth or low birthweight. Higher $PM_{2.5}$ was associated with higher odds of low birthweight in African countries. In China, the country with the largest range of particulate levels, higher $PM_{2.5}$ was associated with higher odds of preterm birth and low birthweight, with some evidence of a threshold effect when comparing the fourth quartile to the first quartile of $PM_{2.5}$ (Odds Ratio [OR] = 1.79; 95% Confidence Interval [CI]: 0.97-3.31 and OR = 1.60; CI: 1.02-2.51 for preterm birth and low birthweight, respectively).
Conclusions: Looking at the relationship between fine particles and adverse birth outcomes across countries and within countries with a large range of particulate levels gives additional insight into the potential causal mechanisms between air pollution and adverse birth outcomes.

SINGLE NUCLEOTIDE POLYMORPHISMS IN METALLOTHIONEIN AND CHANGES IN HAIR MERCURY LEVELS

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Background and Aims: Mercury (Hg) is a potent neurotoxicant of concern to the general public. Recent studies suggested that several genes that mediates mercury metabolism are polymorphic in humans. We hypothesized that single nucleotide polymorphisms (SNPs) in metallothionein (MT) genes may underlie inter-individual differences in mercury metabolism.
Methods: Dental professionals (n=515) were recruited during the Michigan Dental Association (MDA) Annual Conventions in 2009 and 2010. Samples of hair and buccal swabs were collected. Self-administrated questionnaires were completed for demographic information and estimating daily dietary Hg intake from fish.
Results: The sample consisted of 244 dentists (47.4%), 269 non-dentists (52.2%), and 2 unidentified (0.4%) and was predominantly Caucasian (90.5%). The arithmetic mean mercury level in hair (0.51µg/g) was not significantly different from that (0.47µg/g) of the US general population (NHANES 1999-2000). The mean estimated daily methylmercury intake was 0.084 µg/kg/day ranging from 0 to 0.98 µg/kg/day with 25% exceeding the current US EPA Reference Dose (RfD) of 0.1 µg/kg/day. A statistically significant difference was found in mean hair Hg levels of subjects with MT1M 3'UTR (T>C; rs9936471) TT and TC genotypes. Multivariate linear regression analysis found those with TC genotype had higher hair Hg levels than those with TT genotype (n=15) after controlling for estimated daily methylmercury intake from fish. Similar higher hair Hg levels were found in subjects with MT1E 3'UTR (G>T; rs708274) GG genotype compared to those with GT and TT genotypes (n=51).
Conclusions: The findings suggested that MT gene polymorphisms may influence mercury metabolism.

A CASE-CONTROL STUDY ON THE IMPACTS OF HIGH AMBIENT TEMPERATURE ON THE INCIDENCE OF UROLITHIASIS AMONG OUTDOOR WORKERS IN GUANGZHOU, CHINA

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Background and Aims: High temperature exposure impacts the prevalence of urolithiasis on people, especially on those who are exposed to high temperature at their workplaces in tropical and subtropical areas in developing countries. Many previous studies compared prevalence between subjects exposed to, and not exposed to, high temperatures using cross-sectional designs. In this study, we proposed a retrospective matched case-control study to identify potential predictors for urolithiasis occurrence among outdoor workers in Guangzhou, China

Methods: Health surveillance data of a shipbuilding company were collected from Guangdong Institute of Health Inspection, including kidney B-ultrasonography results□strong medical diagnosis evidence for urolithiasis□, electroncardiography results, blood pressure, departments of work, length of service, daily exposure time, gender and age for the period 2003-2010. We matched cases and controls at 1:4 with gender and age as criteria, and used Conditional Logistic Regression (Cox Regression Model) for identifying potential predictors, including B-ultrasonography results with departments of work, length of service, daily exposure time, electrocardiogaphy results and blood pressure results

Results: Of 950 workers in the shipbuilding company, 190 (20.00%) had presented with at least one episode of urolithiasis. Of these, 149 were among workers exposed to high temperature (30.66%) and 41 among the workers not exposed to high temperature (8.84%) (X^2=70.65, P<0.001). Length of service, departments of work, and daily exposure time were all identified as predictors for urolithiasis occurrence (OR_1=1.012, OR_2=0.233, OR_3=0.001, p<0.001), and length of service had the highest odd ratio of the three.

Conclusions: This study shows that length of service, departments of work, and daily exposure time represent risk factors for urolithiasis among outdoor workers in Guangzhou, China.

IN-VEHICLE POLLUTANT EXPOSURES AND ACUTE CARDIORESPIRATORY RESPONSE IN A COHORT OF HEALTHY AND ASTHMATIC CAR COMMUTERS IN THE ATLANTA COMMUTERS' EXPOSURE STUDY

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Background and Aims: Previous findings show acute cardiorespiratory response associated with very short-term exposures to traffic pollutants (McCreanor et al, 2007). It is, thus, plausible that daily car commuters comprise a vulnerable sub-population, despite limited data examining exposures during realistic commutes and health response. We conducted the Atlanta Commuters Exposures (ACE) Study to address these research needs.
Methods: Twenty healthy and 20 asthmatic subjects participated in two, 2h scripted car commutes. We measured a range of pulmonary and cardiovascular biomarkers immediately pre- and post-commute and for 3h, each hour, post-commute. We sampled in-vehicle concentrations of size-resolved particulate matter mass and number, and organic and elemental species using a novel sampling manifold. Mixed effect regression models were used to examine differences between pre- and post-commute biomarker levels.
Results: Elevated concentrations of many pollutant concentrations existed during the commutes. We observed significant ($p < 0.0001$) increases in post-commute exhaled nitric oxide (eNO) indicative of pulmonary inflammation. During the 4 post-commute measurement periods, mean eNO levels ranged from 12-16% above corresponding pre-commute levels and were typically highest at the 1h post-commute measurement period. C-reactive protein (CRP) levels, indicative of systemic inflammation, were also elevated, although not significantly, at each of the post-commute periods. CRP levels were highest (15% higher than pre-commute levels) immediately after the commute ($p = 0.07$). Associations between pre- and post-commute lung function were negligible. For these analyses, results were not significantly different by disease status.
Conclusions: Preliminary ACE study results showed significant elevations in several biomarkers of acute pulmonary and systemic inflammation following a realistic morning commute. These results provide indication that sub-clinical changes, consistent with inflammation, may be occurring in our cohort. Results examining the role of specific particle chemical components, effects on additional endpoints and potential confounding by stress and noise will also be discussed.
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THE EFFECT OF EXPOSURE TO AIR POLLUTANTS ON INSULIN RESISTANCE MODIFIED BY GENOTYPES OF *GSTM1* AND *NAT2* IN THE KOREAN ELDERLY ENVIRONMENTAL PANEL STUDY (KEEPS)

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Background and Aims: Previous studies have found that air pollutants increase cardiovascular outcome and diabetes mellitus (DM) increases the impact of air pollutants on cardiovascular outcome. However, recently, a possibility that DM may be an outcome of air pollution exposures in addition to being an effect modifier for air pollution-associated cardiovascular disease was suggested. Moreover, *GSTM1* and *NAT2*, in relation with detoxification, have been known to affect air pollution-related outcomes. Therefore, in this study, we evaluated the effect of air pollutants on insulin resistance (IR) which is an underlying mechanism of DM and metabolic syndrome and the effect modification by *GSTM1* and *NAT2* genotypes in the Korean elderly.
Methods: We recruited 560 of aged persons more than 60-years old and obtained blood samples three times during five medical examinations between 2008 and 2010. All ambient air pollutant concentration data (PM_{10}, SO_2, O_3, NO_2, and CO) during the study period were obtained from the Korea National Institute of Environmental Research air quality monitoring system. We measured levels of insulin and glucose in serum in order to assess IR. In addition, the HOMA, an indirect index for the assessment of IR, was calculated using the formula as follows; insulin (• U/ml) × [glucose (mmol/l)/22.5]. We also measured urinary level of cotinine as an indicator of smoking amount.
Results: When we estimated the effect of PM_{10}, SO_2, O_3, NO_2, and CO on each insulin resistance index using linear mixed-effect model, PM_{10}, O_3, and NO_2 were found to be associated with increased insulin resistance indices in the elderly after being adjusted for age, sex, BMI, cotinine level, and outdoor temperature (PM_{10}-glucose, p=0.0002; PM_{10}-insulin, p=0.3308; PM_{10}-HOMA, p=0.0888; O_3-glucose, p<0.0001; O_3-insulin, p=0.1061; O_3-HOMA, p=0.0423; NO_2-glucose, p=0.0004; NO_2-insulin, p=0.0302; and NO_2-HOMA, p=0.0019). The positive relationships between air pollutants and insulin resistance indices were apparent only in subjects with *GSTM1* null and *NAT2* GG genotypes.
Conclusions: Our study results suggest that PM_{10}, O_3, and NO_2 affect insulin resistance in the elderly and those with *GSTM1* null and *NAT2* GG genotypes are susceptible to PM_{10}, O_3, and NO_2 in respect of insulin resistance.
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TEMPERATURE MODIFICATION ON THE ASSOCIATION BETWEEN OZONE AND MORTALITY IN THE 3 MAJOR CITIES, SOUTH KOREA

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Background and Aims: Patterns of air pollutions are driven by weather. Particularly, ozone is correlated with temperature. Along with this, both temperature and ozone are associated with human health. Several studies have been suggested that apparent ozone effects could be to heat or an interaction between temperature and ozone could be plausible. In this study, we examined whether temperature modifies the associations between ozone and mortality.
Methods: The data consisted of daily time series of death counts, weather variables, and air pollutants from January 1999 to December 2009 in Seoul, Busan, and Daegu. We used a poission regression model to fit a bivariate response surface in order to examine patterns of interaction of both ozone and temperature on mortality. To quantitatively estimate the ozone-mortality associations across different temperature levels, we separately fitted the stratification model.
Results: When temperature (lag 0) was high (above the threshold temperature), for a 10ppb increase in ozone concentration, the contributions of non-accidental deaths in all ages population were 1.13% (95% confidence interval [CI]: 0.45~1.80%), 1.88% (95% CI: 0.87~2.88%), and 4.51% (95% CI: 2.99~6.00%) in Seoul, Busan, and Daegu, respectively. When temperature (lag 0) was low (below the threshold temperature), for a 10ppb increase in ozone concentration, the contributions of non-accidental deaths in all ages population were 0.22% (95% CI: -0.25~0.69%), 1.15% (95% CI: 0.32~1.97%), and 0.68% (95% CI: -0.25~1.61%) in Seoul, Busan, and Daegu, respectively.
Conclusions: The results of this study show that temperature modified ozone-mortality associations. We recommend that public health strategies to minimize adverse health impact of heat and ozone should be considered within control and prevention of air pollution and weather-related health impacts.

AN APPLICATION OF A RISK SET CALIBRATION METHOD TO A STUDY OF AIR POLLUTION EFFECTS ON ALL CAUSE MORTALITY IN THE NURSES' HEALTH STUDY

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Background and Aims: Chronic exposure to air pollution has been consistently associated with increased risk of all-cause mortality. The majority of these studies have relied on ambient exposure monitoring to assign individual exposure levels. However, the impact of measurement error has not been incorporated into the estimates of risk. Here, we adjust for exposure measurement error using validation data from 9 cities where ambient exposure has been compared to personal exposure.
Methods: 57,574 women from the Nurse's Health Study living in Northeastern and Midwestern metropolitan areas of the United States were followed from 2000-2006 for 3,776,360 person-months, during which time 3642 deaths occurred. GIS-based spatial smoothing models were used to predict monthly exposure to particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) at each participant's residence. Data on risk factors, residence and health outcomes are updated biennially. Using validation data from 9 cities -- Baltimore, Boston, Steubenville, Atlanta, Los Angeles, Seattle, Research Triangle Park, Nashville and Utrecht, Netherlands -- from 432 subjects over 950 person-months, a risk set regression calibration method was utilized to correct relative risk (RR) estimates for measurement error by re-calibrating the measurement error model within each risk set observed in the main study by its counterpart in the validation study.
Results: After adjusting for age in months, calendar year, state of residence and season, the RR for all cause mortality for a 10 $\mu g/m^3$ increase in the 12-month moving average of $PM_{2.5}$ was 1.35 (95% CI: 1.09-1.68) ; after error correction it was 1.63 (95% CI: 0.95-2.80).
Conclusions: These measurement-error corrected results confirm and strengthen the evidence that chronic $PM_{2.5}$ exposure is associated with the risk of all-cause mortality. The effects of chronic exposure $PM_{2.5}$ are likely stronger than previously considered. These findings may have implications for the formulation of environmental policy.

INFLUENCE OF IN UTERO AND CHILDHOOD LEAD EXPOSURE ON BODY MASS INDEX AND WAIST CIRCUMFERENCE AT AGES 7-15 YR

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Background and Aims. Lead exposure in pregnancy has been negatively associated with weight at birth and during preschool years, but little is known about longer term effects on physical growth. We examined the association of *in utero*, early childhood and concurrent lead exposure with indices of fat mass and distribution during pre- and adolescence.
Methods. Among 673 mother-child pairs (325 females, 348 males), we estimated the effect of prenatal and early life lead exposure on body mass index (BMI) and waist circumference using separate multivariable linear regression models stratified by sex, adjusting for potential confounders (current child age and maternal BMI and maternal years of education at baseline).
Results. Mean±SD lead exposure levels were: maternal patella, 11.5±12.1• g/g, and tibia, 9.7±10.0• g/g, bone lead; log_e-umbilical cord blood lead (• g/dL), 1.52±0.65; cumulative log_e-blood lead (• g/dL) from 1 to 4 years (6.52±1.86); log_e-current blood lead (• g/dL), 0.94±0.57. No measure of lead exposure was associated with BMI or waist circumference in boys or girls aged 7-15 yr. Mean child age (yr) was 10.2 ±2.5; mean BMI was 19.7±4.0 and waist circumference (cm) 68.5 ± 11.4; mean current maternal BMI was 28.4±5.0. Each one unit increment in maternal BMI was associated with a 0.2 higher BMI in children ($p<0.0001$), and was associated with a $\geq$0.4 cm larger waist circumference in boys and in girls ($p\leq 0.001$), adjusted for each lead measure and other covariates.
Conclusions. Lead exposure *in utero* and in childhood did not appear to influence indices of weight status or fat distribution in pre- and adolescent Mexico City boys and girls. Further research should consider more proximal behavioral and environmental determinants of BMI and waist circumference and examine the long term effects of early lead exposure on linear growth.

EFFECTIVENESS OF INFLUENZA VACCINE IN THE COMMUNITY-DWELLING ELDERLY

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Background and Aims: Influenza vaccines are reviewed each year, and often changed, in an effort to maintain their effectiveness against drifted influenza viruses. There is however no regular review of influenza vaccine effectiveness during, or at the end of, Taiwan's influenza seasons. The main purpose of this study was to estimate the effectiveness of influenza vaccination of the high risk and healthy elderly population lived in non-institutionalized.

Methods: The present cohort comprised subjects who vaccinated and unvaccinated were select from Taiwan's National Health Insurance Research Database. Over seven seasons 2000–6, data on age, sex , area and vaccination status were collected. We used a retrospective case control design in seven consecutive influenza seasons, and estimated influenza vaccine effectiveness (VE) for patients of elderly.

Results: The major measurement found that, after adjusting confounding factors, the vaccinated could reduce a rate of 36% to catch a common cold, 2% to infect influenza-like illness as well as 45% to have hospital admission for pneumonia or cardiac disease. In the reduced medical expenditure of influenza vaccination, we estimated the saved of it based on the risk difference between the vaccinated and unvaccinated.

Conclusion: We deducted the cost of purchasing vaccine, diagnosis fee of national health insurance, the influenza vaccination could reduce the medical expenditure of 2.35 billin dollars if the vaccinated rate was 80%.

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Key word: *Influenza; Vaccine; Elderly*

MERCURY LEVELS IN URINE AND HAIR, PERIPHERAL NERVE FUNCTION AND SINGLE NUCLEOTIDE POLYMORPHISMS RELATED TO MERCURY METABOLISM

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Background and Aims: Mercury (Hg) is a potent neurotoxicant. We investigated the impact of Hg exposure on peripheral nerve function. We also hypothesized that single nucleotide polymorphisms (SNPs) in genes coding glutathione-related proteins, selenoproteins and metallothioneins may modify the relationship of Hg exposure with changes in peripheral nerve function.
Methods: Dental professionals (n=515) were recruited in 2009 and 2010. Samples and measurements included: sensory nerve conduction measurements (onset latency, peak latency and amplitude) of the median, ulnar and sural nerves; buccal swabs for DNA; hair; and urine.
Results: The subjects included 244 dentists (47.4%), 269 non-dentists (52.2%; mostly dental hygienists and dental assistants), and 2 of unknown occupation (0.4%) All participants completed a questionnaire for demographics and factors related to elemental and methyl- Hg exposure. The mean Hg levels in urine (1.06µg/L) and hair (0.51µg/g) were not significantly different from the US general population (0.95 µg/L and 0.47µg/g, respectively) (NHANES 1999-2000, 2003-2004). In multivariate linear regression models adjusting for demographics, there was a consistent, though mostly not statistically significant, relationship of increased hair Hg levels with improved nerve function for all nerves measurements. A similar relationship was found between increased methylmercury exposure via fish consumption (as measured in daily intake of polyunsaturated fatty acid, eicosapentaenoic acid and docosahexaenoic acid) and improved nerve function. No consistent relationship was observed in covariate-adjusted urine Hg models predicting nerve function. Only 3 out of a total of 504 multivariate models that investigated effect modification of SNPs on the relationship of Hg biomarkers with nerve function had stable and statistically significant interaction terms.
Conclusions: Overall, there might be a beneficial effect of fish consumption on peripheral nerve function. There was little evidence of effect modification of the studied SNPs on the relationship of mercury exposure and biomarkers, respectively with peripheral nerve function given the possibility of false positives.

LEGIONELLA SPP. AND LEGIONELLOSIS IN NEW ZEALAND, 2005-2010: DISEASE EPIDEMIOLOGY AND ENVIRONMENTAL SURVEILLANCE

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Background and Aims: Legionellosis, an infection caused by the bacterium *Legionella*, is a serious and sometimes fatal cause of community-acquired pneumonia worldwide. In New Zealand two of the most common agents are *L. pneumophila* and *L. longbeachae*. In the past six years, some regions have seen an increase in the number of isolates of *L. longbeachae* and in 2009 it accounted for about 40% of total laboratory confirmed cases – about the same proportion as *L pneumophilia*. This differs from observed patterns in other parts of the world where the predominant species responsible for illness is *L. pneumophila* serogroup 1.
Legionellosis became a notifiable disease in New Zealand in 1980 and since then over 1,400 cases have been laboratory confirmed. The aim of this research was to characterise the incidence rates and occurrence of different species using descriptive epidemiology of surveillance and disease notification data.
Methods: We analysed cases using disease anonymous notification and laboratory surveillance data. Key data fields collected include case demographics, clinical features, laboratory identification (including environmental isolates) of the causative agent and risk factors.
Results: In the five years (2005-2009), overall notification rate was 1.7 per 100,000 but the age-specific notification rate for people 70 years and older was 6.3 per 100,000 population compared with 1.7 per 100,000 in the 40 to 49 year age group – Incidence Rate Ratio 0.27 (95% Confidence limits 0.19 to 0.37, $p < 0.00001$).
Notifications increased considerably in 2010 with an annual rate of 4.6 per 100,000. The increased rate may be a result of changed laboratory testing, direct laboratory notifications, greater clinical awareness of the illness or a true increased incidence of the disease in New Zealand.
Conclusions: The higher rates of legionellosis observed in New Zealand, and high proportion of *L. longbeachae* cases compared with other temperate countries, may be related to environmental factors. This suggests a distinctive legionellosis epidemiology for New Zealand, worthy of further research.

SPATIO-TEMPORAL VARIATION IN TRIHALOMETHANES IN NEW SOUTH WALES.

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Background and Aims: We described the spatio-temporal variation of trihalomethanes in drinking water in New South Wales, Australia from 1996 to 2007.
Method: We conducted a descriptive analysis of the spatial and temporal trends and the influence of season and drought on the monthly concentration and speciation of trihalomethanes (THMs) using routinely sampled data from two metropolitan and 13 rural water utilities within New South Wales.
Results*:* Monthly total THM concentrations in the two metropolitan water utilities of Sydney/Illawarra (mean 66.8µg/L) and Hunter (mean 62.7µg/L) were similar compared to the considerable variation between rural water utilities (range in mean THM: 14.5-330.7µg/L). Higher THM concentrations were found in water supplies treated with chlorination compared to chloramination and in water supplies sourced from surface waters compared to ground water. Ground water was found to have a higher proportion of brominated THMs compared to surface water. Chloroform was the predominate THM in two-thirds of the rural water utilities. We found variation in the concentration and speciation of THM between seasons and between periods of drought or no drought. The total mean THM concentrations were higher in summer than winter in twelve of the fifteen utilities. During drought the concentrations of chloroform were found to have decreased while BDCM and DBCM increased in a large number of utilities.
Conclusion: There is considerable spatial and temporal variation in THMs amongst New South Wales water utilities and these variations are likely related to water source, treatment processes, catchments, drought and seasonal factors. Although we had no data on the levels of organic matter in the water supplies, the decrease in chloroform during drought may be due to the lack of organic matter entering the water supplies from decreased rain run-off and the increase in DBCM and BDCM may be due to increased salinity from the lowering of water supplies.

RISK DIFFERENCE ADDITIVITY IS AN INAPPROPRIATE TEST OF BIOLOGICAL INTERACTION FOR MANY COMBINATION EXPOSURES

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Background and Aims: Epidemiologists and toxicologists are faced with similar problems in assessing interactions between exposures, yet they approach the question very differently. Epidemiologic analysis of interactions has been categorized into several "contexts" (statistical, biological, public health, and individual). While statistical "interactions" are said to carry no biological meaning, it is often asserted that additivity of the risk differences (RDA) is the fundamental criterion for causal inference about biological interactions. Here, we contrast the theoretical frameworks for interaction in these fields, elucidating the different cases in which risk difference additivity is or is not a biologically appropriate criterion.
Methods: We analyze a simple thought experiment that has been used in both fields to develop the definition of non-interaction, with nearly opposite interpretations. In epidemiology, the "sham combination" leads to a requirement that non-interactive dose-response curves be linear. In toxicology, the same thought experiment results in the model of "concentration addition" (CA), a definition of non-interaction generally accepted by toxicologists as appropriate for similarly-acting chemicals. We apply epidemiologic tools for interaction analysis to mathematical models of concentration-additive combination exposures in order to evaluate the usefulness of these tools.
Results: The RDA model is equivalent to CA only when dose-response curves are linear, an uncommon situation. Simple models demonstrate that concentration-additive combinations can result in strong synergy or antagonism in the epidemiologic framework at even the lowest exposure levels. For these types of combination exposures, RDA is an inappropriate tool for the assessment of biological interactivity. In addition, for combinations which act through non-similar pathways, RDA is appropriate only at low effect levels.
Conclusions: RDA is not a biologically appropriate test of interaction for many exposures of interest. We suggest more appropriate methods for analysis of concentration-additive epidemiologic data. The two fields can learn a great deal about interaction from each other.

AIR QUALITY INDEX AND INCREASED ACUTE MYOCARIDIAL INFARCT ADMISSION TO HOSPITAL IN MELBOURNE, AUSTRALIA

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Background and Aims: The health effects of the air pollutants have been known for many years, as has the interaction effect between air pollution and climate with respect to human health. In Australia, air pollution levels are generally lower than those observed in the US and Europe. Recent work in Melbourne has indicated that ambient air pollution in these cities is making significant contributions to daily mortality and hospital admissions for cardiovascular and respiratory disease. The aim is to determine whether the observed pattern of increased acute myocardial admissions (AMI) in Melbourne can be explained by air pollution.
Method: A One-Way ANOVA and Pearson's correlation was used to examine the relationship between daily AMI admissions and daily maximum air quality index (AQI). Daily AQI was categorised into five groups. A CHAID decision tree was used to determine which environmental variables showed the strongest relationship with AMI admissions.
Results: The results of the correlation analysis suggested a weak correlations between air quality and meteorological variables and AMI admissions, although these relationships are significant at $p = 0.01$ level. Results of the ANOVA indicated AMI admissions are significantly different on days when AQI is rated as Fair or Poor. The relationship is present at day 0 and lags of 1-3 days. The strongest relationship is at day 0. AQI maximum was the single most important variable in explaining the AMI admissions rate in Melbourne.
Conclusions: In this study in Melbourne, patterns are consistent with urban air pollution and urban meteorology impacts on health described by others. Days with poorer air quality appear to be associated with increased numbers of AMI admissions.

ASSESSING CLIMATE CHANGE AND HEALTH: THE EFFECT OF WIND, CHRISTCHURCH, NEW ZEALAND

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Background and Aims: There is now widespread acceptance that human activities are causing climate change. In New Zealand a possible outcome of this will be a greater incidence of extreme heat events such as an increase in westerly windflow particularly hot, dry and turbulent wind colloquially known in New Zealand as the nor'wester. For epidemiologists, exposure to abnormally high ambient temperatures brought about through climatic conditions such as the nor'wester could potentially induce heat related conditions.
Few studies have specifically examined the link between climatic wind and heat-associated adverse health outcomes (morbidity) yet wind is undoubtedly an important environmental factor. The aim of this research was to retrospectively examine and identify the impacts of heat and wind on heat induced illnesses (e.g. cardiac, respiratory, renal disease, diabetes) on data collected from 1990 to 2010 in Christchurch, New Zealand.
Methods: The analysis was based on data collected for hospital admission and meteorological variables including temperature, wind speed and wind direction.
Results: Analysis of data revealed nine wind variables significantly related to heated induced illnesses. Further results will be presented to determine whether when compared with corresponding variables calculated over the 1990-2010 period, whether only the northerly wind on the day of admission has estimated associations with effect sign and size.
Conclusions: Research looking at relations between (natural) variation in meteorological variables, especially temperature and health effects has been extensive, encompassing several decades. Yet no material understanding the health risks from specific events such as climatic winds has been produced before in New Zealand. Knowledge of vulnerability allows an informed approach to the development and evaluation of strategies to lessen those health risks.

AN INTERVENTION STUDY USING FREE-STANDING HEPA AIR FILTERS AND AIR CONDITIONERS PLACED IN BEDROOMS OF INNER CITY CHILDREN WITH ASTHMA

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Background and aims: Airborne particulate matter (PM) is an asthma trigger and can aggravate respiratory and other health conditions. Environmental tobacco smoke (ETS), to which many children are exposed, is associated with increased frequency and severity of asthma attacks, prolonged duration of symptoms, and decreased lung function. Children in urban areas are especially exposed to indoor pollutants, which often dominate exposures. Air filters can substantially reduce PM exposures and, as suggested in several studies, asthma symptoms. Room filters are inexpensive and easily installed, but performance is affected by clean air delivery rates, air exchange rates (AERs), and other factors. This study evaluates the utility of filters and air conditioners (ACs), intended to reduce AERs and improve filter performance, on exposures and health of asthmatic children in Detroit, Michigan.

Methods: 126 households containing an asthmatic child were randomized into a control group, a group receiving a HEPA filter placed in the child's bedroom, or a group receiving a filter and an AC. Each participant received educational community health worker home visits. Information regarding home characteristics and occupant activities were collected using surveys and inspections. Parameters monitored each season over a year included PM, CO2, ETS, and filter use. Child health measures included pulmonary function, medication use and symptom frequency.

Results: When used, filters substantially reduced PM concentrations, producing 70% reductions as measured immediately after filter installation. However, participants decreased their use of the filters over time. When corrected for ETS and other co-factors, ACs provided a modest drop in PM concentrations, but concentrations sometimes increased. The ongoing analysis of health symptoms suggests diminished symptoms when filters were used.

Conclusions: Measures that capture actual exposures are needed, including continuous monitoring of filter use and pollutant levels, in order to avoid biases that dilute effects seen in air filter and other intervention studies.

THE HEALTH AND ECONOMIC THREATS OF GLOBAL FOOD RECALLS AND THE GROWING NATIONAL AND INTERNATIONAL EFFORTS TO ADVANCE FOOD SAFETY

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Background and Aims: The global burden of food borne disease and its impact on trade and development is currently unknown. On the other hand, the global recalls of food is increasing, contributing to the risk of pathogens across national borders creating new challenges to food safety regulators. The study examines the public health and economic threats of global food recalls and efforts being made by national and international agencies to advance food safety.

Methods: Data collection from multiple sources on food recalls and review of selected national and international initiatives to advance food safety.

Results: Based on the number of recalls reported globally, there has been a substantial increase in the past years. *Salmonella* accounts for the majority cases of food borne illnesses followed by undeclared allergens, and intolerances, *E.coli, Listeria, Monocytogens* and *Clostridium botulism.* The main foods that were subject to recall were dairy products, seafood, poultry including eggs, fruits and vegetables, nuts and raw agricultural commodities. Greater number of recalls were reported by United States, Canada, Australia and a few European and Asian countries. Most of the recalled foods originated from China, Mexico, North America and a few Asian and African countries. Two major initiatives laid the foundation to strengthen the food safety system globally. These were the " Food Safety Modernization Act" passed by the U.S senate in January this year and the WHO resolution on "Advancing Food Safety" endorsed by member states in May last year.

Conclusions: There is a continued need for closer collaboration among stakeholders to support measures and interventions in the global implementation of the initiatives to advance and modernize food safety. The important roles WHO and FAO play in support of the Codex Alimentarious Commission and the participation of developing countries should be given active consideration.

THE EFFECTS OF HEAT WAVES ON MORTLAITY AND HOSPITALISATION IN SYDNEY, AUSTRALIA 1994-2009.

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Background and aims: Global warming is likely to bring not only warmer temperatures on average, but greater frequency of extreme weather events, including hot days. Understanding who is susceptible to these extreme events will be important in minimising their public health impact, including establishing targeted health programs to better protect the vulnerable We examined the association of heat waves in Sydney with daily mortality (1997-2007) and hospital admissions (1997-2010).
Methods: We categorized the Sydney Greater Metropolitan Region into five sub regional climate zones. We defined sub-regional heat waves as days where the daily apparent maximum temperature exceeded the monthly 95th percentile for the study period. We used a time-stratified case-crossover design with a conditional logistic regression model adjusted for flu epidemics, public holidays, and region. Odds ratios (OR) and 95% confidence intervals for cardiovascular and respiratory mortality and hospital admissions on heat wave compared with non heat wave days were estimated.
Results: Heat waves (lag 0) were associated with all cause mortality (OR=1.07; 95%CI: 1.05-1.10), all cardiovascular mortality (OR=1.07; 95%CI: 1.03-1.12), all respiratory mortality (OR=1.13; 95%CI: 1.03-1.23). As expected heat waves (lag0) were associated with hospital admissions for heat related injuries, dehydration, and fluid disorders. Heat waves (lag1) were also associated with hospital admissions for renal disease (OR=1.09; 95%CI: 1.05-1.12), mental and behavioural disorders (OR=1.03; 95%CI: 1.01-1.05), and diabetes (OR=1.06; 95%CI: 1.01-1.12).
Conclusions: Heat waves are associated with increases in mortality and hospital admissions.

EPIDEMIOLOGY IN METALLIC MERCURY POISONING AFTER ENVIRONMENTAL EXPOSURE: CASE - INSTITUTIONAL ACTION ON THE CITY WITH MORE THAN 100 EXPOSED IN BRAZIL

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Introduction: Human exposure to toxic substances and metals occurs worldwide, with severe consequences to the environment and human health. Accidents caused by substances and goods in the local inadequate are common.
The Epidemiological Surveillance Center was originally notified of two children poisoned by mercury metallic.
Upon investigation it was found 113 people exposed in a county in the state of SP.
Objectives : • To describe the epidemiological research generated by the initial cases that ended with 113 exposed
• Describe the main inter-institutional actions that were essential to facilitate diagnosis, treatment and control of intoxication
Methodology : The investigation began with the investigation of two children under 5 years of exposure intoxicated and involved the whole family, several students, workers and nearby residents. All exposed underwent specific complementary tests.Measurements were carried out preventive information and guidance to the entire population of the municipality. It involved a lawsuit with several institutions related to the issue of health, environment and education.
Conclusion : The investigation culminated with the identification of 113 exposed, clinical management, development of a protocol for future monitoring of exposure and environmental control of homes, schools and region.

URINARY ARSENIC AS A BIOMARKER OF IN UTERO EXPOSURE VIA MATERNAL DRINKING WATER AND DIET: RESULTS FROM A US PREGNANCY COHORT

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Background and Aims: Emerging data indicate that in addition to drinking water contamination, rice consumption may lead to substantial inorganic arsenic exposure (As). Here, we report urinary arsenic excretion in 193 pregnant women in a region of the United States with elevated well water arsenic concentrations.
Methods: We enlisted pregnant women who reported using a private water system at their home, through clinics in the state of New Hampshire. At a six-month prenatal visit, we collected and analyzed a urine sample and a three-day dietary record for water, fish/seafood, and rice and rice products. We also tested women's home tap water for As, which we combined with tap water consumption to estimate exposure through water.
Results: 15% of women were consuming drinking water above the current WHO standard (10 µg As/L). Rice intake averaged 11.73 g/d (range = 0-111.58 g/d (dry mass). The median total urinary arsenic concentration (sum of inorganic As, monomethylarsonic acid and dimethylarsinic acid) was 3.99 µg/L (range = 0.45-38.84 µg/L). After adjusting for age and urinary dilution using creatinine, both rice consumption (g/d) and arsenic exposure through water (µg/d) were significantly associated with natural log-transformed total urinary arsenic in general linear models (β = 0.0095, $P < 0.0001$; β = 0.0295, $P < 0.0001$, respectively). Arsenobetaine levels were lower than those observed in non-pregnant women in our state (0.8 µg/L) reflecting fish/seafood avoidance by pregnant women.
Conclusions: We estimate consuming 1.1 cups of cooked rice/d is associated with urinary arsenic concentrations comparable to 2 liters/d of 10 µg As/L water. Given the potential adverse health consequences of arsenic even at low levels, exposure through rice consumption may need to be considered when designing strategies for reducing arsenic exposure among US pregnant women.

PARACETAMOL USE IS ASSOCIATED WITH ASTHMA IN FARMING AND NON-FARMING CHILDREN

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Background and Aims: Paracetamol use has been associated with asthma in both children and adults. This has not been assessed in farmers' children who have a lower prevalence of asthma compared to children of the general population. We assessed the associations between antibiotic use and paracetamol use, and asthma, hayfever, eczema and atopy, in a population of farming and non-farming children.
Methods: In a cross-sectional questionnaire survey of 1,370 farming children and 588 non-farming children, aged 5-17 years we assessed asthma, hayfever and eczema as well as paracetamol use and antibiotioc use.
Results: After adjustment for potential confounders paracetamol use in the first 12 months was associated with wheeze ever (OR=1.77, 95% CI 1.22-2.58) and asthma ever (OR=1.82, 95% CI 1.19-2.77). Current paracetamol use (at least once a month) was also significantly associated with most asthma symptoms (wheeze in last 12 months OR=2.84, 95% CI 1.67-4.82; asthma ever OR=1.80, 95% CI 1.16-2.79; wheezing during exercise OR=2.97,95% CI 1.76-5.02; cough at night OR=1.98, 95% CI 1.21-3.26),and rhinitis symptoms (sneezing ever OR=1.62, 95% CI 1.06-2.47; sneezing in last 12 months OR=1.61, 95% CI 1.04-2.48; hay fever ever OR=1.83, 95% CI 1.18-2.84). Current paracetamol use (at least once a month) was also weakly associated with itchy rash in the last 12 months (OR=1.81, 95% CI 1.02-3.20) and eczema ever (OR=1.55, 95% CI 1.01-2.37). Use of antibiotics in the first 12 months was also significantly (and independently) associated with asthma and rhinitis, but not with eczema. No clear associations between atopy and paracetamol or antibiotics were found. However, stratified analyses showed strongest associations for children with non-atopic symptoms. No differences were found for farming and non-farming children.
Conclusions: Paracetamol and antibiotics are associated with asthma, and rhinitis (and to a lesser extent eczema), with the strongest associations in non-atopics.

EFFECTIVENESS OF INTERVENTIONS IN IMPROVING INDOOR AND OUTDOOR AIR QUALITY: PRELIMINARY RESULTS FROM A RANDOMIZED TRIAL OF WOODSMOKE AND ASTHMA

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Background and Aims: We are conducting a randomized trial to examine the impact of simple interventions on woodsmoke-derived $PM_{2.5}$ and symptoms in children with asthma. Pre- and post-intervention indoor and outdoor air sampling results from the Nez Perce reservation in Idaho and 2 western Montana communities are presented here.
Methods: Participating homes were randomized to receive a new EPA-certified woodstove, a stand-alone filtration unit or a filtration unit with a placebo filter. Indoor and outdoor sampling was conducted in 35 homes during the winters of 2008-11. Air sampling included pre- and post-intervention 48-hour continuous monitoring of $PM_{2.5}$ mass in the common area and outside the home using DustTrak aerosol monitors (TSI).
Results: Overall mean(SD) indoor pre- and post-intervention $PM_{2.5}$ concentrations were 46.8(40.4) and 27.9(21.6) $\mu g/m^3$, respectively. Homes receiving the active filter intervention demonstrated a significantly greater percent reduction in indoor $PM_{2.5}$ concentrations [60.0; 95% CI: 24.4, 95.7] relative to placebo homes, whereas homes receiving woodstoves saw only small, highly variable reductions [3.6; 95% CI: -30.4, 37.6]. Overall mean(SD) outdoor pre- and post-intervention $PM_{2.5}$ concentrations were 41.4(24.9) and 35.5(21.1) $\mu g/m^3$, respectively. Although modest reductions in mean outdoor $PM_{2.5}$ [4.9(24.6) $\mu g/m^3$] were observed post-intervention in woodstove homes, reductions did not vary significantly by intervention status.
Conclusions: Results from the first 3 study communities with pre- and post-intervention data indicate high effectiveness of active filtration units in improving indoor air quality. Further precision in estimates is anticipated with the addition of newly recruited homes in Montana and Alaska. Surprisingly, relative to placebo, the woodstove intervention had no significant overall impact on $PM_{2.5}$ concentrations measured outside the home. Future work will evaluate ambient and meteorological data and home characteristics in examining intervention effectiveness in improving outdoor air quality.

NONLINEAR ASSOCIATION OF DIURNAL TEMPERATURE RANGE WITH OXIDATIVE AND PHYSIOLOGIC STRESS MARKERS IN THE KOREAN ELDERLY ENVIRONMENTAL PANEL STUDY (KEEPS)

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Background and Aims: While diurnal temperature range (DTR) has been found to be a risk factor for mortality in a previous study with an assumption of linearity, some disease mortality, such as that associated with rheumatic heart disease (RHD), showed a threshold effect for DTR. To define the nonlinear relationship pathway between DTR and health effects, we investigated how physiologic and oxidative stress markers responded to DTR.
Methods: This study was part of the Korean Elderly Environmental Panel Study (KEEPS). Data was obtained from 569 participants who regularly attended a community elderly care center located in Seoul, Korea. The study was conducted a total of five times over a three years period beginning in August, 2008. We examined physiologic stress markers including heart rate variability (HRV) and indices such as mean heart rate, standard deviation of normal-to-normal (SDNN), normalized low frequency (LF) and high frequency (HF), and low/high frequency ratio (LF:HF). Urinary malondialdehyde (MDA) was evaluated as an oxidative stress marker. Effects of DTR below or above the median level were estimated using a generalized linear mixed model.
Results: Significant differences in effects of DTR above and below the median level indicated the presence of a threshold effect or a nonlinear association between DTR and HRV markers. Estimated effects for log-transformed SDNN were 0.211 (standard error [SE] 0.069, *P* =0.0021) below and -0.093 (SE 0.038, *P* =0.0129) above the median DTR. While the mean heart rate slope above median DTR was significant, slopes of normalized HF and LF:HF ratio below median DTR were statistically significant. In addition, log-transformed MDA showed a pattern similar to HRV indices.
Conclusions: The study demonstrated that physiologic and oxidative stress increased at low and high DTR with minimal stress levels around the median level of DTR indicating a physiologic comfort point.

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EPIDEMIOLOGY OF MUNICIPALITIES WITH RISK FACTORS AHEAD OF AIR POLLUTION AND RELATED HEALTH PROBLEMS

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Introduction: The Brazilian Health Ministry has proposed as a means of establishing priority areas for developing the program for monitoring of Populations Exposed to Atmospheric Contaminants - VIGIAR, an Instrument for Identifying Risk Municipalities - IIMR. This tool creates a ranking for the municipality, taking into account information on health and environment. This work is construction of IIMR for the state of São Paulo.
Methodology: To construct the ranking, we use the existing databases, which are built with municipal indicators, which were referred to the general data of the state of Sao Paulo, where:
Health information:- Rate of hospital admissions for respiratory diseases by the municipality and the state as a whole, its index is the ratio of these measures.
- Mortality rate from respiratory diseases by the municipality and the state as a whole, its index is the ratio of these measures.
Environmental information: Presence of stationary sources of emissions, represented by extractive industries or processing, which is an indicator score established from their number in each municipality. - Fleet vehicle by municipality and population, its index is a score established from the ratio: number of cars per population in the municipality- Biomass burning due to forest fires or the burning of agricultural waste, which indicator is the ratio between the number of foci per area of the municipality and the total area for the sate
For each indicator was established as a scoring category.
Results: The municipality with the highest rankings were located in the metropolitan areas of the state, showing that these priority areas for the establishment of activities VIGIAR.
Conclusion: Indices generated Contribute to the identification and development of public polices of air pollution.

ASSESSING THE RELATION BETWEEN MUSCULOSKELETAL DISEASE PREVALENCE AND PHYSICALLY DEMANDING WORK

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Background and Aims: The study was designed to assess cause-effect relations between physically demanding work and musculoskeletal disease prevalence using epidemiological analysis.
Methods: The study group comprised 24 male press operators (an average age of 37.8 ± 1.9, length of service – more than 17 months). The control group comprised 62 male subjects (an average age of 39.2 ± 1.5, length of service - more than 18 months). The main criteria for the choice of control group were absence of the studied adverse factor, similarity in age and length of service. In 2009, prevalence levels for the study and control groups were estimated to be 250 ‰ and 81 ‰, respectively. In view of respectively high disease prevalence within the groups, we calculated odds ratio (OR) along with relative risk (RR).
Results: The epidemiological analysis findings are the following: OR is 3.8 (95% confidence interval (CI) is 1.04 – 14.78); RR is 3.10 (95% CI is 0.87 – 11.01); etiological fraction (EF) is 67.7%. OR values indicate a reliable cause-effect relation between physically demanding work and musculoskeletal disease prevalence whereas RR also indicates this relation but with a lower degree of reliability. Risk difference is 0.17 which corresponds to the population risk for musculoskeletal diseases in healthy study group subjects – 3 cases per year. This disease can be considered occupational since according to the classification proposed in the Guidelines for Occupational Risk Assessment adopted in Russia, etiological relation between musculoskeletal diseases and work is significantly high.
Conclusions: The application of epidemiological indicators including OR allowed identification of a reliable cause-effect relation between physically demanding work and musculoskeletal disease prevalence in press operators. OR-based methods have better statistical characteristics than those based on RR, especially when a disease is rather prevalent, and provide more reliable assessment of the relation between factors and health effects.

HEALTH IMPACTS OF THE HEBEI SPIRIT OIL SPILL ACCIDENT ON THE RESIDENTS OF TAEAN, SOUTH KOREA

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Background and Aims: The Hebei Spirit oil spill accident occurred just off the coast of Taean province in South Korea on December 7, 2007. It is estimated that 12,547 Kl of crude oil was spilled into the sea near Taean national park. This study investigated health impacts of the oil spill accident in the targeted residents.

Methods: Questionnaire survey and chemical analysis were carried out in order to look for health impacts 1 to 2 years following the Hebei Spirit oil spill. Urine samples were collected from the residents and analyzed for metabolites of volatile organic compounds(VOCs) and polycyclic aromatic hydrocarbons(PAHs).

Results: Analysis of the oil-related metabolites in the urine samples showed that the concentration of VOCs metabolites drastically decreased as compared to the initial period following the oil spill. On the other hand, metabolites of PAHs showed a trend of gradual decline over time, though the levels were not noticeably different from the control group. The analysis for the environmental samples showed that no VOCs were detected, but PAHs were partly present in groundwater, soil, vegetables , and seafood samples. Questionnaire survey showed that approximately 75% of the residents were concerned about health impacts due to exposure to the oil pollutants and suffered from symptoms such as vertigo, headache, nausea, skin disorders (itch), abnormalities in eyesight, and respiratory malfunctions.

Conclusions: The present study showed that various physical symptoms observed among the residents are possibly associated with exposure to oil pollutants and most of the residents recognized such maladies are attributable to exposure to the oil pollutants. Therefore, long-term health impacts should be monitored by the exposure to residual oil pollutants in the oil spill environment.

PRENATAL MANGANESE EXPOSURE AND FETAL GROWTH IN LIMÓN, COSTA RICA: DATA FROM THE INFANTS' ENVIRONMENTAL HEALTH (ISA) STUDY

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Background and aims: Mancozeb is the most widely used pesticide in banana plantations in Costa Rica. Recent studies suggest that mancozeb use potentially exposes agricultural workers and their families to manganese (approximately 21% by weight of mancozeb). Our study aims to determine whether prenatal exposure to manganese from mancozeb applications is associated with fetal growth.

Methods: The study population includes the participants of the Infants' Environmental Health (ISA) Study, a birth cohort study of 450 mother-child pairs living in communities near banana plantations with large-scale production and pesticide use in Limón, Costa Rica. To assess prenatal exposure to manganese, maternal hair and blood manganese levels were measured during the first, second, and third trimester. Determinants of exposure including residential proximity to banana plantations, household members' pesticide use patterns, and housing quality were examined. Questionnaires have been administered to the women during the first, second, and third trimester and shortly after delivery to ascertain information on sociodemographic characteristics, lifestyle habits, and occupational history. Birth outcomes are being abstracted from the newborns' Official Cards of Health. Multiple linear regression models and G-computation estimators will be used to examine the association between prenatal manganese exposure and fetal growth.

Results: We have completed enrollment of 370 mother-child pairs. Blood and hair samples have been sent for analysis and approximately 100 women have delivered. Preliminary analysis of 26 hair samples collected during the first or second trimester showed a significant difference in mean hair manganese levels between pregnant women living less than 100 meters away from a banana plantation and women living more than 100 meters away (Student t-test, $p<0.05$). We will present the full results of the relationship between hair and blood manganese, birth weight, and gestational duration in approximately 250 children.

Conclusion: This early finding suggests that hair manganese levels could be associated with proximity to banana plantations, and consequently with mancozeb exposure. Full results of the analysis with fetal growth will be presented and discussed.

TRAFFIC NOISE HEALTH EFFECTS AND THE BENEFIT OF ACCESS TO QUIET SIDE

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Background and Aims: Annoyance due to community noise is a growing problem in the urbanized world. Noise reduction at the source is inadequate to tackle the negative trend and other approaches must be investigated, such as of residential spaces. An earlier study in Sweden showed that access to quiet side in one's dwelling had a positive effect on noise annoyance and well-being.(Ohrstrom, Skanberg et al. 2006) Our aim was to confirm whether these results withstood and also whether quietness in different spaces (such as bedroom, living room and balcony) were of similar or differential importance.
Methods: A survey regarding noise and health was carried out in Malmö, southern Sweden in 2007. 2612 individuals aged 18-80 years participated. (response rate 54%). We used geographic information systems to assess the average road and railway noise (LAeq,24h) at the participants' residential address. Data included geometries of roads, railways, buildings, elevation data, ground types and noise barriers.
Results: Sleeping and concentration problems were associated to traffic noise from road, rail and the two sources combined. No significant differences were found depending on the noise source. In a logistic regression model adjusted for age, sex and noise exposure, having one's bedroom facing a large road was associated to both sleeping and concentration problems, while bedroom facing a railway mainly seemed to be associated with concentration difficulties and had no significant association to sleeping problems. Having a balcony facing large road or rail was associated to concentration difficulties but not to sleeping problems. Access to at least one quiet space in one's dwelling was strongly associated to lesser concentration difficulties and sleeping problems.
Conclusions: Having access to quiet places in one´s dwelling was associated to less sleep and concentration-related problems. We could not conclude that bedroom location was more important than quietness in other rooms.
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SOCIOECONOMIC STATUS AND ACUTE MYOCARDIAL INFARCT ADMISSIONS TO HOSPITAL IN MELBOURNE, AUSTRALIA

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Background and Aims: Explanatory studies of the relationship between area deprivation and health have highlighted urbanisation and inequality as an emerging theme. Socioeconomic influences on health have been reported at both the individual and area levels of analysis. Acute myocardial infarction (AMI) morbidity in Melbourne and socioeconomic status was mapped to demonstrate spatial associations within the data.
Methods: Age standardised rate ratios are calculated by determining the age specific rates for each age group, the expected and observed AMI were calculated. The observed AMI divided by the expected AMI provided a ratio of observed to expected AMI admissions controlling for differences in age structure. The standard Melbourne population was the baseline population. The measure of socioeconomic status used to examine health inequalities was the 2001 area-based Socio-Economic Index for Areas (SEIFA). AMI admissions to hospital were classified into SEIFA quintiles according to SEIFA value for place of residence. Each quintile contained approximately 668,000 adult persons. Quintile 1 includes the most disadvantaged areas and quintile 5 the least disadvantaged areas.
Results: The absolute and relative differences in AMI admissions to hospital for SEIFA quintiles 1-5 indicate that rates of AMI admissions are higher in the most disadvantaged areas in the western suburbs, the urban fringe and industrial areas. The rate ratio suggests there were twice as many AMI admissions in quintile 1 (most disadvantage) than in quintile 5 (least disadvantage).
Conclusions: The analysis indicates that socioeconomic inequality contributes to AMI admissions to hospital in Melbourne. Regional differences in AMI admissions were quantified and described. Spatial analysis was used to identify spatial clusters of AMI admissions in Melbourne metropolitan region. Quintile maps highlighted the differences in AMI admissions rates per quintile. AMI risk was presented in a spatial framework capable of informing policy and addressing disease prevention.

MULTIPLE METAL EXPOSURES IN ADOLESCENTS: ATTENTION-INDUCED STRESS, LEAD, ARSENIC AND CARDIAC VARIABILITY

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Background and Aims: Cardiovascular mortality and morbidity in adults increase at lead and arsenic concentrations well below most international occupational guidelines. The few published studies of lead and cardiovascular function in children produced weak and conflicting results. Few studies systematically address multiple metal effects on cardiac health. We studied the combined effects of lead and arsenic on heart rate variability (HRV), a key predictor of cardiovascular morbidity and mortality, in adolescents to determine if metal exposures were associated with early signs of cardiovascular problems.
Methods: We recorded seated electrocardiograms (ECG) from 512 adolescents, 12-15 years, participants in a lead-surveillance program since early childhood in Torreón, Coahuila, a northern Mexican industrial city. We measured blood lead and spot urine creatinine-corrected arsenic on the recording day. We recorded three 10-minute ECGs, first with subjects in resting condition, the second and third during the Continuous Performance Test (CPT), a sustained attention task requiring response to rarely presented target sequences in easy and difficult conditions designed to produce cognitive stress, in counterbalanced order. Fourier decomposition produced power spectra of beat-to-beat ECG intervals. We analyzed CPT performance and ECG power in standard frequency bands with mixed models accounting for repeated measures. We also present models combining earlier childhood lead levels with contemporary arsenic concentrations.
Results: Lead and arsenic independently depressed CPT attention (no significant interaction) with no effect size change under two stress levels. High frequency HRV (0.14-0.40 Hz), indicating parasympathetic autonomic nervous system (vagal) activity, decreased with increasing stress, but paradoxically increased with increasing arsenic concentration in all conditions.
Conclusions: Lead and arsenic additively combined to depress sustained attention in adolescents. Cognitive stress depressed cardiac-vagal tone while arsenic increased vagal tone. We further explore connections between multiple metal exposures, attention and autonomic nervous system activity associated with cardiac health.

TRAFFIC-RELATED EXPOSURES AND HEALTH OUTCOMES OF CHILDREN WITH ASTHMA LIVING BOTH NEAR AND FAR FROM HIGHWAYS

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Background and aims: Proximity to major roads has been associated with respiratory disorders and other adverse health effects. However, the understanding of traffic-related exposures and the associated health impacts is incomplete. Concentrations can vary dramatically spatially and temporally, and a fine spatial scale is needed to resolve traffic-related pollutants such as PM, black carbon (BC), NOx, and VOCs. This paper describes results obtained in recent and ongoing exposure and epidemiological studies in Detroit, Michigan.
Methods: We first explore the use of Medicaid data to investigate associations of acute asthma outcomes among Detroit children and proximity to major roads using a population-matched case-control analysis over a three year period, conditional linear regression, and both linear and nonlinear relationships with distance. We then present the design and preliminary results from an ongoing case-control study in which children with asthma were selected on the basis of residential proximity to major highways in Detroit, and which utilized seasonal health measurements, e.g., spirometry, and a variety of exposure assessment approaches.
Results: In the Medicaid data, asthma events were associated with proximity to primary roads with an odds ratio of 0.97 (95% CI: 0.94, 0.99) for a 1 km increase in distance, implying that asthma events were less likely as the distance between the residence and a primary road increases. In the field study, air quality impacts associated with traffic were observed in both time series and spatial studies, e.g., BC levels were elevated at monitors very near highways during the rush hour period, as well as on transects obtained across major roads.
Conclusions: There is moderately strong evidence of elevated risk of asthma close to major roads, based on case-control study, though increments of traffic-associated pollutants measured near the roads were generally modest.

A PRELIMINARY EVALUATION OF ENVIRONMENTAL LIGHT POLLUTION, ANTHROPOMORPHIC CHARACTERISTICS, AND BEHAVIORAL FACTORS IN PREDICTING URINARY MELATONIN METABOLITE CONCENTRATIONS

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Background and Aims: There is growing evidence that light pollution may play a role in a variety of diseases, including cancer. For cancer, the primary mechanism postulated is that exposure to light-at-night (LAN) suppresses the production of melatonin, an endogenous hormone with oncostatic properties. Our objective was to evaluate whether exposures to LAN, as well as anthropomorphic and behavioral factors, predict levels of 6-sulfatoxymelatonin (6-SMT), the primary urinary metabolite of melatonin.
Methods: Participants consisted of 301 women who provided a 24-hour urine sample, completed a questionnaire, and resided in Northern California. Approximately half lived in urban/suburban regions and half in more rural areas. A geographic information system was used to assign outdoor LAN levels to participants' residences based on satellite imagery data maintained by the U.S. Defense Meterological Satellite Program. Indoor LAN exposures were estimated from survey responses regarding the use of bedroom lighting and sleep habits. Data on anthropomorphic and behavioral factors were garnered from survey questions. An ELISA was used to quantify 6-SMT concentrations in urine. Concentrations were creatinine adjusted and transformed to symmetrize the data prior to statistical analyses. Age-adjusted generalized linear models were used to assess significant predictors of 6-SMT.
Results: Outdoor LAN values varied between participant residences, with levels highest among those in urban/suburban areas and lowest among those in rural areas (p-value <0.001). Among younger women, 6-SMT levels did not vary with age, but among those $\geq$55 years, levels dropped significantly with increasing age ($p<0.005$). While there was some suggestion that lower 6-SMT levels were related to indoor and outdoor LAN exposures, higher levels of physical activity, and use of oral contraceptives, none of these relationships were statistically significant.
Conclusions: These preliminary analyses failed to identify any significant predictors of 6-SMT, beyond age. We are continuing to evaluate these relationships through more comprehensive modeling.

EVALUATION OF A HEAT VULNERABILITY INDEX ON ABNORMALLY HOT DAYS: AN APPLICATION OF ENVIRONMENTAL PUBLIC HEALTH TRACKING DATA

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Background and Aims: Heat waves and extreme hot weather conditions have been associated with increased morbidity and mortality, but the risks are not evenly distributed throughout the population. Previously, a heat vulnerability index (HVI) was created that combined factors of socio-economic and environmental vulnerability, social isolation, air conditioning prevalence, and pre-existing health conditions to geographically locate populations with increased vulnerability to heat in metropolitan areas throughout the United States. Our study aims to determine whether the intra-urban spatial distribution of heat vulnerability, as characterized by the HVI, is consistent with increased rates of morbidity and mortality on abnormally hot days.

Methods: We defined abnormally hot days as days where the difference between the maximum temperature for that day and the 30-year normal warm season maximum temperature was in the 95th percentile for that weather station for all warm season days (May-September) for 2000-2007. We used Poisson generalized estimating equations to assess the interaction between the HVI and abnormally hot days on hospitalization and mortality counts by zip code, controlling for daily ozone levels and day of week in five states from the Environmental Public Health Tracking Network.

Results: The HVI was consistently associated with higher hospitalization and mortality rates, but abnormally hot days were not associated with increased morbidity or mortality after adjustment for the HVI. The interaction of HVI with abnormally hot days was not significant. Division of the HVI into three categories showed different trends from state to state, indicating potentially nonlinear relationships between the HVI and health outcomes.

Conclusions: Our results demonstrate that the HVI denotes increased health vulnerability that was independent of the measure of heat that we used. Further investigation of our heat measure compared to other heat measures and the HVI as a measure of vulnerability in other areas of the country is warranted.

HEATWAVES INCREASE THE RISK OF EMERGENCE HOSPITAL ADMISSIONS FOR RENAL DISEASES IN CHILDREN

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BACKGROUND: Heatwaves can cause significant health consequences such as increased mortality and morbidity. However, their impact on the children living in tropical/subtropical regions remains to be determined. This study aimed to examine the association between heatwaves and emergency hospital admissions (EHAs) for renal diseases in children (aged 0-14 years) in Brisbane, Australia.
METHODS: A local definition of heatwave was developed (• 37°C for two or more consecutive days). EHAs for renal diseases in children and environmental data were obtained for Brisbane city from 1996 and 2005. A time-stratified case-crossover design was used to compare risks for renal diseases between heatwave and non-heatwave periods.
RESULTS: There were 1,747 EHAs for renal diseases in children. Heatwaves exhibited a significant impact on EHAs for renal diseases in children after adjusting for confounders (odds ratio (OR): 2.7; 95% confidence interval (CI): 1.1-6.3). Heat effects on children's renal diseases appeared to be acute and gradually attenuated with lagged days (OR: 2.3 (95% CI: 0.9-6.3) for lag 1; 1.1 (95% CI: 0.4-3.6) for lag 2).
CONCLUSIONS: There were significant increases in EHAs for renal diseases in children during heatwaves in Brisbane, a subtropical city where people are well accustomed to warm weather. This finding may have significant implications for pediatric renal care.

Epidemiological study of health effect on stone workers of Hualien—Processing gemstone and nephrite had the highest risk

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Background and aim: Hualien is the main place of stone industry in Taiwan. The stone workers had been long-term exposed to some ores that contain quartz or asbestos. However, most of them work in small and unregistered factories. The health effect on these workers is unknown. The objective of study was to assess the pulmonary fibrotic changes in stone workers and evaluate the hazard of different works in stone industry.

Methods: We had completed 47 walk-through surveys of stone processing workplaces between 2006 and 2009. The work environment, processing procedures, materials used in each procedure were recorded. We grouped workers into 8 types of works, including processing gemstone, processing nephrite, making stone embellishment, making vase, making urn, make small stone decoration, artistic carving, and construction material factory. Each type of work was treated as a similar exposure group. A cross-sectional survey was performed in stone workers and their family of Hualien in 2010. The profusion of chest radiogram was graded complied with ILO/ICRP standard. Those who had profusion 1/1 or greater with lung crackle were identified as cases of pulmonary interstitial fibrosis. To prevent confounding, subjects were excluded when they had history of tuberculosis or other occupations that may cause lung fibrosis. Multivariate logistic regression was used.

Results: 328 subjects were enrolled for analysis. Among them, 17 subjects was identified as cases and the prevalence was 5.2%. After adjusting the pack-years of smoking and age, processing gemstone had the highest risk (OR=3.85, p=0.02), followed by processing nephrite (OR=3.10, p=0.05). By using employment less than 10 years as the reference group, the odds ratio of process gemstone more than 20 years was 6.62 ($p<0.01$) and the odds ratio of processing nephrite more than 20 years was 4.79 ($p<0.01$).

Conclusions: Processing gemstone and nephrite had the highest risk in stone industry.

Background

Research needs on climate change and health can be categorized into (1) identifying exposure-response relationships between weather and climate parameters and health outcomes, taking into consideration confounding and effect modification by other factors associated with particular outcomes, and local conditions that could affect the strength of association (e.g. presence of early warning systems); (2) detecting and attributing changing disease patterns to climate change; (3) taking a systems-based approach to develop models to project how health burdens could change under different climate and socio-ecosystem futures; (4) evaluating the effectiveness of health adaptation interventions to identify best practices and lessons learned; (5) estimating the possible health impacts of adaptation and mitigation policies and programs implemented in other sectors; and (6) developing storylines to explore the possible magnitude and extent of health impacts from low probability, high consequence climate change (e.g. migration from significant reductions in crop yields in Sub-Saharan Africa).

Methods

A panel discussion will explore these research needs in the context of the Mediterranean region. Planned speakers include: Bettina Menne, Tony McMichael, Daniela Ippoliti or Paola Michelozzi, AntonisAnalistis, or KleaKatsouyanni, Tanja Wolf, Guy Hutton, and TuomoKarljanen

IMPACT OF CLIMATE CHANGE ON HEAT-RELATED MORTALITY IN PORTUGAL: CURRENT AND FUTURE RISKS

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The observation that major causes of ill health exhibit distinct seasonal patterns suggests *a priori* that weather and/or climate influence their distribution and incidence. However, the inter-linkages between climate change and human health are complex and location specific. In this study we investigated the temperature-mortality health-related effects at local level in Portugal. We also explored possible future changes in attributable heat deaths under different climate scenarios.

The health impact assessment was done for the summer season (April – September), for Lisbon and Oporto. For each city, generalized estimating equations approach was applied to model the relationship between maximum temperature and daily mortality for all-causes, cardiovascular and respiratory diseases by age group, in the summer season. The possible future trends in heatstress were explored based on future climate scenarios.

For 1°C increase in maximum temperature above the city-specific threshold, all-cause mortality increased by 5.6% (95% CI: 4.6; 6.6) in Lisbon and 3.0% (95% CI: 2.0, 3.9) in Oporto respectively. In both cities, stronger associations were found for respiratory diseases and the elderly group was the most vulnerable. All the future climate scenarios used indicate significant increases in days with maximum temperatures above the city-specific threshold, suggesting that the risk of dying from heatstress will very likely increase in the future.

Heatstress exposure health effects area and will remain important determinants of health in Portugal under climate change. Current and future climate change adaptation measures need to consider how effective they are/will be to reduce climate-related health risks at local level.

AIR POLLUTION AND DEPRESSIVE SYMPTOMS IN THE ELDERLY: THE KOREAN ELDERLY ENVIRONMENTAL PANEL STUDY (KEEPS)

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Background and Aims: Although the effects of air pollution on various diseases were well studied, few studies examined its effects on depression. This study investigated the effect of air pollution on the depression symptoms.
Methods: Authors used 569 participants who regularly joined a community elderly care center located in Seoul. The Korean version of the Geriatric Depression Scale-Short Form (SGDS-K) was used to evaluate depression symptomatology during 3-year follow-up study from 2008. Five ambient air pollutants were analyzed using Generalized Estimating Equations (GEE) to associate with SGDS-K. A factor analysis was conducted to determine which items of the SGDS-K were combined to generate a given factor.
Results: Increases of interquartile range of a 3-day moving average of PM_{10}, a 5-day moving average of NO_2, and 3 weeks moving average of O_3 were associated with increases 0.16% (95% CI, 0.04-0.30), 0.24% (95% CI, 0.07-0.44), and 0.83% (95% CI, 0.26-1.65), respectively, of SGDS-K scores. For these three pollutants, factor analysis showed that air pollution worsened emotion such as happiness and satisfaction, and increased physical discomfort such as problems with memory and less energy. However, air pollution was not strongly associated with inferiority feeling or loss of interest. Air pollution effects on depression symptoms were exerted more for female and in warm temperature.
Conclusions: This study showed increasing particulate matter, nitrogen dioxide, and ozone may deteriorate depression symptoms among the elderly. Emotion and physical discomfort were most affected by ambient air pollution.

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ENVIRONMENTAL HEALTH INDICATORS RELEVANT FOR MAORI IN NEW ZEALAND

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Background and Aims: M• ori, the indigenous peoples (tangata whenua) of New Zealand, comprise 15% (565,329 people - 2006 census) of the total New Zealand population. M• ori are heavily over-represented in low socio-economic groups but evidence exists which shows that M• ori suffer worse health compared to non-M• ori of similar socio-economic status. Robust M• ori environmental health indicators that are relevant and meaningful are a fundamental foundation for effective planning, policy development, service delivery and monitoring for improved M• ori health outcomes. The aim of this study was to assess the feasibility for developing a set of indicators to gauge factors of M• ori environmental health in M• ori terms.
Methods: The primary method for developing environmental health indicators was extensive consultation with M• ori to ensure that indicators aligned with M• ori concepts of health and environment. The Hawkes' Bay region was chosen as a pilot study to obtain feedback from stakeholders on both the process and specific environmental health issues that should be covered by a set of indicators with an initial focus on water quality.
We also conducted a literature review which included recognised M• ori health models to ensure that the sets of indicators reflected M• ori understandings of environmental health and provided an empirical base for jurisdictional environmental health agencies to identify areas of greatest risk.
Data from government and non-government agencies (including longitudinal data sets) were identified and assessed for completeness, usability, accuracy and applicability at the regional level and match M• ori health priorities.
Results: We present a set of proposed M• ori environmental health indicators for stakeholders to inform local planning and decision-making.
Conclusions: A review of the current M• ori health indicator sets showed that they are essentially Government driven measures that are intended to assess progress towards State-defined objectives for M• ori health. The development of a specific set of M• ori environmental health indicators in consultation with M• ori will assist towards addressing M• ori needs for healthy M• ori futures.

IS THE EFFECT OF MEAN TEMPERATURE ON EMERGENCY HOSPITAL ADMISSIONS FOR CARDIOVASCULAR DISEASES MODIFIED BY DIURNAL TEMPERATURE RANGE?

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Background and Aims: Both ambient mean temperature and diurnal temperature range are associated with human health. However, it is unknown whether the effect of mean temperature is influenced by diurnal temperature range. This study explored whether the relationship between mean temperature and emergency hospital admissions for cardiovascular diseases is modified by diurnal temperature range.
Methods: We estimated the effects of mean temperature and diurnal temperature range on the daily cardiovascular emergency hospital admissions during 1996–2005 in Brisbane, Australia. Poisson regression models accounting for overdispersion were used after adjusting for population size, long-term trend, holidays, day of the week, ozone, PM_{10} and humidity. Diurnal temperature range was divided into five groups for every 20 percentage of its distribution. We also evaluated the effects of two temperature exposures among several age groups (all age, 15–64, 65–74 and 75+).
Results: Diurnal temperature range was positively related to emergency hospital admissions for cardiovascular diseases in all age groups except for people aged 15–64 years old. When the diurnal temperature range was above 14.8 ^{o}C, the risk of cardiovascular diseases admissions increased by 11.5% ($p<0.05$) compared to the baseline diurnal temperature range (<8.6 ^{o}C) after controlling for mean temperature. Higher effect estimates were found for every unit degree (standard deviation of temperature) increase in mean temperature than that of diurnal temperature range. No modification effect of diurnal temperature range was found in the association between mean temperature and emergency hospital admissions for cardiovascular diseases.
Conclusion: Diurnal temperature range does not modify the effect of mean temperature on cardiovascular morbidity. Mean temperature contributes more in the temperature-morbidity relationship than diurnal temperature range. However, the elderly are more susceptible to diurnal temperature change than people aged between 15–64 years old.

DO MORE ACCURATE EXPOSURE PREDICTIONS ALWAYS IMPROVE HEALTH EFFECT ESTIMATES?

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Background and Aims: Air pollution concentrations are typically not measured at subject locations, so monitoring data are used to predict exposures by land-use regression (LUR) or related methods. It is often assumed that minimizing prediction error improves health effect estimation. We show this is not always correct..
Methods: We simulate exposures at subject and monitor locations by a LUR model with three geographic covariates, assuming only monitoring data are observed. We simulate health outcomes from a linear disease model. We fit a LUR model to the monitoring data and use predicted subject exposures to estimate the health effect. We calculate average out-of-sample R^2 as a measure of prediction accuracy and the bias and standard deviation of effect estimates. We compare the correctly specified LUR model to a misspecified version that omits the third geographic covariate. We vary the numbers of subjects and distribution of monitor locations.
Results: In all scenarios, the average out-of-sample R^2 at subject locations for the correctly specified LUR model is 0.70, apparently better than the corresponding value of 0.50 for the misspecified model. Health effect estimates are nearly unbiased, but their standard deviations vary between scenarios. With 10,000 subjects and uniformly high variability of geographic covariates in monitoring data, the standard deviation of health effect estimates is 0.12 for the correctly specified model and 0.21 for the misspecified model. If the third geographic covariate is less variable across monitor locations, the standard deviation is 0.23 for the correctly specified model and 0.16 for the misspecified model; i.e., the “better” exposure model leads to less certain effect estimates.
Conclusions: Improved air pollution exposure predictions do not necessarily lead to better estimation of health effects. Exposure models should be evaluated based on utility for estimating health effect parameters, in contrast to the current practice of optimizing prediction accuracy.

ESTIMATING ACUTE AIR POLLUTION HEALTH EFFECTS IN THE MULTI-ETHNIC STUDY OF ATHEROSCLEROSIS (MESA)

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Background and Aims: There is growing interest in exploiting cohort data to estimate acute health effects of air pollution. Since exposure and outcome have seasonal trends, we need to control for temporal confounding. A methodology developed for time series studies is to include semiparametric spline terms in the regression. Methods have been proposed for selecting degrees of freedom (df), but existing literature does not address the implications for cohort data.
Methods: Our first objective is to adapt semiparametric regression methods to cohort studies, accounting for the possibility of multiple or no health observations on some days. We derive methods for choosing df and for computing standard errors. Our second objective is a more efficient alternative to semiparametric regression based on preadjusting the exposure, exploiting exposure data on days with no health observations. The health model can be fit by ordinary least squares (OLS) or by generalized least squares (GLS) using weights derived from a mixed model. We report simulation results and apply our methods to a previously published study of fine particulate matter and retinal arterial diameter in MESA, a population-based cohort of men and women aged 45-84 from 6 sites, funded by NHLBI.
Results: Sufficient df to account for temporal structure in the outcome consistently results in unconfounded effect estimates. This is not always the case if df are only sufficient to account for the trend in the exposure. Preadjusting the exposure and using GLS is more efficient than semiparametric regression for datasets with limited health observations compared to the required df.
Conclusions: Semiparametric regression methods from time series studies can be adapted for cohort data, as long as the data structure is considered in determining the number of df and in calculating standard errors. Efficiency can be improved by preadjusting the exposure and fitting the health model with GLS.

SOCIAL INEQUALITY IN PERCEIVED AIR QUALITY USING COMBINATION OF INDIVIDUAL- BASED AND AREA- BASED SOCIOECONOMIC CHRACTERISTICS IN SEOUL, KOREA

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Background and Aims: The majority of urban air quality studies focused on scientifically measured air quality. Scant attention has so far been paid to the perceived air quality. perceived air quality is another important component for health and quality of lif e. In this paper, we offer a current picture of urban air quality in which residents think about air pollution. This study investigated t hat the relation between measured air quality and perceived air quality and the determinants of perceived local air quality focusi ng on the both individual and area characteristics.
Methods: we used representative survey (Seoul Citizen's Health Indicators Survey (SCHIS)) and integrated measured air qualit y (TAQ). The total study population was 15,856. We extracted individual-level sociodemographic and socioeconomic variables fr om SCHIS: age, sex, marital status, self-rated health, educational attainment and household income. We also considered comm unity variables which may affect perceived air quality, such as percentage of college educated aged 20 over, satisfaction of publi c transportation and percentage of below poverty line. Multilevel analysis techniques were applied for parameter estimates.
Results: Mean distributions of air quality perception by community level was opposite against the total air quality patterns using simple linear statistics by plotting. There are area variances in perceived air quality and socioeconomic status across 25 KUs. W e found that the degree of perceived air pollution was younger age (20-34 aged, odds ratio:1.397), higher educational attainmen t(graduate, odds ratio:1.667), lower household income. For area level, Communities more economically deprived and higher per centage of college educated aged 20 over were associated with poor perceived air quality.
Conclusions: This paper sought to show how the perception of air quality may be affected by individual SES and area level SE S. Education was a stronger predictor of perceived air quality than economical measurement such as income and poverty line of this study
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AIR QUALITY CHANGES AFTER COMMISSIONING OF AN URBAN ROAD TUNNEL

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Background & Aims: The commissioning of a new road tunnel in Sydney, Australia, in March 2007 provided an opportunity to assess the effect of this intervention on air pollutant concentrations in the affected area. Dispersion model-based predictions were that pollutant concentrations would decrease around the main bypassed road where traffic flow was halved and would increase along feeder roads to the tunnel.
Methods: PM_{10}, $PM_{2.5}$ and NO_2 data from six continuous monitoring stations erected in the study area were used and compared with regional changes in air quality. We also collected data on NO_2, as a marker of traffic related air pollution, using a network of passive samplers. Spatial variability was assessed by land use regression. The study period was Jan 2006 to Dec 2008.
Results: Data from the continuous monitors showed that, after adjusting for regional changes in air quality, the opening of the tunnel did not lead to consistent reductions in either PM or NO_2 in the study area as a whole. However, the passive sampler data showed that, while NO_2 levels were not significantly reduced in the first post-tunnel year (-2.1%, 95% CI -5.9% to +1.8%), they were significantly reduced in the second post-tunnel year (-16.1%, 95% CI -19.2% to -12.7%). Further, passive sampler NO_2 concentrations were reduced in both post-tunnel years along the major by-passed road. The LUR model also demonstrated reductions of NO_2 (up to 10 ppb) along the by-passed road and an increase in NO_2 of up to 5 ppb along the feeder roads.
Conclusion: This study highlights the need to study fine scale spatial variability when assessing the impact of traffic interventions and supports the effectiveness of traffic interventions in reducing exposures for people living close to main traffic routes.

LOW DOSE MIXTURE EFFECTS OF BISPHENOL A AND ISOBUTYLPARABEN FOR THE MALE REPRODUCTIVE SYSTEM

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Background and Aims: Exposure to individual estrogenic endocrine disruptors at relatively high doses could induce male reproductive abnormality. Recently, the concerns were increased on how estrogenic endocrine disruptors can generate reproductive adverse effects in a mixture at a concentration that does not individually induce observable effects. This study was performed to determine the effect of mixture exposure on male reproductivity at low level of bisphenol A (BPA) and isobutylparaben (IBP).
Methods: Corn oil, BPA (0.05 mg/kg/day), IBP (2.5 mg/kg/day) and mixture (BPA 0.05 mg/kg/day and IBP 2.5 mg/kg/day) were administered once daily by oral gavage to dam from gestation day 6 to lactation day 21 for 8 weeks to pregnant Sprague-Dawley rats. After lactation, treatment groups were divided into three vehicles - BPA, IBP and mixture treated groups. Male pups were sacrificed by isophorone at postnatal day 70. Male pups were examined for developmental characteristics, body and organ weight (testis, epididymis and prostate), serum sex hormones, thyroid hormones, sperm toxicity, and histological change of testis and epididymis.
Results: The IBP-treated group showed decreased estradiol levels in the early life stage. Life long period exposed groups showed increased body weight and decreased testosterone levels in IBP- and mixture-treated groups; increased relative epididymis weight in BPA-treated group compared to control; and decreased testosterone and triiodothyronine levels in the mixture-treated group. Epididymal sperm count and motility was significantly decreased in all treated groups. The histological findings using hematoxylin and eosin stain of the testis and epididymis did not change between control and treatment groups.
Conclusions: Early life exposure to low dose BPA and IBP in male rats showed adverse synergistic effects to the male reproductive system in adulthood.

CHILDHOOD EXPOSURE TO DEPLETED URANIUM: CONSEQUENCES OF THE 2003 ARMED CONFLICT IN IRAQ

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Background and Aims: Ravages of war include widespread environmental and human health consequences, some becoming apparent years or decades after the conflict. Radioactive depleted uranium (DU) is used as armour-piercing munitions in current warfare. This analysis describes the exposure of Iraqi children to DU during the 2003 armed conflict.
Methods: Children are exposed to radioactivity while playing in and around abandoned military vehicles struck by DU munitions. Due to the paucity of data for 2003, analysis of DU ammunitions use during the 1991 Iraq war, as presented by Marshall (2005), was extrapolated to estimate the degree of exposure and the resulting health risks for Iraqi children during the 2003 war.
Results: Greatest exposure to DU was secondary to children playing inside discarded military vehicles. Inhalation of airborne particulate in this setting accounted for a maximum cumulative exposure of 2.077 grams, while gastrointestinal ingestion resulted in a cumulative exposure of 43.269 grams, resulting in equivalent doses of radiation to the lungs, bone surface, and colon of 0.039, 0.033, and 0.003 Sieverts, respectively. Effects of such exposure include an incremental birth defect risk of 0.052% for progeny of the exposed, with an increased incremental fatal cancer risk of 2.388%.
Conclusions: The outcomes of DU exposure are not insignificant and include increased risk of fatal malignancies and birth defects in offspring. In order to prevent such exposures, production and use of radioactive weapons should be stopped and their contamination ceased.

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ACUTE EFFECTS STUDY OF EXPOSURE TO ROAD TUNNEL VENTILATION STACK EMISSIONS

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Background & Aims: To study the association between exposure to emissions from a road tunnel ventilation stack and short term respiratory and irritant effects in a group of volunteers.
Methods: We recruited 36 volunteers in Sydney, Australia, to a randomised cross-over study over three years. 2006 represented the baseline year where the tunnel was not operational, and 2007 and 2008 post-intervention years when the tunnel was active (58,318 vpd, November 2008). Each group underwent three types of exposures each year: downwind of the road tunnel ventilation stack; upwind of the stack; and at a positive control site (remote, heavily trafficked site). Each exposure consisted of two consecutive mornings of two hours exposure each. Three repeated measurements for spirometry, exhaled nitric oxide (FeNO) and irritant and respiratory symptom scores were collected each morning. We collected data on PM_{10}, $PM_{2.5}$ & PM_1, NO_2 and VOCs during each of the exposure sessions. Data were analysed by mixed effects regression.
Results: 25% of subjects reported a diagnosis of asthma and 72% were atopic at baseline. 26 (72%) subjects participated in 2007 and 20 (56%) in 2008. Exposure downwind of the ventilation stack was associated with some increase in "dry nose" scores, but there was no effect on FEV_1, FVC, FeNO or other symptoms. Over the three year period as a whole, exposure at the heavily trafficked control site was associated with higher FeNO (ratio=1.09; $p<0.001$), higher scores for eye symptoms ($p=0.03$), chest symptoms ($p<0.001$), and throat symptoms ($p=0.06$).
Conclusion: There was little evidence of any short-term adverse effect of exposure downwind of the road tunnel ventilation stack. The findings of increased symptoms and inflammation at the control site overall validates the study design for detecting effects of short-term traffic exposures.

INFLUENZA EPIDEMIC AND METEOROLOGICAL FACTORS IN 47 PREFECTURES IN JAPAN

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Background and Aims: In evaluating the impact of climate change on human health, it is important to evaluate not only the heat effects, but also the cold effects. It is, however, not straight-forward to evaluate cold effects; unlike heat effect, cold effect is not a direct (non-linear) function of temperature. We thought that influenza epidemic is one of the reasons for this, because influenza epidemic occurs in winter, but is not necessarily larger during colder winter. Here, we explored the relation between influenza incidence and meteorological factors to obtain some clue to model the influenza effect in evaluating cold effects.
Methods: Meteorological factors in each of the 47 Prefectures in Japan were related to the corresponding government-provided number of patients per sentinel medical facility per week. The relation was regressed using smoothing spline. Absolute humidity was calculated using the formula, 217 * (vapor pressure) / (temperature in Celsius + 273.15).
Results: Among the factors, absolute humidity showed one of the most consistent relations, with only one exception, i.e., Okinawa Prefecture. Down to a certain level, no patients were observed, and beyond the level, the incidence became higher monotonously along with the absolute humidity. The "highest no patient limit" level appeared higher in Southern Prefectures. As the only exception, Okinawa Prefecture, where the climate is subtropical, showed that epidemics occurred even on days with high absolute humidity. Unlike absolute humidity, relative humidity showed inconsistent relation.
Conclusions: To relate the influenza incidence, it is better to use absolute humidity, rather than relative humidity. We speculate that the "highest no patient limit" level was higher for Southern Prefectures, because the winter is warmer for Southern Prefectures during the influenza epidemic season. This may lead to the modelling of influenza effect as one of the cold effects.

TIME WINDOW OF EXPOSURE IN THE RELATION TO PRETERM BIRTH FROM AMBIENT AIR POLLUTION

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Background and Aims: Whether air pollution contributed to preterm birth is as yet unanswered with the previous evidence pointing in different directions, but none of the previous epidemiological studies has elaborated the susceptible embryologic period of preterm birth. The study was to assess the time window of exposure and its role in the relation between ambient air pollution and the risk of preterm birth.

Methods: We conducted a nation-wide cross-sectional study of 1,490,247 singleton Taiwanese births in 2001-2007 using information from the Birth Registry. The outcome of interests was preterm delivery (gestational age < 37 weeks). The exposure assessment was based on residential address during pregnancy, and applied geographic information system (GIS) to integrate monthly air pollutant data from 72 EPA monitoring stations which was interpolated to pollutant surfaces using inverse distance weighting method (IDW). The effect estimates were presented as odds ratios per 10 ppb changes for O_3, NO_2, 10 $\mu g/m^3$ changes for PM_{10}, 1 ppb changes for SO_2 and 100 ppb changes for CO.

Results: In the logistic regression adjusting for confounding, the risk of preterm birth was increased in relation to the first (adjusted OR=1.031, 95% CI: 1.026, 1.037), second (adjusted OR=1.015, 95% CI: 1.010, 1.021), and third (adjusted OR=1.025, 95% CI: 1.019, 1.031) trimester O_3. The effect estimates for preterm birth were significantly elevated during the third (adjusted OR=1.010, 95% CI: 1.006, 1.014) trimester PM_{10} exposure.

Conclusions: The study provides evidence that exposure to outdoor air O_3 and PM_{10} may increase the risk of preterm birth and the most susceptible time periods are during the whole pregnancy for O3 and third trimester of gestation for PM_{10}.

ASSOCIATIONS BETWEEN SMALL AREA LEVELS OF AIR POLLUTION AND SOCIO-ECONOMIC CHARACTERISTICS IN THE NETHERLANDS AND ENGLAND

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Background and aims: Several studies have shown that elevated levels of air pollution are concentrated among social deprivated neighbourhoods and areas. As inhabitants of these areas may be especially vulnerable to the negative health effects of air pollution, insight in local associations between population characteristics and air pollution levels is of public health interest. We assessed the relation between long term exposure to (traffic-related) air pollution and several population characteristics.
Methods: Detailed 100m maps of air pollution levels of PM10 and NO_2 were developed using land use regression. Population characteristics were collected from Statistics Netherlands and the Office of National Statistics (UK). We linked the socio-economic population characteristics at the lowest possible aggregation level, which was the 6-digit postal code level in the Netherlands (appr. 20 addresses) and the Census Super Output Area in the England, with modelled air pollution averaged at the same level of aggregation. We then assessed the association between area air pollution levels and population characteristics by descriptive statistics.
Results: In a national analysis in the Netherlands, pollution levels increased with higher degree of urbanization, percentage non-western immigrants, lower house price , while average monthly person income was unrelated to air pollution levels. We found that city results could deviate between cities and from the national results. For England associations with income, education, employment, ethnicity and urbanisation will be analysed.
Conclusion: This study on small area differences in air pollution and population characteristics shows that in the Netherlands postal code areas with lower social economic status (and probably the highest traffic density) encounter the highest air pollution levels. The use of small area information based on land use regression techniques can be helpful to elucidate such information for local (environmental) policy.

INTERNATIONAL COORDINATION IN BIRTH COHORTS

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Background and Aims: Miami Declaration, agreed at the G8 Environment Ministers meeting in 1997, called for cooperative actions by major industrialized governments to protect children's health. Their meeting held in Italy in 2009 agreed to collaborate on studies related to impacts of environmental chemicals and heavy metals on children's health.
Methods: In FY 2010, the Ministry of the Environment started Japan Environment and Children's Study (JECS), a birth cohort study involving 100,000 children and their parents, biological sampling and medical questionnaire from the pregnancy until the child becomes 13 years old. Large-scale birth cohorts of 100,000 children exist in Denmark and Norway, and planned in the United States. In order to strengthen coordination among these studies, the Ministry organized an international workshop in February 2011.
Results: text Experts from JECS, similar cohorts in the United States, Denmark and Korea, International Child Cancer Cohort Consortium (I4C), WHO and UNEP discussed international coordination in birth cohorts. In JECS, recruitment started in January 2011, and the methods for outcome measurements are being finalized soon. Analysis of human and environmental samples will start in a few years. Participants agreed that harmonization efforts should start at this stage when large-scale national birth cohorts are starting in several countries.
Conclusions: Working groups for harmonizing outcome and exposure measurements should be established under the auspices of intergovernmental organizations. I4C is a good example for such efforts.

CANCER PROMOTION EFFECT AFTER THE CHERNOBYL ACCIDENT IN FINLAND?

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Background and Aims: 25 years after the accident at Chernobyl nuclear power plant people are still concerned about potential adverse health effects related to exposure to radiation. In order to test a hypothesis on cancer promotion we studied whether total cancer incidence due to the Chernobyl fallout was increased within the first eleven years after the accident.
Methods: A registry based cohort was constructed from the Finnish population with a stable residence in the first post-Chernobyl year. Exposure assessment was based on measurements of dose-rate made between May 1986 and August 1987 performed during a mobile survey with a route of 19,000 km. The analysis comprises overall cancer incidence in four exposure areas. Person-years and number of cases were stratified by sex; age group; house type; and socioeconomic status in 1985. A pre-Chernobyl period of 1981-85 was used as a baseline which reflects the underlying differences in cancer incidence between the exposure areas and represents the aggregate effect of confounding factors. Incidence rate ratios between the exposure areas in 1981-1985, 1988-1992 and 1993-1997 were estimated using the Poisson regression.
Results: In 1981-1985, the total cancer incidence rates were lower in the highest exposure area than in the other three areas where the incidences were close to each other. In 1988-1992 and in 1993-1997, the incidence rate ratios did not differ statistically significantly from those in the pre-Chernobyl period. **Conclusions:** The results do not support the promotion effect of cancers due to low doses from the Chernobyl fallout in Finland.

PRENATAL MATERNAL AND NEONATAL URINARY BISPHENOL A AND NEURODEVELOPMENT IN THE FIRST TWO YEARS FROM THE MOCEH STUDY

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Background and Aims: The exposure of pregnant women to bisphenol A may result in fetal or neonatal mortality, birth defects, or reduced birth weight and growth in their offspring (The US NTP). To investigate the effect of the prenatal maternal and the neonatal urinary BPA concentration on children's neurodevelopment at 6, 12, and 24 months
Methods: Six hundred sixty three pairs (mother and infant) in the Mothers and Children's Environmental Health (MOCEH) study, a multicenter prospective cohort study since 2006, were analyzed 6 through 24 months old of child. Korean version of the Bayley Scales of Infant Development-Revised (BSID-II) was used to assess cognitive and psychomotor development at 6, 12, and 24 months of age. Prenatal urinary BPA were measured at 20 weeks, 35-40 weeks of gestational age and neonatal urinary BPA was measured at neonatal unit. The multivariate linear regression and mixed effect model adjusted for several confounding variables were used to show the association between urinary BPA level and baby's neurodevelopment.
Results: Geometric means (geometric standard deviation) of maternal (20 weeks and 35-40 weeks of gestational age) and neonatal urinary BPA concentration were 0.56 (4.47), 0.82 (5.24), 3.30 (4.27) • g/L, respectively. The neonatal urinary BPA concentration was not significantly correlated with maternal urinary BPA concentration. Prenatal maternal urinary BPA concentration at 35-40 weeks of gestational age positively associated with mental development index at 24 months of age in male compared to the mental development index at 6 months (• =2.07, p=0.004). The neonatal urinary BPA concentration was not associated with children's neurodevelopment index at 6, 12, and 24 months.
Conclusions: Prenatal maternal urinary BPA concentrations were positively associated with neurodevelopment in children at 2 years old.
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DOES COMMUNITY VULNERABILITY AMPLIFY THE RELATIONSHIP BETWEEN TRAFFIC EXPOSURE AND ADVERSE BIRTH OUTCOMES? A UNIVERSITY-REGULATORY RESEARCH COLLABORATIVE ON ENVIRONMENTAL HEALTH INEQUALITIES

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Background: Studies within the United States and elsewhere have identified a relationship between air pollution, preterm birth, and low birth weight Spatial variation in air pollutant concentrations in urban areas have been attributed to traffic emissions, and documented for several pollutants, including nitrogen dioxide, ultrafine particles, and particulates. Epidemiological studies have linked residential proximity to traffic, such as distance to major roadways or traffic density near specific locations with adverse perinatal outcomes, including increased risk of preterm birth, small size for gestational age, and low birth weight. However, there remains a paucity of research on traffic density and birth outcomes, and few studies have examined effect modification by area-level SES measures.
Methods: We build on existing work by examining links between traffic density and risk of preterm birth and effects on average birth weight in a large sample of singleton births (~1.5 million) in California between 2001-2005. We also assessed the potentially synergistic and confounding effects of area-level SES measures. Distance weighted traffic volume measures were geocoded to the mother's address at the time of birth.
Results: Results indicate a decrease in average birth weight with increasing traffic burden [-10.4 (95% CI: -7.1, -13.6)] in the highest versus lowest quintile of traffic density] and a higher risk of preterm birth with higher traffic density [1.04 (95% CI: 1.01, 1.07) highest versus lowest quintile of traffic density]. Effect estimates remained robust after controlling for maternal and neighborhood level SES variables. Although we did not observe effect modification by neighborhood-level SES, we did observe stronger effects for birth weight in areas characterized by higher levels of racial residential segregation.
Conclusion: Results suggest that studies applying source-specific measures of ambient pollution, such as traffic density, can elucidate policy-relevant opportunities for reducing community exposure to multiple pollutants.

TIME SERIES ANALYSES OF DAILY MORTALITY ON DAILY PM2.5, PM10 AND BLACK SMOKE LEVELS IN THE NETHERLANDS; IS DISTINGUISHING BETWEEN DIFFERENT PM MEASURES POSSIBLE ?

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Background and aims: Information on the relationship between PM2.5 levels and mortality in Europe is sparse because of the limited PM2.5 measurement data that were available until recently. In the Netherlands, daily PM2.5 data have been measured at 15 sites of the National Monitoring Network since 2008. We have analyzed PM2.5 data for 2008 and 2009 in combination with daily mortality data on total and cause-specific mortality. We have compared the results of these analyses with results for PM10 and Black Smoke over the same period.
Methods: We analysed the data using Poisson regression in generalized additive models (GAM) with R. Associations between mortality and PM were adjusted using splines for long term and seasonal trend, influenza incidence, mean temperature, relative humidity, barometric pressure, as well as indicators for day of the week and for holidays. Results were presented as Excess Risk per 10 $\mu g/m^3$ increase in daily PM concentrations. Analyses were performed for 4 different time lags. In addition distributed lag models will be analyzed.
Results: PM levels all were statistically significant associated with daily mortality. The Excess Risk for daily PM2.5 (lag 1) and daily total mortality was 0.8% (0.3% - 1.2%). Results for different measures, different lags and cause-specific mortality will be presented. Correlations between particles measures was high (> 0.79). Because of this high correlation, no distinction could be made between the relative importance of the different PM measures. Initial results of distributed lag models indicate that single lag models may underestimate the true mortality impact of PM air pollution.
Conclusion: Newly available PM2.5 data in the Netherlands show statistically significant associations with daily mortality. This is in line with data from the US and other parts of the world. Due to the high mutual correlation between the three PM measures, no distinction could be made between the relative importance of the different measures.

DELTA-AMINOLEVULINIC ACID DEHYDRATASE (ALAD) POLYMORPHISM IN LEAD EXPOSED BANGLADESHI CHILDREN AND ITS EFFECT ON URINARY AMINOLEVULINIC ACIC (ALA)

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Background and objective

Lead has long been recognized as a harmful environmental pollutant. Developing countries like Bangladesh still have higher risk of lead exposure. Previous research suggests that delta-aminolevulinic acid dehydratase (ALAD) genotype can modify lead toxicity and individual susceptibility. As children are more susceptible to lead induced toxicity, the study was to investigate the frequencies of ALAD polymorphism among environmentally lead exposed children in Bangladesh and to determine whether ALAD genotype influenced urinary excretion of aminolevulinic acid (ALA).

Methods

Subjects were elementary school children from a semi-urban industrialized area in Bangladesh. A total of 134 children were studied. Blood and urine were collected to determine the ALAD genotypes, blood lead level (BPb) and urinary aminolevulinic acid (U-ALA).

Results

The mean BPb was found 9.7 µg/dl with 34% participants exceeding 10µg/dl, the CDC recommended level of public health action. In total, the gene distribution for ALAD1-1 was 71%, ALAD1-2 was 26% and ALAD2-2 was 3%. In this study, U-ALA concentration was lower in ALAD2 carriers than ALAD1 carriers at the same exposure level for boys ($p = 0.01$). But for girls, U-ALA did not differ significantly by genotype ($p = 0.61$).

Conclusion

This study provides the information about the frequency of ALAD polymorphism in Bangladeshi children for the first time, associated with U- ALA. ALAD2 showed protective effects in terms of U-ALA among the boys exposed to environmental lead.

LIVING NEAR AGRICULTURAL PESTICIDE APPLICATIONS AND THE RISK OF ADVERSE REPRODUCTIVE OUTCOMES: A REVIEW OF THE LITERATURE

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Background and Aims: Over the last decade, there has been growing concern about the possible health effects, including a number of adverse reproductive outcomes, from pesticides exposure of people living near agricultural fields. This systematic review evaluates the current epidemiological evidence on the association between living near agricultural pesticide applications and adverse reproductive outcomes, including congenital malformations, stillbirth, intrauterine growth retardation (IUGR), low birthweight, preterm birth and spontaneous abortions.
Methods: We identified and reviewed 25 studies from a systematic search of the main scientific databases and other sources published in 1950 to 2007. Study methods and main results were summarised and tabulated according to the year of study, design and type of adverse reproductive outcome. The levels of evidence for reproductive toxicity in humans contributed by each study were assessed and the main limitations associated with these studies discussed.
Results: Overall, there was evidence of a relationship between living near agricultural fields and adverse reproductive outcomes, but the strength of evidence varied between outcomes. The evidence suggested an association for the congenital malformations, but due to methodological limitations, such as poor exposure measurement and potentially inadequate control of confounding, a firm conclusion remains beyond reach. For the other outcomes (stillbirth, IUGR, low birthweight, preterm birth and spontaneous abortion) the evidence for any associations was equivocal at best, but some leads warrant further investigation.
Conclusion: Residential proximity to agricultural pesticide applications may be an important source of ambient environmental exposure, but due to the underlying methodological difficulties the evidence for its relationship with adverse reproductive outcomes is generally weak and varied between outcomes. Improved exposure assessment methods are needed to obtain a more reliable assessment of any risks.

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COMMUTERS' HEALTH RISK TO ULTRAFINE PARTICLES IN JAKARTA

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Background and Aims: Latest developments in epidemiological studies indicated that particles might be responsible for increases in the symptom of cardiovascular and respiratory diseases and several adverse health outcomes, including mortality, reduction of lung function, exacerbation of asthma, and an increase in emergency room visits. Public concern over air quality is enhanced by its effect on children, especially on associations with incidence and prevalence of asthma. In Jakarta, emissions of particles are expected to increase, especially its contribution from transportation. Both urban population size and the fraction of the population that owns a private vehicle are increasing. Objective of the study to determine the numbers of ultrafine particulate matter (particles with an aerodynamic diameter of 0.1 □m or less, or $PM_{0.1}$) inhaled by elementary school children, commute workers with private car and commute workers with public transport.
Methods: A *cross-sectional study design* is implemented for assessing ultrafine particulate matter concentrations inhaled by targeted population groups in Jakarta involving ten elementary school children, ten commuters with private car and ten commuters with public transports.
Results: Concentration of ultrafine particulate matter (average) of elementary school children at home, on the road and at school is 29,254/cm^3, 147,897/cm^3 and 61,033/cm^3 respectively. For those commuters with private car at home, on the road and at office is 29,213/cm^3, 310,179/cm^3 and 42,496/cm^3 respectively. For those commuters with public transport, the concentration average of at home, on the road and at office is found higher: 35,332/cm^3, 453,547/cm^3, and 69,867/cm^3 respectively.
Conclusions: School children and commuters with both private car and public transport are at high-risk to have respiratory diseases, reduction of lung function, exacerbation of asthma, and even death especially when they are on the road.
Recommendations: It is suggested that commuters should reduce their length of time during trip on the road and avoid traffic jam during on the road. Providing adequate ventilation and air circulation at home as well as in the office are needed for healthier breathing. Improving management of transportation to reduce traffic jams is also strongly recommended to local government.

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LONG-TERM EXPOSURE TO ROAD TRAFFIC AND MORTALITY IN A PROSPECTIVE COHORT OF WOMEN IN GERMANY

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Objective and aim: We assess whether long-term exposure to traffic-related air pollution is associated with all-cause, cause-specific and lung cancer mortality during a period of declining concentration of particulate matter.
Methods: A cohort of approximately 4800 women (age 55 years) from the Rhine-Ruhr area, Germany, was followed for up to 18 years. Exposure to traffic-related air pollution was defined by distance of residential address to nearest major roads calculated from GIS. Furthermore, one year average PM_{10} and NO_2 concentrations were available (calculated from air-monitoring station data in close vicinity to residents of the subjects). Ninety-two per cent of all subjects lived in the same community during follow up.

Results: Sixteen per cent of the women died during the follow-up period.
(1) Distance to roads: Living closer than 50 m (vs. more than 50 m) from a busy road showed an elevated total mortality adjusted for smoking and educational level: RR=1.47 (1.16 – 1.85). For cardiopulmonary mortality the elevation was even higher: RR=1.68 (1.17- 2.41).
(2) PM10: An increment of 7 µg/m3 PM10 (interquartile range) increased all-cause mortality after adjustment for smoking and educational level (HR 1.19, 95% CI (1.07-1.31)), cardiopulmonary mortality (HR 1.47, 95% CI (1.25-1.73)), and lung cancer mortality (HR 1.59, 95% CI (1.06-2.39)
(3) NO2: An increase in exposure to NO2 by 16 µg/m3 (interquartile range) was associated with an increased hazard ratio for total (HR 1.18, 95% CI (1.07-1.30), cardiopulmonary (HR 1.91, 95% CI (1.60-2.28), and respiratory mortality (HR 2.03, 95% CI (1.26 – 3.27) after adjustment for smoking and educational level,
4) Trend: Cardiopulmonary mortality related to PM was reduced for the extended follow-up with lower PM10 concentration, but not with NO2 for which the concentrations were reduced only minor.
Conclusions: Long-term exposure to traffic-related air pollution increases all-cause, cardiopulmonary and lung cancer mortality in region with high traffic load in Germany.

THE MULTIFACTORIAL ORIGEN OF VASCULAR DISRUPTION DEFECTS IN CALI, COLOMBIA: A CASE CONTROL STUDY

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Background: Vascular disruption defects(VDD) refer to birth defects caused by alteration of blood flow and decreased availability of O2 in a tissue/organ during a critical period of fetal formation. Surveillance of birth defects in Cali-Colombia is developed under the ECLAMC. An analysis of the spatial and temporal distribution reported a cluster of VDD in the poorest area of the city.
Objective: To evaluate socioeconomic, behavioral and environmental factors potentially associated to VDD in Cali
Methods: A case-control study was carried out between 2007 and 2009. Cases were newborns with VDD(mainly gastroschisis, limb reduction) and normal cariotyping. Controls were normal newborns from the same hospital with conception date +/- two weeks of cases. A questionnaire was applied to collect information about: socioeconomic condition(race, education, income level), behavioral (smoking, alcohol, marihuana and cocaine), environmental exposures(activities with high risk)and diet(folic acid, Zn, Fe). Heavy metals(Cd,Pb,Zn) were determined on hair samples of a subgroup of participants(n=50)
Results: We included 45 VDD cases and 135 controls. Women of racial minorities(black and indigenous) had an increased risk of VDD(OR:2.34;CI95=0.93-5.74). Also, mothers exposed to secondhand smoke during the first trimester had an increased risk OR:3.02(CI95%=1.34-6.8). Although, in univariate analysis, increased levels of cadmium were not related to VDD(OR:1.18;CI95%=0.24–4.74), after adjusting for low levels of Zn the risk increased to 5.22(CI95%=0.41 - 66.19). In addition, exposure to Misoprostol®, a method used for abortion, was associated with VDD(OR:14.14;CI95%:1.29–703.14)
Conclusions: Our results suggest multiple exposures potentially associated to VDD, and increased susceptibility and vulnerability. Environmental and behavioral factors, including the use of recreational drugs, smoking, and periconceptional exposure to sub therapeutic doses of abortion drugs may interact in the etiology of VDD.
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THE IMPACT OF ENVIRONMENTAL FACTORS ON MALARIA IN REPUBLIC OF KOREA

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Background and Aims: After reemerging in 1993, *Plasmodium vivax* malaria has been occurred continuously in the Republic of Korea (ROK). Early after reemergence *P. vivax* malaria mainly occurred in the areas adjacent to the Demilitarized Zone (DMZ) and most patients were soldiers. However, since 2003, the number of civilian patients has been more than soldiers. We aimed to investigate the relationship between malaria and environmental factors, such as climatic factors and land use.
Methods: Malaria data were obtained from Korean Center for Disease Control including incidence date and residence information. Among them we selected civilian and domestic cases excluding soldiers and veterans for the year of 2001-2008. Weather information, such as temperature and rainfall, and land use information were matched with the malaria cases by 47 administrative areas. We fitted to intrinsic autoregressive model to investigate the effect of climatic factors and land use on the increase in malaria adjusting neighboring effect with random effect.
Results: Total civilian cases during the study period were 6,928 showing the most value, 1,295, in 2007. Among environmental factors, temperature for warmer season (May to September), rice paddy area, and river area showed positive correlation with malaria. Gangwha county, located in adjacent to DMZ and seashore, showed the highest log relative risk after adjustment for potential confounding variables. The distances from DMZ presented deterministic to malaria incidence, which implies that malaria situation in ROK has been directly influenced by infected mosquitoes originating from the Democratic People's Republic of Korea (DPRK).
Conclusions: Climate change, such as increase in temperature, can be responsible for elevated malaria transmission risk in ROK in the future. To control malaria in ROK, Climatic factors, land use, and their combined effect should be considered and further study considering human activity is necessary.
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THE EFFECTS OF A HEALTHY DIET PROGRAM ON NUTRITION AND DIET KNOWLEDGE, ATTITUDE AND BEHAVIOR OF PUPILS IN THE ELEMENTARY SCHOOL IN TAIWAN

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Background and Aims: In recent years, there has been a growing importance of issue concerned with childhood weight control in Taiwan. This study was designed to obtain preliminary estimates of the effectiveness of a healthy diet teaching program about nutrition and diet compared with one control group.
Methods: A quasi-experimental research design was conducted in this study. The research target contained 65 students as the experimental group from the fifth grade students of one rural elementary school in central Taiwan and 35 students as the control group from the fifth grade students of another rural elementary school in the same district. Students of the experimental group received a healthy diet teaching courses including food combining, diet, nutrition and healthy eating in two units and the control group did not receive these instructions during the experimental period. Both groups were pre-tested before the intervention and post-tested one month later and the obtained data was statistically analyzed by using paired t-test and t-test. In order to evaluate the effectiveness of the program, a questionnaire including the Scale of Healthy Diet Knowledge (Kuder-Richardson reliability = 0.67), Attitude (Cronbach's α= 0.84), and Behavior (Cronbach's α= 0.74) was designed.
Results: The results on the experimental group showed that the knowledge and behavior scores of the posttest were significantly higher than the pretest, while the control group demonstrated no significant difference between the pretest and the posttest. For healthy diet knowledge on the posttest, the experimental group exhibited a significant increase than did the control group, with no significant difference between the two groups on the pretest.
Conclusions: The results indicated that the healthy diet program had positive effects on students in elementary school. Base on the findings of the study, several recommendations for health promoting school were proposed.
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Association between Daily Mean Air Temperature and Mortality of Respiratory Diseases in Beijing, China: a Case-Crossover Study

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Background and Aims: To explore the association between daily mean temperature and respiratory disease death (ICD10:J00-J99) in Beijing.

Methods: Data of daily death for the respiratory diseases (ICD: J00 -J99) in Haidian District in Beijing in Jan.1, 2004- Dec. 31, 2008 were collected from the local CDC. The corresponding meteorological and air pollution data were collected from the local EPB. The temperature-stratified case-crossover design and Logistic regression model were used for the data analysis. We considered lagged exposures, confounding by air pollution and other meteorological factors.

Results : After adjusting the influence of air pollutants (e.g. SO_2, NO2, PM10) and other meteorological factors (relative humidity, wind speed and atmospheric pressure), for 1□ increase in the daily mean air temperature, the corresponding increase of daily death for the respiratory diseases was 7.3% (OR=1.073, 95% CI: 1.002-1.149) within the range (15-25□) and 25.7% (OR=1.257, 95%CI: 1.115-1.416) over 25□ respectively. No significant associations were observed statistically within the temperature below 15□.

Conclusions: The increase of daily mean air temperature may be a risk factor for the daily respiratory disease death when the temperature is higher than 15□, and the adverse effect of the temperature increase is greater over 25□ than the range 15-25□.

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SHORT-TERM VARIATION IN AIR POLLUTION TRIGGERS ACUTE REJECTION AFTER LUNG TRANSPLANTATION

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Background and Aims: Epidemiological studies demonstrated that fine particulate air pollution (PM) can trigger adverse health outcomes. Recently, we demonstrated that chronic exposure to air pollution is associated with increased risk of chronic rejection and mortality after lung transplantation. In the present study, we investigated whether short-term elevations in ambient PM_{10} increased the risk of acute rejection after lung transplantation.
Methods: All transbronchial biopsies from a routine follow-up of 355 transplanted patients at the University Hospital Leuven were included. Acute perivascular and peribronchial rejection was scored and % BAL neutrophils and serum CRP were assessed. We used land use data to calculate the background level of PM_{10} for each participant's home address using a kriging interpolation method. We estimated % BAL neutrophils, serum CRP and the risk of acute rejection in relation with outdoor PM_{10} concentrations on the day of tissue sampling and up to five days before. The model was adjusted for covariates such as age, sex, post-operative day (POD) and daily temperature..
Results: The odds of acute rejection increased by 30% (95% CI: 4-61%) for each 10 µg/m³ increment in ambient PM_{10} concentration three days before the day of biopsy (lag day 3). Log-transformed neutrophils and serum CRP were significantly related to PM_{10} as well. For each 10 µg/m³ increment in ambient PM_{10} concentration on lag day 2, % BAL neutrophils increased by a factor 1.09 (95%CI 1.01-1.18) and serum CRP increased by a factor 1.10 (95%CI 1.02-1.18).
Conclusions: We showed that short-term variation in ambient air pollution acts as a trigger of acute rejection after lung transplantation, probably mediated by a pro-inflammatory response.

ASSESSMENT OF THE TEMPORAL STABILITY OF LAND USE REGRESSION MODELS FOR TRAFFIC-RELATED AIR POLLUTION

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Background and Aims: Land-use regression (LUR) models have been used to estimate exposure to traffic-related air pollution in epidemiologic studies, based on the assumption that the spatial patterns of pollution are stable over time. Under this assumption, a LUR model developed from a particular time point can be applied to other time points. However, this assumption of temporal model stability has not been adequately examined, and has specific relevance to cohort studies where models are developed in specific years and then applied to cohorts over periods of ~10 years.
Methods: A LUR model for annual average NO_2 in Metro Vancouver was developed in 2003, based on measurements at 116 locations (Henderson et al 2007). In 2010, we repeated measurements at the same locations and developed a new model using updated data for the same predictor variables. The temporal stability of LUR models over a 7-year period was evaluated by comparing model predictions and measured spatial contrasts between the two time periods.
Results: Annual average NO_2 concentrations decreased from 2003 to 2010 at 78% of the 73 measurement sites that were identical for the two periods. The correlation between measurements at these sites was 0.78 with a mean (sd) decrease of 1.3 (1.7) $\mu g/m^3$. LUR models from 2003 and 2010 explained 52% and 66% of the observed spatial variation, respectively. The 2003 model explained 52% of variability in 2010 measurements (forecast), as much as it did in the 2003 (concurrent) measurements. The 2010 LUR model explained 51% of the variability in the 2003 measurements (back-cast), less than it did in the 2010 measurements; however, the back-cast explains nearly the same amount of variability in the 2003 measurements as did the original (2003) model.
Conclusions: These results support the validity of applying LUR models to cohort studies over periods as long as 7 years.
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STUDY ON SYNTHESIS OF SILVER NANOPARTICLE DECORATED ZSM-5/MCM-41 MULTIPOROUS COMPOSITE AND ITS ANTI-BACTERIA

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Background and Aims: Silver itself is known as one of the most interesting antibacterial materials. It is generally believed Ag+ can bind to bacterial cell wall membrane (slightly negative), damage it and so alter its functionality. In this report we investigate the preparation of ZSM-5/MCM-41 multiporous composite containing silver (Ag-MC-Z5) and the influence of silver concentration on disinfection capability of Ag-MC-Z5 nano-antibacterial material.
Methods: Silver nanoparticle decorated ZSM-5/MCM-41 multiporous composite has been prepared by using ion-exchange method with change of Ag concentration: 0.1; 0.3; 0.5; 0.7; 0.9 wt%. Formation of Ag nanoparticles, size and shape of Ag-MC-Z5 nano-antibacterial material were determined by X-Ray diffraction (XRD), scanning electron microscopy (SEM) and transmission electron microscopy (TEM). The antibacterial activity of silver nanoparticles against E. coli was investigated as a model for Gram-negative bacteria.
Results: The results showed the presence of spherical nanosized Ag particles about 3 nm – 4 nm. By the initial Ag concentration of nanosized materials were at least 0.5 wt%, it is noted that growth inhibition rates against E. coli was 100 % as the initial concentration of E. coli was 1.5×10^5 CFU/ml and contact time was 10 minutes.
Conclusions: Ag-MC-Z5 nano-antibacterial material has been successfully prepared. E. coli antibacterial activity of Ag-MC-Z5 nano-antibacterial material was better than that of the other materials containing silver such as silver - charcoal, Ag-TiO_2.

Keywords: ZSM-5/MCM-41 multiporous composite, silver, nano-antibacterial material, E. Coli, ion-exchange.

TAP WATER CONSUMPTION, EXPOSURE TO TRIHALOMETHANES DURING PREGNANCY AND WEIGHT GAIN IN THE FIRST SIX MONTHS OF LIFE

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Background and Aims: There is some evidence that *in utero* exposure to trihalomethanes (THMs) – the most prevalent disinfection-by-product – is negatively associated with birthweight. How postnatal growth could be modified had not been studied in human. In rats, impaired postnatal growth was reported in offspring of dams exposed to chloroform. We studied the relationship between tap water consumption and exposure to THMs during pregnancy with weight gain between birth and six months in the INMA (Spain) and RHEA (Greece) mother-child cohorts.
Methods: INMA in Gipuzkoa (N=449), Sabadell (N=533) and Valencia (N=645) and RHEA in Crete (N=939) included 2,566 mother-child pairs. Weight gain was calculated as the weight difference between birth and six months. THMs levels were evaluated through *ad hoc* sampling campaigns and regulatory data, modelled and combined with personal water uses to estimate personal exposure during pregnancy. Regression models took into account confounders such as gender, birthweight, parity, maternal weight, smoking, education.
Results: Median [Interquartile Range] THMs levels (microg/l) were 16 [12-20] in Gipuzkoa, 117 [102-127] in Sabadell, 5 [4-69] in Valencia and 1.0 [0.3-4.1] in Crete. Respectively, 90%, 20%, 32% and 17% of the mothers consumed tap water during pregnancy. Six months weight gain ranged from 4.15kg in girls from Gipuzkoa to 4.90kg in boys from Crete. In a pooled analysis, infants of mothers who declared to consume tap water during pregnancy tended to have a lower weight gain (-69g; p=0.06), particularly in Sabadell (-160g, p=0.03), but no dose-response relationship with amount of consumed tap water was observed. No significant relationship was found in any cohort with chloroform or brominated THMs through ingestion, bathing or showering.
Conclusions: Characteristics were heterogeneous between the cohorts, for both outcomes and exposures. Overall, results do not suggest that tap water and more specifically THMs exposures are associated with early postnatal weight growth.

DOSE EFFECTIVENESS OF CALCIUM SUPPLEMENTATION ON REDUCING CHILDREN'S BLOOD LEAD LEVELS IN INDONESIA

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Background and Aims: Population exposures to lead are mainly related to: vehicle exhaust, in areas where leaded-gasoline is still being used; paint and lead solder in canned food; drinking water pipes; and from certain culturally-based exposures, such as use of lead-glazed ceramics or traditional medication. It is well documented that excess exposure to lead causes health problems in children including neurobehavioral deficits. The objective of this study was to examine the effectiveness of daily calcium supplementation doses on reducing blood lead levels (BLLs) among elementary school children in Bandung, Indonesia.
Methods: A community trial study design was used for this study. Forty elementary schools were randomly selected, 400 children enrolled, and a total of 298 children completed follow-up of 3 months period. Schools were divided randomly into two groups of calcium-supplement intervention groups (250 mg and 500 mg). Capillary blood samples were analyzed for lead levels before and after three months of calcium supplementation. Paired-t test, and multivariate risk factors models using Generalized Estimating Equations (GEE) were performed.
Results: The percent reduction in BLLs was 49.8% for group of 250 mg Ca and 74.5% for group of 500 mg Ca. This study found no different association between groups. The reduction in BLLs was associated with calcium supplement, nutritional status, and time of trip to school.
Conclusion: Calcium supplement dose of 250 mg per day was effective to reduce children blood lead levels up to 50%.
Recommendation: These findings suggest that calcium supplementation dose of 250 mg provides a protective effect against lead exposure among school-aged children.

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DOES SOCIO-ECOLOGICAL FACTOR DRIVE THE SPATIOTEMPORAL PATTERN OF PANDEMIC INFLUENZA A (H1N1) IN BRISBANE, AUSTRALIA?

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Introduction: Pandemic influenza A (H1N1) has a significant public health impact. This study aimed to examine the effect of socio-ecological factors on the transmission of H1N1 in Brisbane, Australia.
Methods: We obtained data from Queensland Health on numbers of notified daily H1N1 in Brisbane by statistical local areas (SLA) in 2009. Data on weather, socio-economic index were obtained from the Australian Bureau of Meteorology, the Australian Bureau of Statistics, respectively. A Bayesian spatial conditional autoregressive (CAR) model was used to quantify the relationship between variation of influenza and independent factors and to determine its spatiotemporal patterns.
Results: Our results show that average increase in weekly H1N1 cases were 45.04% (95% credible interval (CrI): 42.63 – 45.01%) and 23.20% (95% CrI: 16.10 – 32.58%), for a 1^{o}C decrease in average weekly maximum temperature at a lag of 1 week and a 10mm decrease in average weekly rainfall at a lag of 1 week, respectively. An interactive effect between temperature and rainfall on H1N1 incidence was found (changes: 0.71%; 95% CrI: 0.48 – 0.98%). Auto-regression term was significantly associated with H1N1 transmission (changes: 2.5%; 95% CrI: 1.39 – 3.72). No significant association between socio-economic indexes for areas (SEIFA) and H1N1 was observed at SLA level.
Conclusion: Our results demonstrate that average weekly temperature and rainfall were substantially associated with H1N1 incidence at a SLA level. The ecological factors seemed to have played an important role in H1N1 transmission cycles in Brisbane, Australia.

ISEE Symposium

Prenatal exposure to POPs and age of puberty

INFLUENCE OF PERFLUORINATED COMPOUNDS (PFCS) EXPOSURE ON DEVELOPMENT AND HORMONES OF CHILDREN FROM THE DUISBURG BIRTH COHORT STUDY

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Among the Duisburg Birth Cohort Study which was initiated 2000-02 (Wilhelm et al., 2008, Mutat. Res. 659, 83-92) we studied associations between prenatal and postnatal PFOS and PFOA exposure and infants development and hormones. 149 mother-newborn pairs were included in the PFC study. Blood PFC levels were measured in pregnant women, in newborns, and in children at ages 6-8 years. Outcome measurements were birth weight, neurodevelopment (Bayley scales motor and mental development of infants) at 12 and 24 months, assessment of the gender role behavior in young children (Pre-School Activities Inventory (PSAI) at 6-8 years. Estradiol, testosterone, thyroid hormones (TSH, T3, T4, fT3, fT4), were measured in cord serum and at ages 6-8 and 8-10 years, dihydroxyepiandrosteronesulphate (DHEA-S) was analyzed at ages 8-10 years. Median PFOA and PFOS concentrations in serum samples were as follows: pregnant women 2.7 (PFOA) and 8.9 (PFOS) µg/l, cord serum 2.0 (PFOA) and 2.9 (PFOS) µg/l, at age 6-8 yrs 4.6 (PFOA) and 3.6 (PFOS) µg/l. The prenatal PFOS/PFOA concentrations are correlated with the concentrations at 6-8 yrs after birth. Multivariate regression analysis revealed no significant associations between the birth outcomes and thyroid hormones of the newborns and the prenatal PFOA/PFOS exposures. Prenatal PFOS exposure was negatively associated with the mental development at 12 months of infants. This effect was more pronounced in German children (mean decrease 1.7%; 95% CI 0.2% - 3.1% per doubling of exposure). We also found associations between the prenatal PFOA/PFOS concentrations, and the gender role behaviour at 6-8 yrs, the sexual hormones and the DHEA-S levels at age of 8-10 years. Conclusion: PFOS influences early mental development at a low level of effect. This effect disappears when the children are getting older. PFOA and PFOS seem to be involved in adrenal maturation and pubertal development.

BPA IS RELATED TO ABNORMAL LIVER FUNCTION : THE KOREAN ELDERLY ENVIRONMENTAL PANEL STUDY (KEEPS)

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Background and Aims : Bisphenol A(4,40-isopropylidenediphenol, BPA) is known to have adverse effect on various organs. Liver has been reported to be affected in previous animal studies, however there were few human studies and the mechanism is not clear. Our study tried to evaluate the relationship between BPA level and liver function in human using repeated measurement data.
Methods : From 2008 to 2009, a total of 556 elderly participants dwelling in Seoul were evaluated repetitively. At the first visit, demographic data, environmental exposure and habitual histories were gathered through a systemized questionnaire. Blood and urine samples were gathered at the same time and stored for analysis. Generalized linear mixed models were performed adjusting for age, sex, body mass index, drinking, smoking, exercise frequency and cholesterol level.
Results : Mean urinary BPA level were 1.03 μg/g creatinine. Higher urinary BPA levels were associated with elevated liver enzyme levels in a fully adjusted model (ALT, gamma-GTP were significant at $P<0.01$, AST showed marginal significance). Because BPA levels were significantly associated with BMI, we evaluated the BPA-liver relationship with or without controlling for BMI. The association of BPA with abnormal liver function remained significant regardless of controlling for BMI.
Conclusions : Our results suggest that BPA has adverse effect on liver in human. BPA may affect liver function independently from the pathway of obesity.

AMBIENT POLLUTION AND BIRTH OUTCOMES

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Background and Aims: Environmental and personal factors acting during pregnancy may result in adverse birth outcomes, and consequently ill-health in the growing infant. This pilot tested methods for sample selection, field instruments, biological testing and exposure assessment for a future birth cohort study investigating the association of respiratory health and ambient pollution.
Methods: Pregnant women selected from public sector antenatal clinics in the industrially polluted south Durban (n=50) and the less industrialised, north Durban (n=50) were interviewed about their health status, obstetric history, exposure, smoking and nutritional history. Maternal tests for oxidative stress, allergy, atopy and genetic polymorphisms, together with cord blood for heavy metals and neonatal genetic testing, were conducted. Birth outcomes were assessed at the time of delivery. We describe the early analysis of data from this study.
Results: Mean age among participants did not differ from the south (25.1 years) compared to the north (25.7 years). There was minimal evidence of chronic diseases, with prevalences of TB, asthma, chronic bronchitis, emphysema, hypertension and diabetes less than 1%. There were two stillbirths and 8.7% low birthweight (<2.5kg) newborns, Unadjusted risks for low birthweight were increased for those living among higher industrial pollution (RR=3.5, 95% CI: 0.9 - 14.47) and those exposed to motor vehicle fuel or exhaust emissions (RR=3.8, 95%CI: 1.16-12.1). Biochemical evidence of oxidative stress did not vary between north and south (Malondialdehyde was 0.06µM and 0.07µM between north and south respectively, while mitochondrial depolarisation was 43.9% and 44.5% respectively). These markers were not associated with low birthweight. HIV status was not associated with low birthweight.
Conclusions: This pilot study successfully tested methodological challenges in preparation for a birth cohort study investigating ambient pollution and respiratory outcomes. Although not a primary focus of the pilot, preliminary data analysis suggests environmental exposure related risks for low birthweight outcomes.

OCCUPATIONAL EXPOSURES AND CHRONIC OBSTRUCTIVE PULMONARY DISEASE IN A HIGH TUBERCULOSIS PREVALENCE POPULATION

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Background and Aims: Occupational exposures are associated with chronic obstructive pulmonary disease (COPD). These associations have not been investigated against the background of tuberculosis, a risk factor for COPD. This study investigated the relationship between occupational exposures and COPD in a population with a high prevalence of TB.
Methods: Pulmonologist diagnosed cases (n=110) were selected from specialist respiratory clinics at public sector hospitals, and frequency sex and age matched controls (n=102) were selected from other chronic disease clinics at the same institutions. Occupational exposure histories, smoking and other risk factors for COPD were obtained through interviews. Exposure variables included exposure to dusts and chemicals, gases and fumes (CGF). The ALOHA Job Exposure Matrix (JEM) were used to complement the self-reporting variables in the analyses. Odds ratios (OR) were calculated from logistic regression models, adjusting for smoking and past history of tuberculosis. Population attributable risk % (PAR%) was also calculated.
Results: The adjusted OR's for risk of COPD from self-reported high dust exposure-years and high chemical, gases and fume (CGF) exposure-years were 5.9 (95% CI 2.6-13.2) and 3.6 (95% CI: 1.6-7.9) respectively. The adjusted OR's from the JEM derived high cumulative exposure ranged from 1.1 (95% CI 0.6-2.4) to 2.1 (95% CI 1.1-4.2). Among smokers, there was an increased risk for COPD among those exposed to dust (OR=3.1; 95% CI: 0.4-23.9) and CGF (OR=2.3; 95% CI: 0.4-14.4). TB was a risk factor for the development of COPD (OR ranging from 7.7-8.1). The PAR% for COPD from the JEM high cumulative exposure variables ranged from 2.2% for mineral dust to 14.6% for CGF.
Conclusions: Lifetime occupational exposures contribute to the risk of COPD, adjusted for smoking. These risks are present in populations with a high burden of tuberculosis which is generally considered an important causative factor.

CHILD EXPOSURE TO ENVIRONMENTAL TOBACCO SMOKE DURING PRENATAL PERIOD

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Background and Aims: Worldwide, it is estimated that 250 million women smoke cigarettes every day. Despite the adverse health consequences of tobacco smoking and exposure during pregnancy, the percentage of pregnant women who smoke remains extremely high. The aim of the study was to evaluate the prenatal child exposure to environmental tobacco smoke.

Methods: The study population consisted of 1093 pregnant women from different regions of Poland among whom detail questionnaires were conducted three times during pregnancy period. From all women included into the study the saliva sample was collected to verify smoking status in pregnancy. The cotinine level in saliva was analyzed using high performance liquid chromatography coupled with tandem mass spectrometry/positive electrospray ionisation (LC-ESI^+MS/MS) and isotope dilution method.

Results: The percentage of pregnant women who smoked cigarettes decreased from 17.6% at the beginning of pregnancy to 14.1% at 12 weeks of pregnancy and 10.9% at 32 weeks of pregnancy. The highest percentages of smokers were noted among single women with lower educational level and unemployed. The sensitivity of questionnaire was 73% and cotinine as the biomarker of exposure 93%. About 70% of pregnant women were exposed to environmental tobacco smoke.

Conclusions: All effort should be taken to eliminate the pregnant women exposure to active and passive smoking.

ENVIRONMENTAL TOBACCO SMOKE EXPOSURE - PREGNANCY OUTCOMES AND CHILDREN'S HEALTH

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Background and Aim: Environmental tobacco smoke exposure (ETS) is associated with poor pregnancy outcomes including increases risk of spontaneous abortion, stilbirth, preterm delivery, low birth weight and sudden infant death syndrome. ETS exposure after birth can increase the risk of sudden infant death syndrome, respiratory infections, asthma, middle ear diseases and it can cause neurodevelopmental and behavioral problems in children. The aim of the study was to analyze the influence of environmental tobacco smoke exposure on pregnancy outcome and children's health.

Methods: The study population consisted of pregnant women (N=640) and their children (N=190) followed up to two years of life. Pregnant women were interviewed three times during pregnancy. From all women included into the study the saliva sample was collected three times to verified smoking status. Assessment of child ETS exposure within two years after birth was based on questionnaires conducted with mothers, confirmed by biochemical verification of cotinine level in child urine. Cotinine level in biological samples was analyzed using high performance liquid chromatography coupled with tandem mass spectrometry/positive electrospray ionisation (LC-ESI$^+$MS/MS) and isotope dilution method. Pregnancy outcome including: birth weight, length, head and chest circumference was noted by neonatologist. The children's health focused on anthropometry indicators and the incidences of upper and lower respiratory tract infections, allergy and asthma was performed by pediatricians during the first and second year of life.

Results: Multivariative analysis (including gender, gestational age and parental educational status) indicated that the newborn of smoking mothers had significantly lower birth weight (coef. - 307g, $p<0.001$), length (coef. – 1.4cm, $p=0.02$), head (coef. – 0.7cm, $p=0.002$) and chest circumference (coef. – 0.8cm, $p=0.003$). There were no statistically significant associations between ETS exposure and anthropometric measurements within first two years of life. Such exposure increases the risk of respiratory diseases but the results were not statistically significant.

Conclusions: All effort should be taken to eliminate the child ETS exposure both durirg prenatal and postnatal period.

DENTAL HEALTH FOLLOWING CHILDHOOD EXPOSURE TO IONIZING RADIATION

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Background and aims: Exposure to high doses of ionizing radiation (4-30Gy) in childhood may cause dental abnormalities including root and crown defects, caries and decreased parotid secretions. Data on the effects of lower dose radiation to teeth is sparse. This study aimed to examine the long-term effects of radiation given as treatment for tinea capitis (TC) in childhood on dental health.
Methods: The target population included a subsample of 426 irradiated and 401 non-irradiated subjects from the TC cohort (estimated dose to teeth 0.2-0.4Gy). For each of the 253 irradiated and 162 non-irradiated who agreed to participate, a personal interview and a dental examination were performed. The questionnaire covered socio-demographic parameters, smoking, history of diseases and an oral hygiene habits section. The DMFT (decayed (D), missing (M), and filled (F)) index for permanent teeth was used to determine caries experience. Ordered multivariate logistic regression model was used to assess factors (gender, age, education, income, religiosity, smoking, diabetes, oral hygiene habits, dental visit and radiation status) associated with increasing DMFT values.
Results: Rates of 14.6% and 7.4% for complete missing teeth were found among irradiated and non-irradiated individuals, respectively (p=0.02). Irradiated subjects had significantly higher DMFT mean values compared to the non-irradiated (18.6$\pm$7.5 vs. 16.4$\pm$7.2, p=0.003, respectively). Controlling for the above mentioned covariates, irradiation was associated with a 60% increased risk for high DMFT (95%CI 1.08–2.33). Female gender, primary school education, current smoking and poor oral hygiene were found to be independently associated with high DMFT.
Conclusion: Our data suggest that childhood exposure to relatively low doses of ionizing radiation play a role in late outcomes of dental health. This should be taken into account when discussing the increasing use of diagnostic modalities in medicine in general as well as in dental procedures.

ASSOCIATION BETWEEN SLEEP DISTURBANCE, MELATONIN AND FEMALE BREAST CANCER

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Background and Aims: According to a 2007 Taiwan Annual Mortality Report, female breast cancer was the fourth of the top 10 cancer mortality. Ever since the industrial revolution, there has been a steady increase of working hours among female workers. Moreover, it can be argued that part of the breast cancer causing risk could be due to the suppression of melatonin in electric lighting post industrialization era. The aims of this study are to assess the association between melatonin level, sleep disturbance and female breast cancer.
Methods: This case-control study design was conducted from Sep. 2008 to Feb. 2009 in a medical center in Taipei, Taiwan. The study has been approved by the Institutional Review Board of the medical center. A self-report questionnaire was used to collect the demographic data, environmental factors, occupational exposure, family history, etc. Simultaneously, blood and urine samples were collected from volunteers during the OPD. Multiple linear regression and multiple logistic regression were used to assess the association of interests and potential confounders.
Results: There were 140 breast cancer cases and 983 controls in total. After the adjustment for confounders, we found that sleep disturbance were associated with female breast cancer (OR Ž 2.71 ž 95%CI: 1.56- 4.72). The cases' melatonin concentration of urine was lower than controls, which was significant difference after the match on age.
Conclusions: According to the result, we confirmed in the preliminary result that sleep disturbance and low melatonin concentration were some of the risk factors for breast cancer.
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INCREASING RISK OF CARDIOVASCULAR DISEASE IN NON-REGULAR SHIFT WORK OF OCCUPATIONAL WORKERS WITH OBSTRUCTIVE SLEEP APNEA

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Background and Aims: Workers with non-regular shift work could lead the high risk of obstructive sleep apnea (OSA) occurred. OSA was one of the independent risk factor for cardiovascular disease (CVD). However, limited studies have been postulated the relations between OSA and CVD among occupational workers. The objectives of this study were to estimate the severity of OSA and risk of CVD, and to build the potential mechanistic relations of biomarkers including oxidative stress and inflammatory markers with OSA and CVD.

Methods: We recruited 189 non-regular shift workers who examined by polysomnography (PSG) to gain the the apnea-hypopnea index (AHI) and divided into normal (AHI<5) and OSA (AHI Ž 5) groups. Blood and urine samples were collected to analyses the biomarkers of inflammation and oxidative stress such as TNF-• , interleukin-10, MDA, and 8-OHdG. High-sensitivity C-Reactive Protein (hs-CRP) and homocystein were also analyzed to be the CVD risk biomarkers of early response. Ten years CVD risk was calculated by the index from Framingham Heart Study.

Results: The results show that group of OSA in CVD risk is 9.4%, which is significant higher than normal group (7.9%, p=0.048). Significant increase of OSA group compared with normal group was also shown in hs-CRP (p=0.019). Moreover, the same patterns were showed in TNF-• and MDA, indicating the workers with OSA could have more inflammation and oxidative stress level than normal group.

Conclusion: Non-regular shift workers with OSA could lead the raising CVD risk and the oxidative stress and inflammation might be the potential mechanism.

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MEASUREMENT OF EMERGING ENVIRONMENTAL CONTAMINANTS IN EUROPEAN BIRTH COHORTS: AN INVENTORY AND RECOMMENDATIONS

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Background and Aims: There are emerging concerns about potential effects on child health and development of early-life environmental exposure to substances such as brominated flame retardants (BFRs), perfluorinated compounds (PFCs), phthalates and phenols (including bisphenol A – BPA). A number of pregnancy and birth cohort studies are now measuring such exposures. Early collaboration between these ongoing studies will improve potential for future comparison and combined studies. Our aim is therefore to provide an overview of planned, ongoing and published biomarker measurements of emerging contaminants in European birth cohorts.
Methods: The ENRIECO inventory of birth cohorts in Europe (www.birthcohortsenrieco.net) was used to identify measurements of BFRs, PFCs, phthalates, phenols, and other compounds of emerging concern. Furthermore, publications were searched to obtain information on measured concentrations of these chemicals.
Results: Very few European cohorts have already carried out measurements of emerging contaminants; only 7 have published exposure levels. Measurements of BFRs are ongoing or planned in 11 European birth cohorts; measurements of PFCs in 10, of phthalates in 13 and of BPA in 7. Only 2 cohorts are also measuring other exposures such as parabens, triclosan and benzophenone. Biological matrices and timing of the measurements vary considerably between cohorts. BFRs have been determined mostly in blood, breast milk, and placenta, whereas PFCs have been measured mostly in blood (plasma and serum). Urine has been the most used biological matrix to measure phthalates and phenols. Most measurements are conducted prenatally or at birth and generally the measurements involve few subjects in each cohort (a few hundred maximum).
Conclusions: Although there is currently not enough data in the cohorts to combine data, many measurements are ongoing and within a few years there will be possibilities for comparison studies. Cohorts should work together to develop conversion models and inter-laboratory comparisons that will allow future combined studies.

METALS EXPOSURE IN PREGNANT WOMEN IN WESTERN AUSTRALIA

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Background and Aims: The Australian Maternal Exposure to Toxic Substances (AMETS) study was initiated to measure the exposure of pregnant women in Western Australia to a range of persistent toxic substances in the environment. Sample collection for this study is continuing until April 2011, however preliminary results for metals in blood and urine are now available.
Methods: Pregnant women from across Western Australia have been recruited via local hospitals and the community. To date 157 women have provided blood and urine samples for the study, of which 80 blood and 120 urine samples have been analysed for metals. Participants have also completed a questionnaire and diet diary and provided samples of their household drinking water, soil and dust.
Results: Metals concentrations were low in biological samples with the exception of cadmium and uranium which were elevated with respect to the international literature (B-Cd mean 0.90µg/L, range 0.12-2.77µg/L; B-U mean 0.08µg/L, range <0.01-0.22µg/L; U-Cd mean 0.92µg/L, range 0.2-2.8µg/L; U-U mean 0.01µg/L, range <0.01-0.17µg/L). Copper concentrations were variable (B-Cu mean 1447µg/L, range 0.27-2410µg/L; U-Cu 11.8µg/L, range 1.4-55.3µg/L). Thirty percent of participants (aged 19-44 years), had urine cadmium concentrations of >1µg/L and almost 50% of participants had creatinine adjusted concentrations of >1µg/g (median 0.29µg/g, range 0.29-4.65µg/g). Concentrations of metals in soil, dust and drinking water samples were generally low.
Conclusions: Elevated biological cadmium and uranium concentrations were found in pregnant women in Western Australia. These concentrations were at levels which have the potential to increase the risks of health effects, such as decrements in bone density, in the women in later life. Environmental concentrations appeared to explain little of the variance in biological concentrations, as did the other variables collected. These results for Australia confirm those conducted in other locations where diet is the likely main source of metals exposure.

LAND USE REGRESSION MODELS OF PM_{10} AND NO_2 CONCENTRATIONS IN TAIPEI

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Background and Aims: This study developed land use regression models to assess long-term exposure to ambient particulate matters of PM_{10} and NO_2, in order to minimize the exposure misclassification and achieve better individual exposure assessment for the Taiwan cohorts of the ESCAPE study.

Methods: We used a population density based sampling strategy to select 40 locations as our NO_2 measurement sampling sites in Taipei, while PM_{10} measurements were conducted at 20 sites among them, and one additional background site for annual average adjustment. PM_{10} and NO_2 concentrations were monitored simultaneously by using Harvard Impactors and Ogawa passive samplers respectively for 2-week period in three seasons during 2009 and 2010. With collected land-use datasets, containing land-cover and traffic related data, we conducted the GIS analyses to obtain a series of potential predictor variables in concentric circle buffers with several radii ranging from 25 to 5000m of each monitoring site. Based on stochastic modeling techniques, we combined the average concentrations and values of predictor variables in stepwise procedure to develop the final LUR models for PM_{10} and NO_2.

Results: The adjusted annual concentrations were 48.6±5.9 • g/m^3 for PM_{10} and 26.0±6.5 ppb for NO_2. There were 3 predictors for the final model of PM_{10} (adjusted R^2=0.78), including major road length within 25m, industry areas within 1000m, and high density residential areas within 100m. And there were 4 predictors for the NO_2 model (adjusted R^2=0.66), including low density residential areas within 500m, major road length within 25m, urban green areas within 300m, semi-natural and forested areas within 500m.

Conclusions: Our study indicates that exposure to PM_{10} and NO_2 for subjects in Taiwan cohorts of the ESCAPE study can be well estimated by LUR models with 3-4 predictors.

SPATIOTEMPORAL CLUSTERING ANALYSIS OF DENGUE INCIDENCE IN BANGLADESH

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Background and Aims: There has been little research into the spatial distribution and clustering of dengue in Bangladesh, where dengue is endemic and occurring every year since 2000. This study examined the spatial distribution of dengue at district level and identified the district with a high relative risk of dengue in Bangladesh, using geographical information system techniques.

Methods: Data on monthly confirmed dengue cases in each district from January 2000 to December 2009 were provided by the Directorate General of Health services, Dhaka, Bangladesh. Relevant population data and electronic boundaries of each district were obtained from Bangladesh Bureau of Statistics. We identified the spatiotemporal clusters of dengue across districts using SaTScan software. The output from SaTScan was merged into the attribute table to map the spatiotemporal clusters using MapInfo professional.

Results: The results indicate that the Dhaka district had the highest risk of dengue incidence from January 2000 to December 2004 (RR = 80.39). During January 2000 Khulna district and 14 other districts of the southern part of Bangladesh were identified as secondary clusters.

Conclusions: There was a notable spatial difference in relative risk of dengue cases at the district level in Bangladesh. Some districts had significant clusters of high risk for dengue. The socio-environmental determinants of the geographical difference of dengue incidence should be addressed in future research.

OCCURRENCE AND POTENTIAL DETERMINANTS OF VISUALLY INDUCED SYMPTOMS IN SPECTATORS OF THREE DIMENSIONAL (3D) STEREOSCOPIC MOVIES

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Background and aims. The increasing popularity of commercial movies showing three dimensional (3D) computer generated images has raised concern about image safety and possible adverse side effects on viewers. We aim to quantify the occurrence and potential determinants of visually induced symptoms in spectators of 3D movies.
Methods. Self administered questionnaires were distributed to individuals who saw a 3D movie in a cinema in the past 6 months. The questionnaire contains 20 items related to socio-demographic, individual and movie vision characteristics and visually induced symptoms (internal consistency of symptom section, Chronbach alpha=0.69). We asked to report symptoms at 3 different times: during, right after and after 2 hours from movie vision.
Results. We enrolled 177 adults (age range: 18-64 years). At least 1 symptom was reported by 61% of participants. Symptoms were reported by 54.5% individuals during the movie vision, by 35.7% right after and by11% after 2 hours from the vision. The most frequent symptoms were tired eyes (reported by 35.1% during; 13.6% right after; 3.2% after 2 hours), dizziness (14.3%, 9.1%, 0.6%) and headache (12.3%, 2.3%, 5.2%). Significant associations during the movie vision were: Tired eyes – freq. car sickness OR 2.19; 95%IC 1.06-4.52; Tired eyes – daily computer use OR 2.14 (95%IC 1.04-4.39); Dizziness-frequent headache OR 3.05 (95%IC 1.13-8.24); Dizziness- frequent car sickness OR 3.33 (95%IC 1.29-8.6). After the movie vision: Nausea– lateral and close to the screen viewing position OR 5.31 (95%IC 1.16-24.2)
Conclusions. Visually induced symptoms can result from the vision of 3D movies in cinemas. The high occurrence of symptoms, although of mild intensity and rapid disappearance, and the resulting associations with some individual and vision characteristics suggest to get additional insights on individual susceptibility factors.

CONTRIBUTION OF RADON PROGENY TO TOTAL LUNG DOSE AND ITS RELATION WITH LUNG CANCER MORTALITY AMONG FRENCH URANIUM MINERS

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Background and aims: Uranium miners are exposed to radon gas and its short-lived progeny (RnP), long-lived radionuclides and external gamma rays. While the lung cancer risk related to radon exposure has been widely studied, the effect of the other ionizing radiations is not well known. The aim was to assess the risk of lung cancer death associated with lung doses due to these multiple types of radiation exposure in the French cohort of uranium miners.
Methods: The cohort included 3,271 exposed miners followed from 1956 through 1999. Annual exposures were assessed individually. Lung doses were calculated according to the Human Respiratory Tract Model (Publication 66 of the International Commission on Radiological Protection). Exposure-risk relations were estimated by a linear excess relative risk (ERR) model and Poisson regression was used to fit the model.
Results: Mean alpha and non-alpha absorbed doses were equal to 78 and 56 milliGray (mGy), respectively. RnP accounted for 97% of the alpha absorbed dose. A significant ERR of lung cancer death was associated with the total absorbed lung dose (ERR/Gy [95%CI] = 2.9 [0.8-7.5]), the alpha absorbed dose (4.58 [1.3-10.9]) and RnP (4.6 [1.3-11.2]). Assuming a value of 20 for the relative biological effectiveness of alpha particles in lung cancer induction, the ERR/Gy-equivalent for the total-weighted lung dose was 0.2[0.1-0.5], similar to that for the alpha-weighted and RnP-weighted lung dose.
Conclusions: These first results about lung doses from the European Alpha-Risk project, with regard to the lung dose distribution, support the major role of RnP in the risk of lung cancer death.

PERSONAL EXPOSUREAND RISK ASSESSMENT OFVOLATILE ORGANIC COMPOUNDS OF ELEMENTARY CHILDREN

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Background and aims: Volatile organic compounds (VOCs) are important due to frequent presence in the environment and associated adverse health risks. VOCs are largely originated from mobile and industrial sources in ambient air. Although, several studies foundan association between long-term VOC exposure to traffic-related and/or industrial-relatedemissions and possible health effects. A few studies investigated VOC exposure in children. In this study, we assessed personal exposure to VOCs in children with different districts in terms of traffic intensity and industrial factory density, and in different seasons (fall and spring). **Methods:** Passive samplers were used to collect long term and wide range of ambient VOCs. Children wore passive samplers for 7 days. Sample extracts were analyzed by gas chromatography / mass spectrometer (GC/MS).**Results:**TVOC concentrations of spring and fall are 9.13~156.34ppb and 27.96~123.45 ppb at the industrial-area school, 9.97~86.99 ppb and 25.29~139.58 ppb at the traffic-area school, and 0.39~121.14 ppb and 12.84~151.06 ppb at the background school, respectively. Concentration magnitudes in descending order are industrial-areaschool, traffic-areaschool and background school.Concentrations are higher in fall than those in spring.Among VOCs, benzene, toluene, m-xylene, p-xylene and o-xylene are abundant VOCs. BTEX and TVOC indoor concentrations weresignificantlyhigher in the traffic andindustrial areas. **Conclusion:**Traffic and industrial school areas have a high concentration of VOC.The dataobtained in this studycan be used to estimate and represent children's VOC exposure in Kaohsiung city.Further study is neededto measure the impact of VOC on the health of the children in Kaohsiung city.

Key words：Volatile organic compounds (VOC), Passive sampler,Air pollution

RISK FROM OCCUPATIONAL AND ENVIRONMENTAL RADON AND ROLE OF SMOKING

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Background and Aims: Because of the predominant role of cigarette smoking as a cause of lung cancer, an understanding of the joint effect of smoking and radon exposure is needed for the appropriate assessment of the risk from radon.
Methods: The present study is based on two Czech cohorts of U miners (N=10 900) and on another cohort of people exposed to high levels of radon in houses (N=11 900). Results are based on recent data by 2010 which include 1107 and 240 cases of lung cancer in the occupational and residential studies, respectively. Individual smoking data were collected for most of subjects (68% and 75%, respectively). The relative risk is evaluated in dependence on cumulated exposure with effect modification by time since exposure and smoking.
Results: It is shown that the excess relative risk per unit exposure from earlier periods of exposure (20 years and more) is about 1/3 in comparison to recent exposures (5-19 years), whereas the relative effect from exposures before 35 years is only about 1/10. Smoking specific estimates of excess relative risk per unit exposure were 3-5 times higher among never smokers in both studies. In addition, the interaction of radon and smoking is evaluated by geometric mixture models and is found to be between additive and multiplicative model. When smoking specific equivalent doses to the lungs and modifying effect of time since exposure are used, the combined effect of radon and smoking is close to the additive model.
Conclusions: The study confirms the additive role of smoking and radon, particularly when temporal factors and smoking specific estimates of radiation doses are used in the model. The work was conducted under project NS 10596 of the Czech Ministry of Health.

THE OPPOSING EFFECTS OF CLIMATE CHANGE AND SOCIO-ECONOMIC DEVELOPMENT ON THE GLOBAL DISTRIBUTION OF MALARIA

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Background and Aims: The current global geographic distribution of malaria results from a complex interaction between climatic and non climatic factors. Over the past century, socio-economic development and public health measures have contributed to a marked contraction in the distribution of malaria. Previous assessments of the potential impact of global changes on malaria have not quantified the effects of non climate factors.
Methods: In this paper, we describe an empirical logistic regression model of the past, present and potential future distribution of malaria which incorporates both the effects of climate change and of socio-economic development. In our approach, we use a WHO estimate of malarious regions, present climate data published by the University of East Anglia, and socioeconomic and climatic projections based on the latest IPCC report.
Results: A logistic regression model using temperature, precipitation and gross domestic product per capita (GDPpc) identifies the recent global geographic distribution of malaria with high accuracy (sensitivity 85% and specificity 95%). Empirically, climate factors have a substantial effect on malaria transmission in countries where GDPpc is currently less than US$20 000. Using projections of future climate, GDPpc and population consistent with the IPCC A1B scenario, we estimate the potential future population living in areas where malaria can be transmitted in 2030 and 2050. In 2050, the projected population at risk is approximately 5.2 billion when considering climatic effects only, 1.95 billion when considering the combined effects of GDP and climate, and 1.74 billion when considering GDP effects only.
Conclusions: Under the A1B scenario, we project that climate change has much weaker effects on malaria than GDPpc increase. This outcome is, however, dependent on optimistic estimates of continued socioeconomic development. Even then, climate change has important effects on the projected distribution of malaria, leading to an increase of over 200 million in the projected population at risk.

ASSOCIATION BETWEEN PESTICIDES EXPOSURE AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER

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Background and Aims: Pesticides are used intensively in Taiwan. Residual pesticides in fruits and vegetables are commonly reported. The risk of fetus and young children exposed to pesticides is with great concern. The objectives of the study are to establish the baseline data of exposure for young children and to explore the association between pesticides exposure and attention-deficit/ hyperactivity disorder (ADHD).
Methods: There were 153 pre-school normal children (control group) and 67 doctor-diagnosed ADHD children (case group) recruited in this study. Their urine samples were collected and structured questionnaires were completed by the parents. We analyzed the parent pesticides included organochlorines, carbamates, pyrethrins, and organophosphates and the metabolites of organophosphates - six kinds of dialkyl phosphates (DAP). After pretreatment of samples, the specimens were analyzed by using GC/mass spectrometry.
Results: The detectable pesticides included diazinon, transfluthrin, chlorpyrifos, p,p'–DDT, bioallethrin, and pretilachlor. Among them, transfluthrin and bioallethrin were the highest in terms of both detection rate and mean concentration. DDT was the least detected one. More than 25% of urine samples were detected more than two kinds of pesticides. We found one of the DAP metabolites was detected in 98% of samples, and diethylthiophosphate and dimethylphosphate had the highest detection rates (64% and 62%, respectively). Children with higher urinary dialkylphosphate concentrations, especially diethylphosphate, diethyldithiophosphate and dimethyl alkylphosphate concentrations, were more likely to be diagnosed as having ADHD; the OR were 2.587, 8.014 and 2.372, after adjusting for confounding factors during pregnancy.
Conclusions: Our results suggest that Taipei children were commonly exposed to pesticides and the association between organophosphate pesticides and ADHD was statistically significant.

CHLORPYRIFOS DEGRADATION RATE FROM DIRECT PHOTOCHEMISTRY

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Background: Most of the available knowledge regarding the environmental fate of pesticides focuses on their degradation in bulk water or soil. Recently, it became clear that the degradation rate and environmental fate of pesticides are affected by photooxidation reactions when pesticides are in contact with the atmosphere. Furthermore, previous studies have mainly focused on the reactivity of the parent compound only and not of its derivatives, even though degradation products may continue to pose environmental concern.
Aims: This research provides a quantitative investigation of the photo-oxidation of thin film chlorpyrifos, an organophosphate pesticide widely used in agriculture and urban environments. This includes determination of reaction rates, quantum yields and products identification.
Methods: Chlorpyrifos degradation was studied under solar radiation in ambient and synthetic atmosphere. Actinic flux and absorbance spectra of absorbed chlorpyrifos were also measured in order to calculate the quantum yield for chlorpyrifos direct photochemistry. Photo-oxidation experiments were conducted with both analytical and technical grade chlorpyrifos, as well as with its derivative: chlorpyrifos-oxon.
Results: The photo-degradation of absorbed analytical chlorpyrifos is very fast, with half-life of 1.3 hours and quantum yield of • =0.017. While the apparent photo-degradation rate of technical chlorpyrifos is faster (0.7 hours), its quantum yield is almost the same (• =0.015). The derivative chlorpyrifos-oxon is less sensitive to photo-oxidation (• =0.001), and is therefore more likely to remain longer on open atmospheric surfaces. These results imply that chlorpyrifos-oxon is more likely to be found on aerosols from treated fields. Indeed, air sampling near chlorpyrifos treated field was found to contain chlorpyrifos-oxon. 3,5,6-trichloro-2-pyridinol, which is a major product of chlorpyrifos in bulk processes, was not detected in the laboratory film samples or in the air samples.
Conclusions: The present research provides new kinetic constants and shows that surface degradation processes should be considered in understanding environmental fate of pesticides.

The study of exposure assessment using biomarkers collected from children living in an industrial complex area in Korea

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Background and Aims: Ulsan is one of the industrial cities where a big petrochemical complex is located. Since 2003, the study named "A Prospective Cohort Study of Environmental Pollutants: A study in an industrial complex area" has been conducted to investigate health effects associated with chronic exposure to environmental pollutants in Ulsan. Children are particularly vulnerable to adverse health effects associated with heavy metal exposure(Gunnar et al 2007). So one of the goals of the research was to investigate an association between biomarkers collected from children and area where they live.

Methods: The study participants were children aged 7-13 who lived in Ulsan. Informed consent was obtained from each participant. A questionnaire survey was conducted and bio-samples such as blood and urine were collected. A total of 734 participants had been recruited for two years(2009-2010). Area was divided into 3 groups depending on their proximity to the industrial complex. Data was analyzed using logistic regression analyses.

Results: The mean levels of blood lead and cadmium in the urine were 1.67㎍/ℓ and 0.72㎍/g creatinine, respectively. We observed a significant decrease in cadmium levels with increasing age. The lead levels in children living in study areas were lower than those in children living in comparison area but the difference was not statistically significant. On the other hand, the cadmium levels in children living in study areas were significantly higher than those in children living in comparison area after adjusting for age, income, sex, the use of odorant at home.

Conclusions: Our observation supports the hypothesis that environmental exposure levels of children are correlated with their environmental quality where they live.

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RISK OF PREGNANCY LOSS ACCORDING TO URINARY PHTHALATE LEVELS AROUND THE TIME OF CONCEPTION

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Background and aims: Animal studies indicate that some phthalate metabolites may harm female reproductive function. The main objectives was to investigate associations between exposure to phthalate metabolites and the risk of pregnancy loss.
Methods: In a previously established cohort of first pregnancy planners we analyzed four primary and two oxidized secondary phthalate metabolites in urine samples collected at day 10 after the first day of the last menstrual period before conception occurred (n=128) and during the previous cycle (if any, n=111). Subclinical embryonal loss was identified by repeated urinary hCG measurements and information on clinical spontaneous abortions was obtained by telephone interview by the mother.
Results: An increased risk of pregnancy loss (n=48, Hazard Ratio (HR) 2.11; 95% confidence interval (CI) 1.07-4.16) was found among women with urinary concentration of mono-ethylhexyl phthalate (MEPH) in the upper tertile in the conception sample compared with women in the lowest tertile. The risk of subclinical embryonal loss (n=32) was 16.54 (CI 2.22-123.27) while the risk of clinical spontaneous abortion (n=16) decreased (HR 0.17 CI (0.04-0.76). None of the other measured phthalate metabolites were statistically significant associated to increased risk of pregnancy loss.
Conclusions: The phthalate metabolite MEHP may be associated with increased risk of early embryonal loss. Since this is the first human study to show this association, and the sample size is small, the study needs to be corroborated in independent studies.

LOSS-TO-FOLLOW UP AND SELECTION BIAS IN A LONGITUDINAL STUDY OF CLEAN-UP WORKERS OF THE *PRESTIGE* OIL SPILL

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Background and Aims: Loss to follow-up may introduce bias in epidemiological assessments of chronic health effects of incidental environmental exposures. A baseline study conducted in fishermen two years after the *Prestige* oil spill (Spain) showed that clean-up workers had a higher prevalence of respiratory symptoms and bronchial hyperresponsiveness (BHR), and higher levels of the oxidative stress marker 8-isoprostane than non-exposed. A follow-up survey was conducted four years later. We evaluated how loss to follow-up may have introduced selection bias in the longitudinal study.
Methods: Repeated respiratory testing including BHR and 8-isoprostane level was done using identical methodology as in the baseline study. The associations between study participation and respiratory health status at baseline and at follow-up were studied separately for exposed and non-exposed.
Results: Participation rates were similar in exposed (158/230=69%) and non-exposed (57/87=66%). Among non-exposed, the prevalence of respiratory symptoms at baseline was higher among participants (38% vs. 11%; p=0.01) than among non-participants. This difference was not apparent for exposed (35% vs. 26%; p=0.22). The prevalence of BHR slightly increased during follow-up among exposed (15 to 18%) and strongly increased in non-exposed (11 to 33%). After adjustment for sex and age, Odds Ratios for BHR among responders were 2.2 (95% CI 0.8-6.4) at baseline and 0.6 (0.3-1.2) at follow-up. Mean EBC 8-isoprostane levels increased 14 to 19 pg/mL in exposed and 6 to 21 pg/mL in non-exposed, and the adjusted GM ratios were 2.3 (95% CI 1.4-3.6) at baseline and 1.0 (0.7-1.4) at follow-up.
Conclusions: A differential loss to follow-up related to baseline health status may have introduced selection bias. In addition, a marked deterioration of respiratory health status during follow-up among non-exposed but not among exposed may be suggestive of an initial selection bias that only has become apparent after several years of follow-up.

EXPOSURE ASSESSMENT OF WASTE MANAGEMENT: RESULTS FROM A MULTI YEAR FOLLOW-UP OF SOLID WASTE LANDFILLS

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Background and Aims: Potential risk to health from waste disposal in landfills is a public concern issue and this concern is based on equivocal evidence. The main conclusion of the overall assessment of the literature about waste management and health is that adverse effects evidence for population living near landfill is usually insufficient and inconclusive. A major problem is the weakness of quantitative exposure information and exposure assessment methods. We propose here exposure assessment based on a multi-disciplinary approach where emissions and ambient samples are characterized to assess exposure to potential hazards.
Methods: A multi year follow-up has been undertaken for two landfills that accepts non-hazardous solid waste. Exposure assessment was based on measured emissions from the landfill, both from landfill gas energy recovery systems and from uncontrolled surface emissions. Emissions and atmospheric concentrations have been assessed with analytical campaigns, sampling the main known carcinogenic compounds emitted from landfills coming both from landfill gas torch combustion (dioxins, furanes and PAHs) and from diffusive emissions (VCM and benzene). Exposure assessments were based on receptor's concentrations, using atmospheric dispersion models to estimate maximum concentrations and depositions in correspondence to sensitive receptors.
Results: Emissions from two different plants have been measured both for non-methanic volatile organic compounds PAHs and dioxin-like compounds. Results from diffusion modelling indicated limited exposure for identified receptors, with differences from year to year. Risk assessment has been performed both for carcinogenic and non carcinogenic assessment, showing acceptable risk.
Conclusion: Direct exposure measurements play a key role in order to improve the epidemiological studies for populations living in areas where waste management facilities are located or planned. A standardized approach, that might be discussed starting from this example, could become, within few years, a new instrument for environmental epidemiology in this complex problem, at least until reliable biomarkers will be available.

DIETARY BENZO(A)PYRENE AND FETAL GROWTH: EFFECT MODIFICATION BY VITAMIN C INTAKE AND MATERNAL *GSTP1* POLYMORPHISM

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Background and aims: Previous studies report reductions in fetal growth associated with maternal exposure to airborne polycyclic aromatic hydrocarbons (PAH), and with higher levels of DNA adducts reflecting total PAH exposure. The potential role of dietary PAHs, the main source of exposure to these compounds among non-smokers, remains uncertain. This study assesses associations between fetal growth indicators and maternal dietary intakes of PAH benzo(a)pyrene [B(a)P] during pregnancy, exploring the potential effect modification by dietary vitamin C and maternal *glutathione S-transferase pi1* (*GSTP1*) polymorphism, both hypothesized to influence PAH detoxification/metabolism.
Methods: 657 women in the INMA (Environment and Childhood) Project from Sabadell (Barcelona) were recruited during the first trimester of pregnancy. Dietary B(a)P intakes were estimated from food consumption data. Genotyping was conducted for the Ile105Val variant of *GSTP1*. Multivariable linear or logistic models were used to assess associations between size at birth and dietary B(a)P, stratified by vitamin C intakes and *GSTP1* polymorphism.
Results: There were significant interactions between elevated vitamin C intakes (above the mean, 189.41mg/day) and dietary B(a)P in models for birth weight and length ($P<0.05$), as well as small size for gestational age (SGA) ($P<0.10$). B(a)P intakes were associated with significant reductions in birth weight and length (coefficient±SE for a 1-SD increase in B(a)P: -101.63±34.62 g and -0.38±0.16 cm, respectively), and increased odds of SGA (OR for the top tertile of B(a)P: 3.51; 95%CI: 1.16-10.59) among women with low vitamin C intakes. Among these women, associations were strongest in those carrying the *GSTP1* Val allele, associated with lower contaminant detoxification activity.
Conclusions: Increasing intake of vitamin C in pregnancy could help to reduce the adverse effect of B(a)P exposure on fetal growth, particularly in genetically susceptible populations.

ASSOCIATION BETWEEN AIR POLLUTION AND MONTHLY RESPIRATORY PRESCRIBING IN PRIMARY HEALTH CARE

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Background and Aims: Asthma and Chronic Obstructive Pulmonary Disease (COPD) are two of the most common chronic respiratory diseases. The effect size of exacerbation of respiratory symptoms triggered by daily variation of air pollution has been found to be between 1% (Atkinson 2001; Medina-Ramon 2006) and 7% (Laurent 2009) per 10µg/m^3. We aimed to assess the relationship between routinely collected respiratory prescribing and air quality at primary health care level using a multilevel statistical model including consideration of lags. Due to universal health care coverage in the UK this is a polulation based analysis.
Methods: We analysed respiratory medication (salbutamol) prescribed monthly by 64 primary care practices (400,000+ population) in the Northeast of England, (2002-2006) in two stages. Firstly, we used a harmonic dynamic regression model to reflect area-wide monthly average respiratory prescribing rates in relation to monthly temperature. Using the monthly prescribing rate as offset we then built the multilevel model using air quality, deprivation and demographic covariates by primary health care practice, using monthly respiratory prescribing rate as offset.
Results: Our final model showed that an increase of 10µg/m^3 in ambient PM_{10} was associated with an increase of 1% (95% CI, 0.1- 2%) in monthly salbutamol prescribing. We demonstrated that monthly respiratory prescribing in primary care can be used as indicator of air pollution effect on asthma and COPD, increasing the scope of its use for health surveillance.
Conclusions: The magnitude of effect found in this study was in the order that could be expected from studies of daily level associations between air pollution and asthma outcomes. The use of a multilevel model with offset provided a realistic representation of the relationship, as it allowed to both handle the grouped nature of primary care data and account for the seasonal variation of respiratory health outcomes.
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IN UTERO EXPOSURE TO DRINKING WATER FROM DIFFERENT SOURCES AND EARLY POSTNATAL WEIGHT GROWTH VELOCITY. RESULTS FROM THE FRENCH EDEN MOTHER-CHILD COHORT

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Background and Aims: There are sparse data about the potential effects of maternal exposure to tap water contaminants during pregnancy on child development and growth. As analytical chemistry is not able to identify all contaminants, a global approach could be usefully complementarily used. We studied the relationship between water consumption and infant growth, according to the source supplying tap water.
Methods: The EDEN cohort included 2002 women in the cities of Nancy and Poitiers before the 24th gestational week. Addresses were geo-localised and merged with data from Regional Health Agencies to get source of water used to produce tap water (surface, ground or mixed). Water consumption habits during the 1st trimester of pregnancy were estimated by self questionnaire. Infant postnatal weight growth during the first year was modelled using a mixture of measured and parent-reported data. We used regression models and partial correlation coefficients taking confounders such as breastfeeding, parental socioeconomic factors and anthropometric measurements into account.
Results: Women from Nancy were more exposed to surface water (52% *versus* 14% in Poitiers; $p<0.0001$). Birth weight and postnatal weight growth velocities were not significantly different between the cities. There was no significant relationship between maternal exposure to surface water and early weight growth velocities. However, weight growth velocities at one and three months were positively associated with the amount of consumed water among the women exposed to surface water ($r=0.11$, $p=0.03$ at 1 month) but not in the others ($r=0.00$, $p=0.98$; p-for-interaction=0.09). There was no interaction with child gender (all $p>0.20$).
Conclusions: We highlighted a weak association between amount of consumed water and postnatal weight growth in mothers exposed to tap water from sources of a lower global quality. These results encourage collecting data on water source in the birth cohorts. If they were replicated, incriminated compounds should be identified.

THE LEVELS OF POLYBROMINATED DIPHENYL ETHERS IN FOODSTUFFS AND HUMAN EXPOSURE

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Background and Aims: Polybrominated diphenyl ethers (PBDEs) have been widely used as brominated flame retardants (BFRs) for various electronics, manufactures, plastics, textiles and construction material. The structure of PBDEs are similar to thyroxin, could disrupt thyroid gland function, and the other adverse effects include neurotoxicity, developmental toxicity, reproductive toxicity and carcinogen. They could be detected in various environmental matrices, such as sediment, air, food and various organisms.The aim of the study is to determine PBDEs contaminate food stuff and to calculate daily intake in human.
Methods: This study determined 9 kinds of commonly foodstuffs in Taiwan by GC/ mass spectrometry, include milkfish, salmon, chicken, beef, pork, butter, egg, rice and milk. Analyses included BDE–28, BDE–47, BDE–99, BDE–100, BDE–153, BDE–154, BDE–183 and BDE–209, and daily food intake questionnaires were applied for 150 adults randomly.
Results: For dry weight, the pork samples has the highest ŽPBDEs levels (1.950±0.645 ng/g dry weight), and then are salmon and egg samples (1.300±0.184 ng/g dry weight and 1.100±0.369 ng/g dry weight); for lipid, the chicken samples has the highest ŽPBDEs levels (12.989±4.072 ng/g lipid), and then are pork and egg samples (11.130±3.775 ng/g lipid and 8.524±2.894 ng/g lipid); for wet weight, the butter samples has the highest ŽPBDEs levels (0.886±0.309 ng/g wet weight), and then are egg and pork samples (0.546±0.185 ng/g wet weight and 0.541±0.181 ng/g wet weight). Rice which levels of •PBDEs were all n.d. in our study.
Conclusions: The average daily dietary intake estimate of PBDEs was calculated.. the •PBDEs daily intake levels is 71.803±7.843 ng/day forTaiwanese, and the pork samples are the highest (22.186±12.470 ng/day), and then are egg and milk samples (16.342±6.902 ng/day and 15.983±18.100 ng/day).

CONCENTRATIONS OF POLYBROMINATED DIPHENYL ETHERS (PBDE) IN BLOOD OF PREGNANT WOMEN IN WESTERN AUSTRALIA

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Background and Aims:
Exposure to brominated flame retardants has become an emerging area of health concern with epidemiological studies reporting neurobehavioural and neurotoxic effects. Research indicates concentrations of PBDE in blood are higher in North America (0.63-46 ng g^{-1} lipid) than Europe (0.24-2.4 ng g^{-1} lipid). Limited data are available on Australian levels. Research conducted in Australia on pooled samples ranged from 6.4 to 8 ng g^{-1} lipid.
The aim of this study was to determine concentrations of PBDEs in blood of pregnant women in Western Australia.
Methods:
Pregnant women, aged 18 years or older, non-smokers, not occupationally exposed to POPs and living in Western Australia (n=119) were recruited between 2008 and 2011 to the Australian Maternal Exposure to Toxic Substances (AMETS) study.
Participants completed a questionnaire on demographic and lifestyle information as well as activities that may increase exposure to PBDEs, for example age of the home, number of televisions and computers, recently bought furniture.
At 38 weeks gestation, participants were asked to provide a blood sample and these were analysed in an accredited laboratory for concentrations of BDE-47, BDE-99, BDE-100, BDE-153 and BDE-154.
STATA11 was used for the statistical analysis.
Results:
The mean age of respondents was 32 years and 42% lived in homes that were less than 10 years old. Households on average had 1.6 televisions and 19.4% of these televisions were a year old or less. Participants had on average 1.8 computers in their homes, 56% of computers were two years old or less. Sixty five percent of respondents had purchased new furniture in the past 12 months.
The laboratory analyses of the concentration of PBDEs in blood is in process.
Conclusions:
There are limited data on concentrations of PBDE in pregnant women and this study will provide data on exposure among Australian women, allowing a preliminary assessment of risk.

CORRELATION BETWEEN NOISE AND AIR POLLUTION – KNOWNS AND GAPS

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Background and aims: The co-exposure to both traffic-related noise and air pollution may entail a mutual confounding effect of these environmental stressors on common health endpoints such as cardiovascular disease. To disentangle their effects we evaluated the correlation between measured nitrogen dioxide (NO_2) concentrations and modelled noise levels ($LA_{eq,24h}$) and between 15-minute ultrafine particle counts (UFP) and 15-minute noise measurements (LA_{eq}) in the city of Girona.
Methods: Long-term averages of NO_2 were measured with passive samplers at 83 outdoor residential locations. These locations were assigned an $LA_{eq,24h}$ from a validated traffic noise model (NMPB-routes 96). Besides, we performed 15-minute simultaneous measurements of UFP and traffic-related noise at 31 sidewalk locations during non-rush traffic hours. These measurements were performed with a P-trak and a CESVA SC30 sonometre, respectively. Finally, we compared these results with other studies.
Results: The NO_2-noise correlation was 0.62 (Pearson). However, it was lower at sites with higher traffic density and in the downtown. Building density, distance to the street and traffic density were main determinants of the NO_2 and noise variability. Besides, we could evaluate the relationship between measurements of UFP and traffic-related noise (spearman rank=0.55). In Chicago and Riverside, the Pearson correlation between 2-week NO_2 and 5-minute noise measurements were 0.41 and 0.62, respectively, and between 5-min UFP and noise measurements it was 0.22 to 0.31 and 0.41, respectively (Allen et al, 2009). Other studies reported higher and lower correlations using modelled estimates and different air pollutants.
Conclusions: The specific characteristics of each city and each pollutant require evaluating this correlation in each study area prior to analysing the long-term effects of traffic-related noise and air pollution on potential common endpoints. Further studies should evaluate local traffic-related pollutants such as UFP and also compare modelled versus measured data and distinguish between low and high correlation locations.

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USING QUANTITATIVE MICROBIAL RISK ASSESSMENT (QMRA) FOR SAFE GREYWATER REUSE

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Background and Aims: Use of greywater for irrigating home gardens may potentially decrease domestic water consumption by over 50%, while contributing to sustainable garden irrigation in arid regions and in times of drought. Despite these important advantages, greywater reuse may also hold potential risks for public and environmental health. Pathogens in the water may spread disease through direct contact, consumption of produce, or may be transferred by vectors such as mosquitoes. The aim of the current study was to assess risks associated with on-site greywater reuse.
Methods: A quantitative microbial risk assessment (QMRA) framework (Haas et al, 1999) was used for the assessment of three pathogens; Rotavirus, Pseudomonas aeruginosa, and Staphylococcus aureus. Different theoretical and empirical exposure and risks scenarios were tested.
Results: Given the correlation between Rotavirus and *E. Coli* (WHO, 2006), it was postulated that in a single household, a maximum level of 10^2 *E. coli* CFU/100 ml is safe based on the World Health Organization acceptable risk of $1.4*10^{-3}$ for Rotavirus infection. The risk from *P. aeruginosa* and *S. aureus* in the tested exposure scenarios was so low, that it seems unnecessary to include them in the regulations. To reduce exposure level and consequently the risk, barriers such as sub-surface drip irrigation, prohibition of irrigation of vegetables that are consumed raw, and washing hands with soap, should be used.
Conclusions: As long as basic regulatory rules are maintained, greywater reuse in a single household poses little risk to public health. A similar approach should be taken towards the establishment of quantitative risk assessment for environmental pollutants such as salinity, organic matter and metals.
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THE IMPACT OF LOCAL AIR POLLUTION ON MEDICATION USE

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Background and aims: Information on the influence of long term exposure to (traffic-related) air pollution on medication use is sparse. Detailed maps of air pollution levels of PM10 and NO_2,, based on land use regression models became recently available for the whole of the Netherlands. We studied the relation between long term exposure to (traffic-related) air pollution and medication use, making use of routinely collected information at public pharmacies.
Methods: The Foundation for Pharmaceutical Statistics (SFK) routinely collects data about the use of pharmaceuticals in the Netherlands. Air pollution maps were linked to addresses and the average air pollution level was calculated for the 4-digit postal code area, which was the lowest possible aggregation level for which medication data was available. We obtained information on the total number of prescriptions within each postal code area for the prescription of antihypertensives and airway medication. The percentage of non-western immigrants and the average socio-economic status (SES) of the residents within each postal code area were used as potential confounders. Indirect standardization for gender and age was applied.A spatial regression model was used to assess a possible association between medicine use and air pollution exposure.
Results: The study area contains more than 1.5 million residential addresses, approximately one fifth of all addresses in the Netherlands. Both air pollution components were positively associated with prescriptions; with NO_2 levels statistically significant with prescription of antihypertensives (RR 1.04 per 10 µg/m^3; CI: 1.00 – 1.09) and airway medication (RR 1.05 per 10 µg/m^3; CI: 1.02 – 1.08).
Conclusion: The present study shows an association between increased (traffic related) air pollution levels and prescription of medication use for antihypertensives and airway diseases at a 4 postal code area level in an area in the Netherlands.

SEASONAL EFFECT OF $PM_{2.5}$ ON MORTALITY: A CASE-CROSSOVER ANALYSIS IN NINE FRENCH CITIES

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Background and aims: Short-term effects of airborne particulate matter on mortality have been consistently reported, especially for fine particles ($PM_{2.5}$), which are thought to contain the most harmful components. Recently, several studies in Europe and North America have suggested that the greatest effect of particles was observed during warm seasons. We examined the seasonal changes in the effects of $PM_{2.5}$ on mortality in nine French cities during the 2000-2006 period.
Methods: Data from urban air monitoring stations measuring $PM_{2.5}$ with TEOM were used to compute daily means of $PM_{2.5}$. For each city, we analysed by season the association between daily $PM_{2.5}$ and daily number of non-accidental deaths, using a time-stratified case-crossover design, adjusting on daily mean temperature at lags 0 and 1-7.
We also used a temperature-stratified case-crossover design to assess changes in the association by temperature quartiles. Analyses were carried out with and without adjustment on daily 8h-maximum levels of ozone. City specific results were combined using random effect models.
Results: Mean levels of $PM_{2.5}$ varied from 13.4 to 18.5 µg/m^3 across the cities. During the study period, a 10 µg/m^3 increase in $PM_{2.5}$ was associated with an estimated increase of 4% in the daily number of deaths [95% confidence interval: -0.3, 8.6] during summer, +0.5% [-0.7, 1.8] during fall, -1.4% [-2.6, -0.2] during winter and -0.4% [-1.8, 1.0] during spring. The association between $PM_{2.5}$ and mortality was also clearly stronger in the warmest days (Tmean>75th percentile of the temperature distribution). Adjustment on ozone did not modify substantially these results.
Conclusions: This study suggests that the effect of $PM_{2.5}$ on mortality increases during summer, especially on days with high temperatures. Seasonal differences in particulate matter composition and in individual's exposure could explain these variations.

EFFECT MODIFICATIONS OF SMOKING ON RISK OF MORTALITY ASSOCIATED WITH INFLUENZA

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Background and Aims: Influenza is well known to cause heavy disease burden in both temperate and tropical/subtropical regions. Although smoking has been found to increase susceptibility to influenza infection, its role in modifying the mortality risk associated with influenza remains unexplored. This study examined the effect modifications of cigarette smoking on influenza-associated mortality in a cohort of older population in Hong Kong.
Methods: During 1998 to 2001, a total of 66,820 (22,679 males and 44,141 females) ambulatory persons aged 65 years or older enrolled in 18 Elderly Health Centres of the Department of Health in Hong Kong. They were interviewed, examined and followed up until December 2009 for mortality outcomes. They were stratified into three groups: never-, ex- and current-smokers. Cox regression models with time-dependent covariates were used to assess the excess risks (ER) of mortality associated with levels of influenza virus activity defined by the proportion of positive isolation in weekly specimens sent for making diagnosis to the Virology Laboratory of Queen Mary Hospital in Hong Kong. The modifying effect of smoking was assessed by Cox proportional hazard models with time-dependent interaction terms defined as the product of influenza and smoking variables with adjustment for potential confounding variables.
Results: ER of mortality for all natural causes associated with a 10% increase in influenza virus activity were 1.3% (95%CI: -1.6, 4.3), 4.8% (0.5, 9.3) and 5.3% (-0.6, 11.6) in never-, ex- and current-smokers, respectively. In models with interaction terms, changes in ER of mortality in ever (ex- and current) smokers relative to never smokers were 1.0% (-5.5, 7.9) and 6.0% (-0.9, 13.4) for males and females, respectively.
Conclusions: This study shows that smoking modifies the influenza burden on morality and provides evidence to support anti-smoking strategies in conjunction with other preventive measures such as vaccination and non-pharmaceutical interventions against influenza.

Q FEVER SEROLOGY AND PREGNANCY OUTCOME IN WOMEN EXPOSED TO LIVESTOCK ANIMALS

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Background and Aims: Q-fever is a bacterial zoonosis caused by Coxiella burnetii. Cows, goats, and sheep are the primary animal reservoirs and human infection occurs by inhalation of aerosols from animal birth products (Fournier et al 1998; Bosnjak et al 2010; Walsh MG 2011).
Pregnant women may, when infected, experience spontaneous abortion, preterm delivery, oligohydramnion, growth retardation and intrauterine fetal death (Carcopinho et al 2009).
Methods: The Danish National Birth Cohort collected blood samples and interview data from 100.418 pregnant women between 1996-2002 (Olsen et al2001).This study sampled 200 pregnant women with occupational exposure to domestic animals (veterinarians and female farmers), 200 women with domestic exposure (women living on farms with dairy cattle and/or sheep) and a random sample of 500 controls.
All samples were screened for antibodies against C. burnetii in a commercial enzyme-linked immunosorbent assay (ELISA). Samples positive either for IgG or IgM antibodies in the ELISA were confirmed with an immunofluorescence (IFA) test.
Results:
Reporting the IFA results, the proportion of women with serologic evidence of Q fever was significantly higher in the group with occupational exposure to livestock (19.1%, OR: 39.0; 95%CI : 11.9-128.4) as well as in the group with domestic exposure to livestock (11.0%, OR: 20.5; 95%CI: 6.1-69.2) when compared to pregnant women from the reference group (0.6% IFA positive).
However, the risk of spontaneous abortion was not higher among women with occupational exposure (0.52%, OR: 0.13; 95%CI: 0.02-1.05) nor among women domestically exposed (1.5%, OR: 0.41; 95%CI: 0.12-1.34).
Conclusions: These findings suggest that veterinarians, farmers and other people exposed to livestock, in this case dairy cattle and sheep, experience greater risk of C.Burnetii infection, but this study did not find any association between exposure and spontaneous abortion. However, an effect on early pregnancy loss cannot be detected in this design.

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COMBINED ANALYSIS OF THE RISK OF ADVERSE BIRTH OUTCOMES ASSOCIATED WITH MATERNAL OCCUPATIONAL EXPOSURE ACROSS EUROPEAN BIRTH COHORTS

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on behalf of the CHICOS occupational cohort working group

Background and Aims: Occupational maternal exposures during pregnancy may be hazardous to optimal fetal and child development. The prospective, population-based, birth cohort study design has not been used much in this field, mainly due to the rareness of exposures. However, because of prospective data collection, collection of information on many co-variates, and the follow-up of children after birth, such cohorts have important strengths. Therefore, a combined analysis with data from many European birth cohorts will be conducted as part of the CHICOS project to estimate whether risk of adverse birth outcomes is related to specific maternal occupations and physical load.
Methods: The ENRIECO inventory of birth cohorts in Europe (www.birthcohortsenrieco.net) was used to identify cohorts that collected maternal occupation information at any time during pregnancy and have already coded this into occupational codes. Combined analyses across these cohorts will determine whether specific occupations with *a-priori* risk indication (such as nurses, hairdressers, farmers) and physical load (determined through a job-exposure matrix) are associated with reductions in birth weight, risk of low birth weight, or reductions in gestational age.
Results*:*A total of 16 European birth cohorts have already coded the maternal occupational information collected through questionnaires into occupational codes. ISCO 88 appears to be the most frequently occupational code reported in the participating cohorts (n=10). The rest have used other occupational codes such as SOC 1999, SOC 2000, NYK or DISCO 88 that can be translated into ISCO 88. This study will be based on 250,000 mother-child pairs.
Conclusions:Pooling data on maternal occupation and birth outcomes across European birth cohorts will provide enough statistical power to disentangle the effects of specific occupational exposures and physical load on birth weight and gestational age and will allow evaluation of heterogeneity between countries in such effects.

ASSOCIATION BETWEEN ULCERATIVE COLITIS AND CLIMATIC FACTORS BASED ON COHORT OF NORWAY

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Background and Aims:Incidence of ulcerative colitis has increased during the last decades and the disease also varies between countries. Incidence rates typically increase northwards at the northern hemisphere and southwards at the southern hemisphere. Temporal changes have been explained by the hygiene hypothesis but few parallel explanations exist for the spatial trend. Many factors are linked to latitude such as climate. In our investigation we studied the association between prevalent cases of ulcerative, identified through self-reported medication, and climatic factors such as mean annual temperature, maximal monthly temperature, precipitation, and altitude.
Methods:We used Cohort of Norway, a collection of ten different health studies conducted from 1994 to 2003 and from five different counties in Norway. We used the participants' self-reported use of medication (aminocalicylic acids) to identify individuals with ulcerative colitis. We included a sensitivity analysis where we studied the effect of misclassification and measurement error.
Results:Maximal monthly temperature was significantly related to the prevalence of ulcerative colitis. For each one-degree increase in maximal monthly temperature the odds for ulcerative colitis decreased with about 11% (95% CI: 4%-17%). None of the other climatic factors were significantly associated to the risk of ulcerative colitis.
Conclusions:We don't think that maximal temperature is directly related to the risk of ulcerative colitis, but that temperature is related to some unknown mechanism which again is causative for developing the disease. Our speculation is that this mechanism is species richness in organisms that can colonize the human gut. Temperature is one of the main forces governing species richness. Composition and biodiversity of the commensal gut flora is known to be one part in the process leading to ulcerative colitis.

ASSOCIATIONS BETWEEN FEMALE LUNG CANCER MORTALITY AND NO, NOX, AND NO2 IN KAOHSIUNG, TAIWAN

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Background and Aims: Cancer and heart disease were the first and second leading causes of death and lung cancer was the most common cancer death in Taiwan. We investigated the associations between mortality from lung cancer and heart disease and long-term levels of PM10, SO2, CO, O3, NO, NOx, and NO2 in an industrial southern Taiwan city, Kaohsiung.

Methods: Our study areas were 11 townships which housed a continuous fixed-site air pollution monitoring station affiliated with Environmental Protection Administration each in Kaohsiung. Age standardized mortality rates in each township from 2007 to 2009 were obtained from Department of Health. Air pollution levels of each station were estimated from 2007 to 2009 (concurrent exposure), 2002 to 2004 (exposure of 5 years ago), 1997 – 1999 (10 years), and 1993 to 1995 (14 years), 4 exposure periods in a total. Three-year mean data were used in analyses. Pearson's correlation coefficients between mortality and pollutions were estimated.

Results: Declined trends of all pollutions but O3 were found from 1993 to 2009. High polluted townships were consistently higher than others during the 14 years. O3 was inversely related to others during 4 exposure periods. Female lung cancer mortality rates were significantly positively associated with concurrent CO (r = 0.69), and NO, NOx, and NO2 from 4 exposure periods with r ranged from 0.61 – 0.81, while negatively associated with O3 from 3 exposure periods. However, there were no significant linear correlations between male lung cancer mortality rates and pollutions. Nor were the linear correlations between both male and female heart disease mortality rates and pollutions.

Conclusions: Positive associations between female lung cancer mortality and NO, NOx, and NO2 shone line on the etiology of female lung cancer with low prevalence of cigarette smoking in Taiwan. Further studies to clarify these relationships were needed.

A RECORD LINKAGE STUDY OF ADVERSE BIRTH OUTCOMES, CHILDHOOD CANCER AND WATER CONTAMINATION BY ATRAZINE AND NITRATES IN THE MIDWESTERN UNITED STATES

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Background and Aims: There is limited evidence that exposure to atrazine and nitrates are associated with low birth weight, prematurity, birth defects and childhood cancer. Contamination of surface and ground water by atrazine and nitrates is high in Midwestern states that produce corn. This study will evaluate whether there is an association between water contamination of ground and surface water by atrazine and nitrates, and adverse birth outcomes and childhood cancer in the Midwest. A second aim is the development of methods to explore possible associations between water contamination and health outcomes by linking existing information from monitoring of water with health outcome data from birth certificates and for linking existing data from birth certificates with other registry data.
Methods: The target population for this study are all births that occurred between 2004 and 2008 in Indiana, Ohio, Michigan, Minnesota, Wisconsin, Indiana, Iowa, Illinois, and Missouri, which is estimated to include approximately 800,000 births. The study has three phases with each phase having greater ability to address spatial and temporal variations in exposure. The first phase is an ecologic study of birth certificate based outcomes including low birth weight and premature birth using estimates of exposure at the county level. In the second phase we will extend the study to include childhood cancers, and birth defects. In the 3rd we will link individual level data from birth certificates with tumor and birth defects registry data with individual level estimates of exposure.
Results: We have established agreements and are currently in the process of obtaining birth outcome and exposure data for all eight states.
Discussion: Many methodological challenges exist in both obtaining health data and estimating exposures for this study. These methodological challenges and results from the first phase of the data will be presented at the meeting.

PERSONAL EXPOSURE TO CARCINOGENIC AIR POLLUTANTS IN STOCKHOLM, SWEDEN: A COMPARISON OVER TIME

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Background and Aims: Urban populations are exposed to a complex mixture of air pollution, including volatile organic compounds (VOC), nitrogen oxides and polycyclic aromatic hydrocarbons (PAH), which are carcinogenic or may be seen as indicators of co-emitted carcinogens. The aim of the present study was to measure personal exposure to carcinogenic air pollutants in Stockholm, Sweden, study time-trends, and to compare personal exposure levels with concentrations at outdoor reference sites.
Methods: Forty participants, 20-50 years of age, randomly selected among residents in the Stockholm municipality carried diffusion samplers close to the breathing zone for one week. Four different air pollutants were sampled; benzene, 1,3-butadiene, NO_x and NO_2. During the measurement period, the participants kept a diary of their daily activities and completed a questionnaire about living conditions and life style factors. Samplers were also placed at two outdoor reference sites during the same time period: one on a roof-top, representing urban background, and one by an inner-city road with heavy traffic. The study was conducted during 7 and 9 weeks during the heating season in 2003 and 2009, respectively.
Results: Levels of most of the measured air pollutants had decreased in this six-year period (by approx 50 percent), both for personal exposure and reference sites. At both occasions, the personal exposure levels were higher than the urban background concentrations. Personal levels did also not correlate to concurrent ambient concentrations.
Conclusions: Population exposure to combustion-related carcinogens in air has decreased in Stockholm, probably due to increasing use of catalytic converters and to decreased traffic because of congestion taxes. The results indicate that personal exposure levels cannot be evaluated directly from ambient concentrations, making personal sampling essential for risk assessment.

THE MECHANISMS OF MOTOR AND SENSORY NERVE DYSFUNCTION AFTER CHRONIC ARSENIC EXPOSURE IN RATS

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Background and Aims: Tens of millions of people are exposed to arsenic contaminated drinking water all over the world, including residents in Argentina, Bangladesh, Chile, China, Mongolia, Taiwan, etc. Previous studies have shown that chronic arsenic exposure could cause various cancers, skin diseases, neurological diseases, cardiovascular diseases and cerebrovascular diseases. Recent epidemiologic studies from Bangladesh showed that chronic arsenic exposure was associated with abnormal sensory nerve action potentials. We therefore set up an animal model to explore the mechanisms of neuropathy caused by chronic arsenic exposure.

Methods: We treated spontaneous hypertensive-prone rats with drinking water containing 133 μg/ml of arsenic (experimental group) for 40 consecutive weeks and compared them to a blank control group. At the end of exposure, we assessed motor functions by observing spontaneous locomotor behaviors (including motion distance and motion velocity) in the open field and monitored the sensory function by measuring the pain stimulation latency during the hot plate test. The enzymatic Na(+)/K(+)-ATPase activity of sciatic nerve was determined by a colorimetric assay, and the pathological changes and severity of neuropathy were be examined by hematoxylin-eosin stain. The possible mechanisms affecting heat shock protein 70 (HSP70) and C-reactive protein (CRP) on nerves were studied by immunohistochemistry. The arsenic levels of the whole blood and the sciatic nerve were measured using Inductively Coupled Plasma Mass Spectrometry and correlated with the toxic effects on the peripheral nerve.

Results: After arsenic exposure, the hot stimulation latencies prolonged statistically significantly in arsenic exposure rats (37.60±1.77 vs. 5.60±1.50 seconds, $p<0.05$). The motor functions in terms of motion distance, velocity and spontaneous locomotion did not decrease significantly. The Na+/K+-ATPase and CRP activities of the sciatic nerve were inhibited, but the HSP70 activity was enhanced.

Conclusions: Chronic arsenic exposure could affect sensory nerve functions probably via enhancing HSP70 and inhibiting Na+/K+-ATPase and CRP activities.

key words, arsenic, peripheral neuropathy, heat shock protein 70, C-reactive protein, Na+/K+-ATPase

THE ASSOCIATION OF MERCURY, FISH CONSUMPTION AND CHILD DEVELOPMENT IN AN EASTERN MEDITERRANEAN COHORT

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Background and Aims: The effects of prenatal, low-level mercury exposure through fish consumption on neurodevelopment have been studied in several populations leading to inconsistent findings. To evaluate this association among residents in Italy, Slovenia, Croatia and Greece, we conducted a prospective cohort study within PHIME, EU Sixth FP.
Methods: Main exposure was total mercury (THg) concentration in mother's hair in pregnancy and in cord blood, and mother's fish intake in pregnancy. Child's neurodevelopmental outcomes were Bayley III composite cognitive, language, and motor scores at 18 months. A number of covariates were included in multivariate linear regression models.
Results: 2189 mothers were enrolled in the study during pregnancy. 1729 mother-child pairs provided information at child's birth. Follow-up at 18 months was 85%. The median mother's hair THg (ng/g) was 729. Mean ratio MeHg/THg was 0.90. Median cord blood THg was 3.75. Correlation between THg in hair and cord blood was: r=0.81. Median weekly servings of fish was 1.38. While unadjusted models showed a negative association of Bayley cognitive score with THg (in both hair and cord blood), after adjustment for country and relevant covariates, Bayley cognitive score was not associated with hair THg (β=0.00026; p=0.5157) nor with cord blood THg (0.048; p=0.6318) but positively associated with fish (β=0.8345, p=0.0162). Bayley language score was not associated with cord blood THg (β=0.0412, p=0.7037), borderline positively associated with hair THg (β=0.0008, p=0.0552) and positively associated with fish consumption in both unadjusted and adjusted models (β=0.8564, p=0.0083). Bayley motor score was negatively associated with hair THg in unadjusted models (β= - 0.00073, p=0.0022), but not in adjusted models (hair Thg: β= - 0.00017, p=0.553; cord blood: β=0.0038, p=0.9583).
Conclusions: In adjusted models, THg in hair and cord blood did not predict Bayley scores but a moderate beneficial effect of fish consumption in pregnancy was observed.

URBAN HEAT ISLAND AND SOCIO-ECONOMIC POSITION AS FACTORS THAT INCREASE THE RISK OF HEAT-RELATED MORTALITY IN ROME, ITALY

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Background and Aim: High temperatures have an impact on health but few studies address the heterogeneity of the impact within cities. The study assesses the spatial variation in the impact of heat on mortality by socio–economic position (SEP) and urban heat island (UHI) in Rome.
Methods: A four-level UHI indicator by census block was defined using satellite data for summer (May-September) 2003-2006. Mortality data for residents 65+ years during summer 2004-2006 were analysed. Age, gender and SEP by census tract of residence where considered.
To investigate the spatial differences in mortality according to residence, the relative risk of dying in each UHI level adjusted for gender, age and SEP was estimated using a Poisson regression model.
The short-term impact of maximum apparent temperature (Tappmax) on mortality was estimated through a case-crossover analysis where the %increase in mortality for 1°C increment above the threshold (Tappmax=27°C) by levels of UHI and SEP was computed.
Results: Results from the Poisson regression model, adjusted for gender and SEP, showed a higher RR in mortality in the hottest areas compared to the cooler ones. However, adjusting for age showed no differential suggesting that the gradient was mainly attributable to higher proportion of elderly living in the hottest areas.
A gradient of risk for SEP and UHI in the impact of Tappmax on mortality was observed. The percent increase in mortality in the deprived areas was higher than in the richer areas (SEP4-5:4.5%vsSEP1-2:2.6%). The effect in the hot areas was double that of the cooler areas (UHI3-4:4.3%;CI95:2.2-6.4%;vsUHI1-2:2.1%;CI95%:0.3-3.9%). This difference increased with age. Furthermore, the differential was maintained when considering the increase in mortality by UHI level and SEP combined.
Conclusions: UHI and SEP are important risk factors to consider when identifying susceptible subgroups to whom prevention measures should be targeted.

Comparison of land use regression models with dispersion models in selected European cities

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Background and Aims: Few studies to this date have carried out comparisons between land use regression (LUR) models and dispersion models for their use in estimating exposures for epidemiological studies. Until now evidence suggest that LUR models predict the small-scale variation in air pollution concentrations as well or better than dispersion models. The ESCAPE project aims to get a better understanding of LUR and dispersion models by comparing the performance across a number of ESCAPE study areas.
Methods: In selected European cities, LUR and dispersion models were used to estimate a range of traffic-related air pollutants (NO2, NOx, PM10, PM2.5, and absorbance) at both ESCAPE monitoring sites and cohort addresses. Comparisons between the two methods were made at the ESCAPE monitoring sites (40 for NOx/NO2 and 20 for PM) between measured and the 2 modelled estimates.
Results: Preliminary results for the Bradford study area (UK) (NOx/NO2 only) show strong correlations using both methods on the 40 monitoring sites. Reported R2's for NOx were 0.88 (LUR, leave-one-out procedure) and 0.63 (ADMS-Urban) and respectively 0.80 and 0.51 for NO2. Correlations between LUR and ADMS for both pollutants were also high with R2 of 0.61. In Umea (Sweden) the NO2 LUR model and the AIRVIRO dispersion model were applied to over 1700 random receptors and the predicted concentrations show a good correlation (R2 = 0.58). In the Ruhr area (Germany) the LUR NOx background model and the EURAD-CTM dispersion model were applied to the cohort addresses also showing good correlation (Spearman R = 0.66).
Conclusions: Preliminary results in Bradford suggest that LUR performs slightly better than ADMS-Urban whereas in Umea and Ruhr area they show a good correlation between both methods at selected receptors. More comparisons will be presented from Stockholm, Copenhagen, Athens, Heraklion, Augsburg, Rome, the Netherlands and Helsinki.

DRINKING WATER CONTAMINATED WITH PERFLUORINATED CHEMICALS – THE USE OF MODELLED AND MEASURED SERUM CONCENTRATIONS IN EPIDEMIOLOGICAL ANALYSES.

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Background and Aims: The C8 Science Panel Community study in the Mid Ohio Valley comprises a number of inter-linked epidemiology studies on various outcomes, including cancer, in relation to PFOA exposure in contaminated drinking water. PFOA exposure is available as (1) measured serum levels and (2) annual modelled serum levels using fate/transport and pharmacokinetic models. The aim of this presentation is to explore the application of different exposure classification strategies, using a study of the prevalence of cancer to illustrate the issues.
Methods: Questionnaire data on cancer diagnosed in the ten years prior to the survey of 2005-6, covariate information on smoking, SES etc, and measurement of serum PFOA were available for 49,082 adults who had spent at least 12 months in one of 6 water districts contaminated with PFOA. To assess stability of ranking of individual serum levels over time, we compared serum PFOA in 2005/6 and 2010 in a nested sample of 755 participants. We use random effects logistic regression models to calculate the odds of the cancers in relation to both individual and water district area averages of serum levels, using the two measures of exposure.
Results: Among cancers diagnosed between 1996 and 2006 there were: prostate 259, breast 231, colon 125. Correlation of PFOA measured in 2005/6 to 2010 was very high (r=.79). Analyses are currently underway and results will be presented of confounder adjusted prevalence using different PFOA exposure metrics.
Conclusions: For epidemiological analyses, measured serum levels reflect individual differences both in exposure and in accumulation/excretion rates; modelled exposures track historical patterns of exposure, but with limited individual information on intake and none on accumulation/excretion rates; marked geographical clustering of exposure offer challenges and opportunities for confounder control. Serum levels correlate highly between 2005 and 2010 measurements partly due to the long serum half-life.

A STUDY ON BACTERIAL INFECTIONS AMONG 1-12 YEAR-OID CHILDREN HOSPITALIZED IN BU-ALI HOSPITAL IN ARDABIL,IRAN

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Background and Aims: Urinary infection and bacterial septicemia are the most important clinical infections and syndromes which could lead to nephropathy, renal dysfunctions and mortality in children. This study was conducted to identify the bacterial causes of urinary infection and septicemia in 1-12 year-old children hospitalized in Bu-ali hospital in Ardabil, Iran.
Methods: In this descriptive and cross-sectional study, urine of 811 children and blood samples of 173 children hospitalized in Bu-ali hospital in Ardabil were cultured in order to study probable bacterial infections (between 2009 & 2010). The urine samples were cultured in BA & EMB and the blood samples were cultured in BHI & EMB culture media. On the other hand, to determine the antibiotic sensitivity of diagnosed bacteria, antibiogram technique was run by disk diffusion method in MHA plate.
Results: a) From 811 cultured urine samples, 534 cases were positive for E.coli (65.84%), 202 cases positive for Klebsiella (24.91%), 31 cases positive for Enterobacter (3.82%), 20 cases positive for Pseudomonas (2.47%), 20 cases positive for Staphylococcus (2.47%) and 4 cases were positive for Proteus (0.49%). b) From 173 cultured blood samples, 142 cases were positive for Staphylococcus (82.08%), 11 cases positive for Streptococcus (6.36%), 9 cases positive for Klebsiella (5.20%), 7 cases positive for E.coli (4.05%) and 4 cases were positive for Enterobacter (2.31%). c) Antibiogram results showed that E.coli bacteria were sensitive to Nalidixic acid & Nitrofurantoin, Klebsiella were sensitive to Amikacin & Nalixic acid and Staphylococcus bacteria showed high sensitivity to Amikacin & Nalidixic acid and Staphylococcus bacteria showed high sensitivity to Amikacin & Co-trimoxazole.
Conclusions: Escherichia coli and Klebsiella were the most prevalent bacteria in the urine samples and Staphylococcus bacteria were the highly prevalent ones in the blood samples. The most effective antibiotics were Nalidixic acid & Nitrofurantoin for E.coli, Amikacin & Nalidixic acid for Klebsiella and Co-trimoxazole & Amikacin for Staphylococcus, respectively.

GENOME-WIDE INTERACTION STUDY OF CUMULATIVE PARTICULATE MATTER EXPOSURE ON AGE-RELATED LUNG FUNCTION DECLINE IN ADULTS, THE SAPALDIA COHORT.

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Background and Aims: Air pollution exposure accelerates age-related lung function decline. There is however evidence that i) genetic variation in individuals determines the susceptibility to ambient air pollution and ii) asthmatics are more prone to accelerated lung function decline than non- asthmatics. We investigated the interaction of genome-wide data with particulate matter (PM) exposure on the annual rate of lung function decline in an agnostic approach.
Methods: 2'500K single nucleotide polymorphisms (SNPs) of 455 asthmatic and 699 non-asthmatic SAPALDIA participants with individual exposure data for 11-year cumulative PM of mean diameter <10µm (PM10) was used. Annual rate of lung function decline (•) was calculated for five spirometric parameters (FEF25-75, FEV1, FVC, FEF25-75/FVC, FEV1/FVC). They were regressed on PM10, the SNP allele dosage and their interaction term adjusting for study center, sex, height, age, packyears, asthma self-report and ancestry informative covariates. We also stratified analyses by asthma status. Only SNPs with minor allele frequency (MAF) >5% were considered.
Results: In both groups combined, the top-ranking interaction signal was observed for • FEV1 ($P=4.07x10^{-8}$; MAF:6%) and contained genes *CRHR2/INMT*, both involved with lung health. Another prominent signal for • FEF25-75 was in *TRAM2*, a gene involved in collagen synthesis ($P=8.78x10^{-8}$; MAF 37%).
In non-asthmatics, a highly prevalent variant (MAF:45%) at 7q22.1 was a top-ranking interaction signal and reached $P=4.15x10^{-9}$ for • FEF25-75 (rank1), $1.31x10^{-6}$ for • FEF25-75/FVC (rank10), $3.08x10^{-6}$ for • FEV1 (rank73) and $6.98x10^{-7}$ for • FEV1/FVC (rank12).
In asthmatics, the top-ranking locus interacting with PM10 ($P=7.27x10^{-12}$, MAF: 8%) contained genes *MYO15A* , necessary for cilia function, and *DRG2*, expressed in normal fibroblasts and linked to the infectious disease progression. Variation in a locus *ZDHHC19/OSTalpha/PCYT1A* (MAF:20%) was interacting with PM10 exposure on • FVC and • FEV1 ($P=9.82x10^{-9}$; $P=1.05x10^{-8}$).
Conclusions: This preliminary evidence of interactions requires replication within the SAPALDIA cohort (N=4000) and collaborative efforts with other studies.

WORD COUNT (including subtitles): 300, Limit: 300

AIR POLLUTION AND LUNG HEALTH IN AUSTRALIAN SCHOOL CHILDREN: A PANEL STUDY

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Background and Aims: We aimed to quantify the effect of ambient air pollution on lung function in a national sample of Australian school-children in a panel study.
Methods: We recruited children with asthma for the panel study from the cross-sectional component of the Australian Children's Health and Air pollution Study. Children were from 51 primary schools that were within 2.5km of 27 air monitoring sites in six cities. Children recorded lung function, asthma symptoms and asthma medication used twice a day in their asthma diary for a six week period. We used generalised linear models to examine associations between air pollutants and lung function and symptoms. Multi-pollutant models were examined. Mean NO_2 levels were 18.7ppb 1-hr average (range 0–69ppb) and 7.9ppb 24-hr average (0–30.8ppb).
Results: Two hundred and seventy children participated in the panel study (girls: 46%; mean age: 10 (SD=1.2) years. About 94% of the children kept a diary for at least four weeks. The most consistent results were seen with NO_2. In single pollutant models there were consistent relationships between NO_2 and night symptoms (cough, wheeze and shortness of breath) and effects were greater for NO_2 24-hr than for NO_2 1-hr. There were also more consistent relationships between NO_2 and day time symptoms and effects were greater for NO_2 24-hr than for NO_2 1-hr. Children were also more likely to use more reliever medications for asthma on days with higher NO_2 concentrations. In two pollutant models with ozone, the effects of NO_2 on lung function were increased, effects on symptoms decreased slightly and effects on daytime medication use were no longer significant.
Conclusions: In this panel of Australian school children, effects of air pollution on lung health were most consistently observed with NO_2.

ASSOCIATION BETWEEN ORGANOCHLORINE PESTICIDE EXPOSURE AND THYROID HORMONES IN FLORICULTURE WORKERS

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Background and Aims: Different studies have shown that *p,p`*-DDE (a stable metabolite of DDT) alter thyroid hormone levels in animals and humans, although results across studies are inconsistent. The aim of this study was to assess the association between exposure to DDT and serum levels of thyroid hormones in floriculture workers.
Methods: A longitudinal study was conducted on 136 male subjects from the State of Mexico and Morelos, Mexico, which were occupationally exposed to non persistent pesticides, during agricultural periods of high (rainy season) and low (dry season) levels of pesticide application. Using a structured questionnaire, a survey was carried out on sociodemographic characteristics, anthropometry, clinical history, alcohol and tobacco consumption, residential chemical exposure, and occupational history. Blood and urine samples were taken to determine serum levels of TSH, total T_3, total T_4, and *p,p'*-DEE, and metabolites of non-persistent pesticides, respectively. The analysis of the association between *p,p'*-DEE levels and thyroid hormonal profile was carried out using multivariate generalized estimating equation (GEE) models.
Results: Our results showed an increase in both T_3 and T_4 hormones in serum associated with a increase in total *p,p'*-DEE levels in serum (*p*-trend<0.05), independently of the levels of organophosphate pesticides and other potential confounding factors.
Conclusions: These results suggest that exposure to organochlorine pesticides may be responsible of increasing T_3 and T_4 serum hormone levels, therefore supporting the hypothesis that persistent organochlorine pesticides alter thyroid function in humans.

INDOOR / OUTDOOR AIR QUALITY RELATIONSHIP IN AN URBAN ENVIRONMENT: DUBLIN CASE STUDIES.

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Background and Aims: Legislative reductions in air pollutant limits values seek to better outdoor air quality, in turn reducing associated illnesses such as cardiopulmonary mortality, strokes and lung cancer. This study focuses on two major traffic related pollutants NO_x (NO_2 + NO) and $PM_{2.5}$. Previous research suggests that people now spend up to 90% of their day indoors yet in Ireland no legislative indoor air pollutant limits exist. A study carried out a study on 57 office environments and found 75% of our daily NO_2 exposure occurred while at work (Lee et al., 2000). This research aims to determine the relationship between exposure of staff to specific air pollutants in Irish working environments (e.g. shops, offices) and factors such as ventilation systems and door design.
Methods: NO_x data is gathered by a monitor working on Chemiluminescence principles and $PM_{2.5}$ by a monitor using light scattering and Gravimetric techniques. Monitors are placed inside and outside (roof and street levels) of the buildings and run continuously for 4 days per run.
Results: To date monitored 5 work places located on busy street canyons of the city centre in Dublin, Ireland have been monitored. Clear relationships between indoor and outdoor concentrations could be seen for sites. Results indicate that indoor concentrations can be significantly greater than outdoor concentrations, Indoor Outdoor ratios of up to 3.97 for NO and 2.13 for $PM_{2.5}$.
Conclusions: I/O indicate greater exposure to those working within the affected buildings than ambient outdoor concentrations indicate. The compliance of Ireland and many other European countries to air quality limit values is based on outdoor air quality; these results show that outdoor monitoring alone may not be enough to quantify true exposures of those working in urban areas.
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URINARY CONCENTRATIONS OF PHTHALATES AND PHENOLS IN A POPULATION OF SPANISH PREGNANT WOMEN AND CHILDREN

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Background and aims: phthalates and phenols exposure is prevalent among the general population and of potential concern for pregnant women and children because of their suspected susceptibility to endocrine effects. In the present study, we aimed to evaluate the extent of exposure to several phthalates and phenols in a sample of Spanish pregnant women—according to their individual characteristics (age, social class, education, body mass index)—and children who participated in the INMA – Infancia y Medio Ambiente (Environment and Childhood) project.
Methods: one spot urine sample was taken during the third trimester of pregnancy from 120 pregnant women and from 30 4-year old children belonging to 5 Spanish birth cohorts, and analysed for 11 phthalate metabolites and 9 phenols.
Results: Three metabolites of di(2-ethylhexyl) phthalate, mono-2-ethyl-5-carboxypentyl phthalate, mono-2-ethyl-5-hydroxyhexyl phthalate, and mono-2-ethyl-5-oxohexyl phthalate; two metabolites of dibutyl phthalates, mono-isobutyl phthalate and mono-n-butyl phthalate; monoethyl phthalate (MEP), the main metabolite of diethyl phthalate; and two phenols, methyl paraben (M-PB) and 2,5-dichlorophenol were detected in the urine samples of all women. The highest urinary concentrations were for MEP and M-PB. Urinary concentrations of all phthalate metabolites and of 2,4-dichlorophenol, 2,5-DCP, and bisphenol A were lower in the pregnant women than in the children. Among women, a positive relationship with social class and education was shown for most of the phthalate metabolites and phenols. Almost all phthalate metabolites varied by region even after adjusting for social class and education.
Conclusions: Phthalate and phenol exposures are prevalent in a group of pregnant women and young children, two susceptible populations, and these exposures might be positively related to social class.

Hospital Landscape Design in Denmark - Staff Experiences in Using the Garden

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Background and Aims: Healthcare occupations traditionally are stressful because they involve an overload from work demands and stress from rotating shifts. However, numerous studies have shown that gardens in healthcare facilities used by staff gave positive outcomes in terms of restoration and recovery-relief from work place stress. This study investigates hospital landscape in five acute-care hospitals located in the Capital Region of Copenhagen, Denmark. It aims to identify how the landscapes are used by the staff and their experiences of restoration while being in the garden.
Methods: The Perceived Restorative Scale (PRS) ranging from 0 (no) to 10 (completely) was used in the questionnaires and Nvivo 8 was used to organize and evaluate the interview results. A total of 183 staff answered the questionnaires and 15 staff (three from each hospital) were selected for an in-depth interview.
Results: Preliminary findings show that hospital staffs, due to their nature of work, have limited time to spend in the hospital garden. The duration of time spent in the garden ranges from five to ten minutes. The result also indicates that two of the most frequent involving the staff while in the garden are having lunch and smoking. Gardens were also utilised as a quick passing through from buildings. Majority of staff mentioned that hospital landscape should be designed with priority to the needs of patients before theirs (the staff). The results also indicate that due to the limitation of time to take breaks while working, the gardens are underutilised by staff.
Conclusions: Recommendations such as easy accessibility to gardens from their work stations and view of the garden from their work windows should be considered for the Danish hospitals.
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CLIMATE CHANGE AND HEALTH IN THE EASTERN MEDITERRANEAN: POTENTIAL EFFECTS AND POSSIBLE SOLUTIONS

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Background and Aims: The effects of climate change on human health are varied and dependent on geographical location. Theses effects include alteration of infectious disease distribution, air pollution, extreme weather events, increased incidence of certain diseases, desertification, drought, and food insecurity (Haines 2004). Many of these effects are pronounced in arid climates such as the Eastern Mediterranean where water scarcity has historically been a source of political, social and economic instability. Our aims are 1) to present the literature on the health effects of climate change and its relevance to health in the Eastern Mediterranean; 2) to discuss potential for collaboration, specifically amongst Israelis and Palestinians, in addressing the shared public health hazards of climate change.
Methods: We present a literature review on the impacts of climate change on desertification, access to potable water, frequency of dust events, and prevalence of disease in the Eastern Mediterranean. Climate models for the Eastern Mediterranean region and their relevance to public health outcomes are assessed. Current mitigation strategies and potential for collaboration in adaptation measures amongst Israelis and Palestinians are explored.
Results: Recent models predict a mean temperature increase of 1.6º to 1.8ºC, a 4 to 8% precipitation reduction, and 12-88cm increase in sea level in the region by 2100 (Pe'er 2000). Collaborations on the health impacts of climate change include: coordination of meteorological, CO_2 concentration, and air pollution monitoring; coordination of disease registries and databases; and shared surveillance of water, food and vector-borne disease outbreaks.
Conclusions: National borders do not serve as protection from the potential effects of climate change on human health. The Eastern Mediterranean, given its arid climate and limited water supply, is likely to have significant public health consequences related to climate change. Further collaboration in understanding and addressing climate change is crucial to ensure the health of all people in the region.
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COHORT OF NORWAY: ACIDIC DRINKING WATER AND THE RISK OF FOREARM-FRACTURE

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Background and Aims: The prevalence of forearm fractures in Norway is high, and it increases with increasing degree of urbanization. We have investigated whether the quality of drinking water may explain this urban-rural gradient. In Norway, pH in drinking water should be 7.5-8.5. We know that pH < 7.5 could be unfavorable to bone-health, with less bicarbonate and calcium, and more heavy metals available. The relationship between drinking water and fractures has not previously been studied on a population level.
Methods:"Cohort of Norway" comprises ten population-based surveys with 174,430 participants aged 20 years or more answering 50 common questions, one concerning former forearm fractures. Geographic Information Systems were used to link the survey-information to the waterworks-registry, based on the participants' home-addresses. Analyses were limited to 126,923 individuals with valid information on exposure, outcome and relevant covariates (age, BMI, marital status, urbanization). For adjustment, we also included the acidity-level in raw-water as a proxy for non-measured water-quality factors.
Results: The pH in tap water was less than 7.5 for 72% of participants, and overall 14% reported having suffered a fracture. Water with pH < 7.5 was associated with an increased risk of forearm fracture in men, compared with pH≥7.5 (OR 1.17, 95% CI 1.12-1.21). A similar odds ratio was observed in women. Adjustment for the covariates did not significantly change these estimates. Including pH-level in raw-water weakened the association, and in women it was only borderline significant (p=0.07).
Conclusions Our results suggest that the pH in drinking water influences the risk of forearm fractures, independently of degree of urbanization and other background factors. The effect of tap water with pH < 7.5 on fracture-risk may to some extent be confounded by the quality of the raw water.
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A CASE-CROSSOVER STUDY OF HOSPITAL ADMISSIONS FOR CORONARY HEART DISEASE AND METALS IN AIR POLLUTION NEAR AN ITALIAN STEEL PLANT

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Background and Aims: Variation in the chemical composition of fine dust might entail different acute and chronic cardiovascular risks. To evaluate the association of daily levels of metals in outdoor air with acute hospital admissions for coronary heart disease (CHD), we conducted a case-crossover study in a population located near a large steel plant.
Methods: A GIS mapped residential history of Friuli Venezia Giulia population (Northeastern Italy) was completed. Among residents within 5km from the main chimney of the steel plant, we mapped cases of CHD (ICD9CM 410-414) admitted between 8/1/2002 and 3/9/2007. Concurrently, daily air concentration of Mn, Fe, Ni, Zn, Cd, Pb, Cr, V and As was measured at a monitoring station located 600 m from the chimney. We used the time-stratified approach for the case-crossover analysis, i.e., referent days were the same day of the week within the same month as the index day. As exposure we considered the average of the cumulative 0- to 2-day lag for each metal. Conditional logistic regression, adjusted for outdoor temperature and humidity, was used to estimate the OR of CHD hospitalization by quartile of exposure and to evaluate trends. Analyses were conducted for cases located within 5km, 2km, in the prevalent wind direction (to SW) and by gender. Case validation with hospital charts is underway.
Results: 274 residents in the area were hospitalized for CHD. Among cases within 5km from the point source, results did not show consistent associations. However, within 2km from the steel plant, the risk of CHD hospitalization increased significantly at higher Mn, Zn and Pb levels. Among cases residing in the SW quadrant the association was even stronger, especially among women, and involved also Cd and Cr.
Conclusions: This case-crossover study provides evidence that environmental exposure to metals may act as a trigger of CHD hospitalization.

PRECIPITATION AND VARIOUS DEGREES OF HEALTH CONSEQUENCES IN TAIWAN (1994–2008)

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Background and Aims: Precipitation intensities appeared to have increased over the recent decades. Heavier precipitations are reported to result in direct causalities or .to affect mental health indirectly. Yet, only limited studies have established the quantitative relationships between levels of precipitation and various types of public health consequences in a subtropical region like Taiwan.

Methods: Data of the daily accumulated precipitation, temperature and daily registration of cause-of-death were integrated from 352 townships between 1994 and 2008 in Taiwan. The relationship between precipitation and reporting cause-of-death on accidental deaths, excluding those from earthquake events (ICD-9: E800–E949) and suicidal death (ICD-9: E950–E959), were analyzed with Spearman correlation coefficient, Poisson regression and further mapped by geographical information system (GIS).

Results: The preliminary findings indicated a positive correlation between precipitation level and various public health consequences. Every 30mm increase of precipitation was significantly associated with an elevated risk of accidental death (RR= 1.022, 1.015–1.030) and suicidal death (RR= 1.025, 1.007–1.026) after adjusted for temperature, season and location of death registry. Results also indicated that precipitation of the very day was the significant variable, compared to that of any previous days. Risk map was constructed according to the estimated level.

Conclusions: A quantitative assessment was successfully conducted between the estimated level of precipitation and the registered deaths due to accidents and suicides. Future studies may take into account the availability of medical resources or sanitary infrastructures before concluding the exact association between precipitation intensity and various causes of death.

LOW-LEVEL ARSENIC EXPOSURE AND OBSTRUCTIVE PULMONARY DISEASE IN THE U.S. POPULATION

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Background and Aims: Arsenic is a known carcinogen found in drinking water throughout the world. Contaminated aquifers in parts of India, China, and Bangladesh have resulted in the poisoning of hundreds of millions of people. An unknown number of workers have occupational exposures from wood preservation, glass production, smelter operation, and semiconductor manufacturing. An emerging body of evidence suggests that exposure to inorganic arsenic may be associated with non-malignant respiratory disease.
Methods: We attempt to determine if there is an association between arsenic exposure at levels seen in the U.S. and prevalence of asthma, emphysema, and chronic bronchitis. Urinary arsenic is collected on 5,365 participants from a representative sample of the U.S. population. Linear regression analysis compares geometric means for participants with and without pulmonary disease. Logistic regression calculates odds of having pulmonary disease comparing participants with the highest and lowest quintiles of urinary arsenic. Two novel methods to adjust for the component of organic arsenic are incorporated into the statistical model
Results: Geometric mean concentration of urinary arsenic for participants with versus those without asthma (0.97;95%CI 0.94-1.01), chronic bronchitis (1.00;95%CI 0.98-1.03), and emphysema (1.00;95%CI 0.96-1.04)are not significantly different. Odds of having asthma is 0.77 (95% CI 0.4-1.47) for participants with the highest quintile of urinary arsenic (• 17.23 mcg/dl) when compared to the lowest quintile (• 3.52 mcg/dl). A significant association is found between increasing urinary arsenic concentration and decreasing age, male gender, and non-“Caucasian race”
Conclusions: After controlling for potential confounders and adjusting for organic arsenic exposure, we find no evidence of association between urinary inorganic arsenic and prevalence of asthma, chronic bronchitis or emphysema.

EFFECTS OF LIFETIME AIR POLLUTION EXPOSURE ON LUNG FUNCTION DURING CHILDHOOD

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Background and Aims: Previous studies of effects of air pollution on lung function in children have shown heterogeneous results. Although some studies have suggested a negative association between air pollution and lung function, others found no effect, while effects for specific pollutants, for specific lung function measures or in specific subpopulation only have also been reported.
One common limitation of previous studies has been the use of pollution exposure data, which does not allow for spatial and temporal variation and may not reflect individuals' exposure. We have developed and validated a comprehensive exposure model of lifetime exposure to PM_{10} and NO_2 for children, which incorporates spatio-temporal variation by combining time-activity data with concentrations in the home, school and during home-school travel, the microenvironmental exposure model (MEEM). The aim of this study was to assess the effect of lifetime PM_{10} and NO_2 exposure on forced expiratory volume in one second (FEV_1) within the setting of a population based birth cohort study, the Manchester Asthma and Allergy Study.
Methods: Participants were recruited prenatally. FEV_1 was measured at age 5, 8 and 11 years and results were expressed as % predicted FEV_1. Children's exposure to PM_{10} and NO_2 was estimated retrospectively using MEEM. The model estimated PM_{10} and NO_2 concentrations (in $\mu g/m^3$) for a typical day for each month of the child's life. This data was aggregated to provide exposure windows of 0-5, 0-8 and 0-11 years, for approximately 400 children. Multiple linear regression was used to asses the effect of modelled exposure on lung function, adjusting for sensitisation and asthma or current wheeze.
Results: No significant associations were found between FEV_1 % predicted and lifetime PM_{10} or NO_2 exposure ($p>0.05$).
Conclusions: This study found no significant association between lung function in children and NO_2 and PM_{10} exposure, despite the use of a detailed exposure assessment methodology.

A SENTINEL CASE SERIES OF CANCER PATIENTS WITH OCCUPATIONAL EXPOSURES TO ELECTROMAGNETIC NON-IONIZING RADIATION WITH SHORT LATENT PERIODS

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Background and Aims: We have reported groups of workrers with high exposures to Non-Ionizing Radiation and short latent periods for cancer. We present a sentinel case series (n=47, 40M, 7F) of self-referred cancer patients with occupational exposures to EMF.Our aim was to report ages of first diagnosis/latency and tumor type and exposures
Methods: We categorized patients with regard to types of radiation, far or near field exposure and direct body contact**,** age of diagnosis and latency. For some we had data on frequencies, for others we provided assessments
Results: 15 patients developed cancer with latent periods < 5y and 12 patients with latent periods between 5y and 10y. The remaining 20 patients had longer latent periods In the <5y latency group there were 8 hematolymphatic cancers and 9 solid tumours – testis, head & neck (including brain) and GI tract. In both the <5y and 5-9y latency groups there were patients exposed to intense levels of EMF, to several frequencies of EMF, or to EMF in combination with IR or other exposures. There were patients with direct body contact, or were in direct line of focus from point sources, or worked in small, electronically dense environments. In the >10y latency group there were more patients with intermittent exposures or exposures at older ages.
Conclusions: The data suggest that cancer in young workers may be associated with intense severe exposures to EMF and short latent periods, especially for hematolymphatic cancers. The findings state the case for (1) more careful modelling of exposure sources and penetration into the body, (2) preventive and protective measures based on control of exposure at source, barriers, and personal protection and (3) exploring low-exposure-low risk relationships for latent periods <10 y

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CONCENTRATIONS OF OZONE AND MORTALITY IN TAIWAN: PRESENT AND FUTURE

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Background and Aims Global climate disruption has been implicated to influence air pollution profiles through altering atmospheric compositions and chemical processes, and result in deteriorating air quality. This study therefore aimed to examine the association between variations of temperature, ozone (O_3) concentrations and mortality in Taiwan aiming to facilitate the projection of elevated health risk in the future.

Methods Database was first set up to integrate daily temperature, humidity, O_3 concentrations and a daily registration of cause-of-death from 1994 to 2008 in six major cities (Keelung, Taipei, Taichung, Chiayi, Tainan and Kaohsiung) of Taiwan. The population from 2010 to 2060 was based on projection by Taiwan Council for Economic Planning and Development. Generalized additive models (GAMs) and meta-analysis of random effect measured the local and regional relative risks of mortality after applying the population projections of six cities to calculate the expected number of deaths above the baseline (1994–2008) for the projected period of 2035–2050.

Results A 10-ppb increase in 2-day-lag of O_3 concentrations was associated with an higher risk in non-accidental-all-causes mortality for all population (RR_{pooled}= 1.065, 1.049–1.081); yet, not for population over than 65 years (RR_{pooled}= 1.010, 0.961–1.062) in Taiwan. For projecting number of daily deaths attributable to O_3 concentrations, an average increase of 3 ppb of O_3 concentrations for all 6 cities was assumed, Having applied a steady exposure–response relationship though the period of 2035–2050, the projected increase of mortality appeared to range between 2.3% (Taichung), the lowest to 10.7% (Taipei), the highest.

Conclusions The estimated level of increased risk associating rising pollution level and mortality further justify the urgent need for both global and regional adaptation strategy.

EARLY LIFE EXPOSURE TO AIR POLLUTION AND RESPIRATORY SYMPTOMS IN CHILDREN: RESULTS FROM A BIRTH COHORT

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Background and Aims: Ambient air pollution has been consistently associated with exacerbation of respiratory symptoms in schoolchildren, but the role of early exposure to traffic-related air pollution in the first occurrence of respiratory symptoms and asthma is not yet clear. We assessed the association between exposure indexes of traffic-related air pollution during early life and respiratory outcomes in a birth cohort.
Methods: A cohort of 708 newborns, residents in a district of Rome (Italy), was enrolled in 2003-2004. Direct interviews to the mother were done at birth and at 6, 15 and 48 months of life. Exposure to NO2 was assessed for each follow-up periods, using the estimates derived from a Land Use Regression model (LUR). For each residential address, GIS variables of proximity to high traffic roads (more than 10,000 vehicles/day, HTR) and traffic density were derived. We used current values of NO2 and GIS indexes for each age as well as NO2 weighted lifetime average values to take into account early pre- and post-natal exposure. Associations with respiratory symptoms (at 6, 15 and 48 months) were assessed with logistic regression (odds ratios, OR) using a cross-sectional and a longitudinal approach (GEE model).
Results: There was no association between the exposure indices and the respiratory outcomes in the longitudinal model, except for wheezing and metres of HTR (150 meters buffer) (OR=1.62; 95%CI, 1.04-2.54). A stronger association was found at 4 year for wheezing and for lower respiratory infections with distance from HTR (OR=2.84; 95%CI, 1.30-6.19 and OR=3.69; 95%CI, 1.61-8.46, respectively), and for doctor-diagnosed asthma with weighted average NO2 (OR=3.07; 95%CI, 0.99-9.54) and metres of HTR in a buffer of 150 metres (OR=3.47; 95%CI, 1.06-11.35).
Conclusions: Consistently with results from literature, some associations between respiratory outcomes and GIS variables and NO2 values were found, especially at 4 years of age.

ASSOCIATION OF TRAFFIC RELATED AIR POLLUTION AND SUBCLINICAL ATHEROSCLEROSIS IN MEDITERRANEAN TOWNS OF THE REGICOR STUDY

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Background and aims: Traffic-related air pollution causes cardiovascular disease and death. Most evidence relates to short-term exposure causing acute effects like myocardial infarction and stroke. However, it is still unknown whether the long-term exposure is associated to the development of atherosclerosis. We investigated the cross-sectional association between traffic-related air pollutants and the carotid intima media thickness (IMT), an established marker of subclinical atherosclerosis, in participants of the REGICOR study, a population based cohort in Girona (Spain).
Methods: We measured the IMT by ultrasound of the carotid artery in 2,215 participants of the REGICOR study during a re-examination in 2007-2009. We assigned exposure using outdoor NO2 levels, derived with a land use regression model, and traffic proximity metrics at the participant's home address at the time of the IMT measurement. Multiple linear regression was used to assess the association of air pollution with IMT.
Results: An 11µg/m3 increase in NO2 (interquartile range) was associated with a 1.1% (95% CI: -0.17% to 0.24%) increase in IMT in the crude analysis. After adjusting for age and sex, the change in IMT was -0.17% (CI: -1.22% to 0.87%). Further adjustment for education, occupational status, marital status, smoking, hypertension, diabetes, body mass index, and physical activity did not change the results. Associations were modified by educational level with stronger estimates in the highly educated population (1.77% change in IMT, CI: -0.50% to 4.04%). There was no evidence of interactions with sex, age, smoking, hypertension or lipid-lowering medication.
Conclusions: We found no association between long-term exposure to NO2 and IMT. The interaction with socio-economic status (i.e. educational level) needs further investigations. In subsequent analyses we will assign exposure based on the participant's 10-year address history and consider adherence to Mediterranean diet as a potential effect modifier.

JAPAN ENVIRONMENT AND CHILDREN'S STUDY – PILOT STUDY AND RESEARCH LAUNCH

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Background and Aims: Basic Plan of the Japan Environment & Children's Study(JECS) formulated in 2010 is aimed at identifying environmental factors affecting children's health. The study follows birth cohort studies such as the Hokkaido (20,000 children) and Tohoku (1,300 children). JECS is designed on a large scale to study multiple hypotheses concerning the impacts of environmental chemicals on pregnancy and reproduction outcomes, congenital abnormalities, psychoneurological development, the immune system and allergies, and the endocrine system.
Methods: Participants of the Study are 100,000 newborns and their parents. Recruitment of pregnant mothers will span a 3-year period commencing in January 2011 with following-up until the age of 13. A community-oriented hospital-based recruitment approach was adopted, covering more than 70% of deliveries in each 15 region. The target recruitment ratio of 70% will ensure the participation of more than 50% of the births. Regular questionnaires, biospecimens and environmental samples will be collected and analyzed. Results and medical outcome will be stored in a database and analyzed by the research group, and also made available for other studies
Results: In the pilot studies, recruitment started in two regions by four universities in February 2009. Consent was obtained from 453 pregnant women, the recruitment ratio ranging from 69.3% to 98.5%. The lessons obtained in the pilot study are incorporated into JECS continually. In JECS, many research coordinators were trained with common manuals related to informed consent, protection of personal information, etc. The recruitment and collecting data are being conducted in each 15 regional unit centers in Japan.
Conclusions: JECS will be the largest birth cohort study in Japan, and one of the largest in the world. It is expected that the Study will result in a great scientific contribution of the children's health and environment.

WHAT IS THE BEST INDICATOR OF THE ADVERSE HEALTH EFFECTS OF COMBUSTION PARTICLES: BLACK CARBON OR PARTICLE MASS?

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Background and Aims: Current air quality standards for particulate matter use the mass concentration (PM10 or PM2.5) as a metric. It has been suggested that particles from combustion sources are more health relevant. Expressed in reduction of the total mass concentration the impact of policies directed at reducing particles from combustion processes is usually relatively small. We therefore evaluated the value of black carbon particles (BCP) as an additional indicator in air quality management.
Methods. We consider different measurement methods for BCP and compare the near roadway concentration gradients of BCP with those of PM mass. We review the evidence comparing the health effects of BCP with those of PM mass. We compare the potential health benefits of a hypothetical traffic abatement measure calculated based on concentrations response functions for BCP with those based on PM2.5.
Results. Near roadway concentration gradients are much steeper for BCP than for PM mass. A relatively large part (40-70%) of the roadside increment in PM2.5 mass concentrations can be attributed to BCP. Health effect estimates from mortality and morbidity time-series studies as well as cohort studies were higher for BCP than for PM10 or PM2.5 when expressed per $\mu g/m^3$. When applying the calculated Relative Risks (RR) for all cause mortality from cohort studies, the increase in life expectancy associated with a hypothetical traffic abatement measure was four to nine times higher when expressed per achievable reduction in BCP compared to that per an equivalent amount of PM2.5 mass.
Conclusion. BCP is a valuable additional air quality indicator to evaluate the health risks of air quality dominated by primary combustion particles

COMPARISON OF LAND-USE REGRESSION MODELS OVER A THREE YEAR PERIOD IN OSLO, NORWAY

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Background and Aims: Spatial modelling of traffic-related air pollution by the use of land-use regression models have increasingly been applied in epidemiological studies. These models provide higher spatially resolved data, but assume that the spatial contrasts are stable over longer periods of time.
Methods: We tested the stability of measured and modelled spatial contrasts over a three year period in Oslo, Norway. A land-use regression model was previously developed to estimate individual exposures in the area based on samples of traffic-related air pollution during the winter of 2005. A total of 69 of these locations were sampled during the same period in 2008.
Results: The final regression models much of the variability in the measurements with an adjusted coefficient of determination (R^2) of 0.66 for nitrogen oxides (NO_x), 0.72 for nitrogen dioxide (NO_2), and 0.56 for nitric oxide (NO). Furthermore, the measurements from 2008 correlated well with the measurements sampled in 2005 (r = 0.91 - 0.95).
Conclusions: Our study found that the spatial contrasts which applied in the model based on the 2005 samples still applied to a large extent when used to predict the samples from 2008 or vice versa (r = 0.65 – 0.85). This suggests that this land-use regression approach for modelling of small-area variation in traffic-related nitrogen dioxide can be used to describe long-term concentrations for individual exposure.

ASSOCIATIONS BETWEEN TRAFFIC AND CARDIOVASCULAR MORTALITY IN A COHORT OF CALIFORNIA WOMEN

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Background and Aim: Several studies have reported associations between exposure to traffic and cardiovascular events and mortality. We examined relationships between exposures to traffic and various measures of mortality and morbidity in a cohort of over 65,000 residentially stable female teachers and administrators participating in the California Teachers Study, who were followed from 1996 though 2005. Mean age of the cohort at inception was 54; the baseline active smoking rate was 5%, and participants had similar occupational exposures.
Methods: Participants' geocoded addresses were linked with cross-sectional measures of traffic intensity from the year 2000. We developed three measures of traffic exposure: (1) traffic density (estimated number of vehicle miles traveled within 150 m of a participant's residence; (2) proximity to a highway within versus beyond 150 m; and (3) vehicle density (number of vehicles registered in each participant's Census block group, divided by the block group area). Using Cox proportional hazards models, we examined associations between these metrics and several measures of mortality, as well as incident myocardial infarction and stroke.
Results: We observed several associations between traffic density and elevated risks of all-cause, cardiopulmonary, and cardiovascular mortality, with statistically significant risk gradients with increasing vehicle density. For example, the hazard ratio for participants in the 90^{th} percentile of traffic density in relation to those below the 50^{th} percentile was 1.20 (95% CI = 1.03, 1.39) for cardiovascular mortality. Associations were not observed between traffic density and incident myocardial infarction or stroke, or for any of the other traffic metrics.
Conclusion: This study provides additional evidence that exposure to traffic is associated with mortality from heart disease in a cohort of middle-aged and older women.

THE EFFECTS OF PARTICULATE AIR POLLUTION ON HOSPITAL ADMISSIONS FOR CARDIAC DISEASES IN POTENTIALLY SENSITIVE SUBGROUPS. A MULTICITY CASE-CROSSOVER ANALYSIS

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Backgrounds and aims. Several studies have shown that particulate air pollution with aerodynamic diameter less than 10 micrometers (PM_{10}) is associated with increased risk of hospital admissions for cardiovascular causes. However, only few studies focused on subgroups of population especially susceptible to these effects. The objective of the present study was to estimate the short-term association between PM_{10} and cardiac hospital admissions, and to identify susceptible groups.

Methods. A "time-stratified" case-crossover study was carried out in 9 Italian cities from 2001 to 2005. The associations between daily PM_{10} and all cardiac diseases (CD), acute coronary syndrome (ACS), arrhythmias and conduction disorders (ACD), and heart failure (HF) were estimated for hospitalizations of 65+ year-old subjects. The effect modification was assessed assuming age, gender and hospital diagnoses from the previous two-years as susceptibility factors.

Results. A total of 167,895 hospitalizations of 65+ year old with a diagnosis of cardiac diseases were considered. The excess risk of CD was 1.03% (95% confidence interval: 0.69-1.38) per 10 ug/m^3 PM_{10} at lag 0 and was lower on the following days. The effect was slightly higher for HF (1.37%; 0.74%-2.00%, lag 0) and ACS (1.13%; 0.37%-1.89%, lag 0-1) than for ACD (1.00%; 0.22%-1.78%, lag 0). Women were at higher risk of PM_{10}-related HF admissions (1.99%; 1.17%-2.82%; p-interaction = 0.022) and 75-84-year-old subjects were at higher risk of ACS admissions (2.61%; 1.49%-3.75%; p-interaction = 0.001). Previously diagnosed hypertension, arrhythmias and heart failure were suggested as effect modifiers of the PM_{10}-heart failure association.

Conclusions. An important effect of PM_{10} on hospitalizations for cardiac diseases was found in Italian cities. Women, 75-84 year-old subjects and subjects whit previous cardiovascular diseases were susceptible to the PM_{10} effects.

ACUTE HEALTH EFFECTS OF TRAFFIC RELATED AIR POLLUTION AND INTERDEPENDENCIES WITH PHYSICAL ACTIVITY

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Background and Aims: The acute health responses in healthy populations resulting from exposure to traffic related air pollution remain unclear. Few studies have assessed simultaneously exposures and acute health markers associated with traffic related air pollution under real world conditions. Ambient factors can potentiate the adverse health responses compared to those shown in chamber studies. The role of physical activity as a potential effect modifier of such health effects is poorly understood. This project aims to determine the physiologic responses in a healthy population in Barcelona following short term exposures representative of a commuting environment under real world conditions.
Methods: Crossover study comparing the physiologic responses pre- and post-exposure to traffic related air pollution. Thirty non-smoking subjects are exposed for 2 hours to contrasting pollution levels while either cycling or resting. Each volunteer is to undergo all four conditions (high vs. low exposure; moderate physcial activity vs. resting). Personal exposure monitoring involves particulate matters of different size diameters, NOx, CO, CO2, elemental carbon (EC), and noise levels. Health endpoints measurements include pulmonary function and inflammation, cardiovascular effects like blood pressure, heart rate variability and oxygen saturation. Blood and urine sampling serves for determination of short acting biomarkers and oxidative stress levels.
Results: Preliminary descriptive analysis from first sessions show concentrations of EC, NOx, and ultrafine particles levels at the high exposure site on average 2, 4.2, and 3.2 times higher than the low exposure site, respectively. Associations with health responses in different sites will be reported in the course of the study.
Conclusions: Findings from this study are expected to inform about the health responses in different levels of air pollution associated with or without moderate physical activity as they appear in commuting, and thus allows deriving recommendations for planning transportation microenvironments that promote better physical and psychological wellbeing.

INTEGRATED ENVIRONMENTAL HEALTH IMPACT ASSESSMENT AT THE SCIENCE-POLICY INTERFACE: GENERATING POLICY-RELEVANT KNOWLEDGE

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Background and Aims: The study explores which science-policy activities have been undertaken in the case studies of two EU consortium projects funded under the EU 6th Framework Programme: INTARESE (Integrated Assessment of Health Risks of Environmental Stressors in Europe) and HEIMTSA (Health and Environment Integrated Methodology and Toolbox for Scenario Assessment). If science and policy actors communicate throughout the assessment process, this is likely to lead to more policy-relevant assessments. This implies among other things that the assessment needs to be:

- specifically targeted to address relevant policy questions and stakeholder perspectives;
- discussed with relevant stakeholders;
- expressed in indicators that are adapted to the underlying policy question and target audience

Methods: A questionnaire on science-policy activities was distributed among 11 case study groups. Responses have been collected from seven groups: two HEIMTSA case studies (on noise and heavy metals), four INTARESE case studies (on water, waste, transport and agricultural land use) and the INTARESE-HEIMTSA common case study on health impacts of climate change policies in Europe.
Results: The findings indicate that the INTARESE and HEIMTSA case studies principally use a science-based approach. The studies did not extensively consider the three science-policy challenges, outlined above, for more openness in problem framing, participation during the assessment process and the policy relevance of the assessment outcomes.
Conclusions: limited science-policy activity
The case studies were set up, primarily, to test the INTARESE and HEIMTSA methodology, and were not intended to actively engage in the science-policy process. Partly because of the methodological and expert-oriented character of the case studies, they did not extensively consider the science-policy challenges. It would be interesting to explore science-policy activities in future assessments that are driven more profoundly by actual policy questions commissioned by policymakers.

TRAINING OF HEALTH RISK ASSESSORS IN EUROPE – DEMAND, NEEDS AND SUPPLY

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Background and aims: Health risk assessment is an essential tool in protecting public health and a key aspect of EU policy and legislation. There is a lack of coordinated training opportunities for health risk assessors in Europe. The aim of the Risk Assessment and Management – European Training Programme (Risk ASSETs) project is to bring together technical specialist, including Epidemiologists, Toxicologists and Environmental Assessors to develop a suitable training programme to address this need.
Methods: A literature review and survey of health risk assessors was undertaken. From this, competencies for health risk assessors were developed and agreed at two international workshops. These were used to develop the curriculum and course module outlines. Epidemiology is a core component of the project and is integrated in all relevant teaching material. Additionally, a review of administrative frameworks for different professional development schemes is being undertaken in order to develop an administrative framework to deliver training across the EU.
Results: The training needs of health risk assessors in Europe are broad and encompass the needs of health risk assessors in regulatory bodies, public health, industry, consultancies and research. The proposed competencies aim to address this broad range of training needs. Consideration has been given to developing essential knowledge and key skill in Epidemiology within the context of health risk assessment. The proposed training scheme allows a non-specialist scientist to undertake a modular programme to qualify as a health risk assessor, with the option of tailoring their training to suit their specific role as a health risk assessor. The proposed administrative system coordinates training across Europe, allowing a trainee to undertake training in different European countries.
Conclusions: There is a substantial need for more coordinated health risk assessment training opportunities in Europe. The Risk ASSETs project provides a proposed health risk assessment training model for Europe. Such a training scheme has the potential to improve the quality of health risk assessments undertaken and, subsequently, improve public health protection.

RELATIONSHIPS BETWEEN ESTIMATED AMBIENT TEMPERATURE VARIATIONS AND MORTALITY IN THE ELDERLY

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Background and Aims: The elderly may not have the effective thermoregulatory responses to heat stress, and are therefore less adapt to sudden changes in ambient temperature. This study aimed to evaluate the relationship between variations in ambient temperature from 1994 through 2008 and overall daily mortality as well as cardiovascular and respiratory mortality in the elder population of Taiwan.

Methods: Meteorological data provided by the Central Weather Bureau (CWB) of Taiwan were interpolated to create representative estimates of diurnal temperature variation of 352 townships by the kriging methods. Daily mortality data were retrieved from the Taiwan Death Registry, Department of Health. The generalized linear models and Poisson regression were used to analyze the impact of variations in mean difference of diurnal temperature on overall, cardiovascular and respiratory mortality, controlling for calendar month and demographic regions.

Results: The increasing percentiles of diurnal temperature variation appeared to be associated with mortality risk compared with 0–4th and presented a rising trend. Risk ratios of daily mortality for temperature variations of 10.5°C and 12.2°C (95th and 99th percentiles) were significantly elevated for both genders, especially in cold weather. These risks seemed to increase to a greater scale among a sub-metropolitan city, an isolated island and mountain areas. After performing stratified analyses by gender, elderly women were found to be more susceptible to extremely high temperature variations at the 99th percentiles and more likely to die of cardiovascular and respiratory diseases.

Conclusions: A positive correlation was detected between temperature variation and mortality in the elderly. The increase in death events correlated with higher percentiles of temperature variations suggests that the increasing dynamics of temperature are a valid reflection of greater risk, highlighting the need for precautionary measures.

HIGHER URINARY 1-HYDROXYPYRENE LEVELS FOR RESIDENTS LIVING CLOSER TO A PETROCHEMICAL COMPLEX

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Background and Aims: This study measured urinary 1-hydroxypyrene as a biomarker to assess people's exposure to polycyclic aromatic hydrocarbons (PAHs) emitted from a petrochemical complex.

Methods: We defined the downwind areas within 10 km radius of the petrochemical complex as the exposed zone and the upwind areas of 25 km away from the complex as reference zone. Residents who have lived in the chosen zones for more than 5 years were randomly selected as study subjects by three age groups, i.e. 6-15 years, 35-60 years, and 61 years and older. Spot urine samples were collected and analyzed for 1-hydroxypyrene by a HPLC-florescent method.

Results: Urinary 1-hydroxypyrene concentrations of 328 subjects in the exposed zone (0.20±0.36 • mol/mol-creatinine) were significantly higher than those of 189 subjects in the reference zone (0.08±0.06 • mol/mol-creatinine) by t-test. Combined, urinary 1-hydroxypyrene concentrations in 6-15 years age group (0.11±0.16 • mol/mol-creatinine) were statistically lower than those in the other 2 age groups (0.16±0.30 and 0.21±0.39 • mol/mol-creatinine) by ANOVA-test. And 1-hydroxypyrene concentrations were higher in residents who exposed to ETS or incense, but were not different by gender. The zone effect on urinary 1-hydroxypyrene levels remained significant after adjusting for covariates of age, sex, smoking, ETS, grilled food consuming and incenses burning in regression models.

Conclusions: The result of this study showed that residents' 1-hydroxypyrene concentrations were significantly related to zone effect, indicating their proximity to a large industrial point source of PAHs.

MATERNAL EXPOSURE TO ORGANOPHOSPHATE PESTICIDES, PON1 POLYMORPHISMS AND MISCARRIAGE

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Background and Aims: Although there is evidence from animal studies of impaired reproductive function by exposure to OP, the effects on spontaneous abortion have not been sufficiently evaluated in epidemiological studies. Paraoxonase (PON1) detoxifies organophosphates by cleavage of active oxons. Some *PON1* gene polymorphisms could reduce the enzyme activity and increase susceptibility to OP toxicity. The aim of this study was to asses the association between occupational exposure of women to organophosphate pesticides (OP) and miscarriage, and to evaluate the association of PON1 polymorphisms of mothers ($PON1_{55}$, $PON1_{192}$ and $PON1_{-108}$) on miscarriage.
Methods: A cross-sectional study was conducted in a population of women resident in communities highly exposed to OP. A total of 313 women, floriculture workers or spouses/couple of floriculture workers, were selected. They all had at least one pregnancy during last 10 years. We obtained information for 534 pregnancies. The $PON1_{55}$ and $PON1_{192}$ genetic variants were obtained by PCR-RFLP, while the $PON1_{-108}$ polymorphism was analyzed by RT-PCR.
Results: we do not found a significant association between occupational exposure to pesticides and miscarriage. Concerning PON1 polymorphisms, the risk of miscarriage was twice higher in mothers carrying the PON1 192RR genotype compared 192QQ genotypes (OR=2.2; 95% CI 0.93, 5.36). The $PON1_{55}$ M allele shown a higher risk of miscarriage compared with mothers carrying the $PON1_{55}$ LL genotype (OR=4,8; IC95% 1,6–14,2).
Conclusions: These results suggest that women carrying genotypes $PON1_{192}$ RR, $PON1_{55}$ MM and $PON1_{55}$ ML which are exposed to OP have higher risk of miscarriage.

WEATHER AND CHILD MORTALITY IN CAPE TOWN, SOUTH AFRICA

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Background and Aims: Evidence for the impacts of temperature upon daily mortality has been based upon studies on high income populations in Europe, East Asia and North America and children's mortality has been little studied. We describe the associations of heat and cold with child mortality in a population with a temperate climate, large heatlh inequalities and high rates of child mortality.
Methods: Individual mortality data for the population Cape Town (2001-2004) were divided into age and cause of death groups. The association of ambient temperature with daily mortality was analysed using Poisson regression models, adjusted for time varying confounders, including season, particulate air pollution, influenza, day of week, relative humidity and autocorrelation. To quantify the temperature effects, linear associations of lag 0-2 temperature above a heat threshold and lag 3-13 below a cold threshold were assumed. Here we focus on children (ages 0-14).
Results: Child mortality increased with heat, by 5.29% (95% CI 2.38,8.28) per °C above 19°C. The association was present for all causes of death and in particular for infectious diseases (6.68% (3.16,10.32)). Cold temperatures (below 12^{o}C) were also associated with excess mortality. The effects of heat on child mortality appear to be delayed and there is little evidence of short term mortality displacement.
Conclusions: Hot and cold weather have important associations with mortality in children in Cape Town. This suggests a large avoidable burden of heat on children in this population, and further research should be undertaken on potential public health interventions.

INCREASED FRACTIONAL EXHALED NO AND DECREASED LUNG FUNCTION ARE ASSOCIATED WITH ULTRAFINE PARTICLES AND NOT OTHER PM CHARACTERISTICS: HEALTH EFFECT ASSESSMENT IN THE RAPTES PROJECT

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Background and aims: Epidemiological studies demonstrated adverse health effects of ambient particulate matter (PM), but it is not clear which characteristics (e.g., size, composition) or sources of PM are responsible for observed effects. The aim of RAPTES (Risk of Airborne Particles: Toxicological-Epidemiological hybrid Study) is to study effects of various PM characteristics on volunteers exposed experimentally to air pollution in several real-world settings.
Methods: Thirty healthy volunteers were exposed multiple times at different sites in the Netherlands: two traffic sites, underground train station, farm and urban background. High contrast and low correlation between PM characteristics were documented in a preceding screening phase. Exposure of volunteers and air pollution characterization took place on 30 days (March-October 2009) over five-hour sampling periods and included measurements of PM_{10}, $PM_{2.5}$, particle number concentration (PNC), trace metals, and total PM oxidative potential. Participants followed a fixed exercise protocol on stationary bicycles. Fractional exhaled nitric oxide (FE_{NO}; non-invasive marker of airway inflammation) and spirometry were measured before and at three different time points after exposure.
Results: Exposure to PNC during five-hour exposure was significantly associated with volunteers' FE_{NO}: immediately and two hours after exposure we observed an 11.6% increase over baseline in FE_{NO}, with 7.4% increase the next morning. PNC was also significantly associated with a 1% decrease in FEV_1 and FVC at most time points.
PM_{10}, $PM_{2.5}$ and total PM oxidative potential were not associated with changes in respiratory health parameters. PM characteristics were not associated with changes in PEF and FEF_{25-75}.
In multi-pollutant models, effects of PNC remained significant whereas effects of other PM characteristics still did not show (significant) associations.
Conclusions: An increase in FE_{NO} and decrease in lung function was observed in young, healthy volunteers following a five-hour exposure to ambient air pollution. These effects were specifically associated with PNC and not with other PM characteristics.

DISCORDANCE BETWEEN ONE-HOUR AND ANNUAL LIMITS OF THE WORLD HEALTH ORGANIZATION AIR QUALITY GUIDELINE (WHOAQG) FOR NO2

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Background and Aims: It is important to ensure the short-term and annual AQG are valid and robust to provide support to setting standards which, if enforced, will reliably ensure that exposure reduction targets are met effectively for health protection.
Methods: We developed a lognormal distribution model to examine the relationship between short-term and annual AQG for NO_2 using data in 2010 in Hong Kong and London. This model, which takes into account the allowable exceedances of AQG, was robust after extreme values (4 times the geometric standard deviation above the geometric mean) were excluded [2].
Results: The WHOAQG of 40• g/m^3 cannot be achieved through compliance with short-term limit of 200• g/m^3. The predicted 1-hr AQG is sensitive to the standard deviation of the ambient mass concentration, and estimated to be 140• g/m^3 and 128• g/m^3 in Hong Kong and London respectively. In the model validation using WHO 24-hr AQG for PM_{10} / $PM_{2.5}$, we obtained reliable prediction of annual AQG for PM_{10} (21.5• g/m^3) and $PM_{2.5}$ (10.3• g/m^3) in Hong Kong.
Conclusions: The large difference between WHO 1-hr limit (200• g/m^3) and the predicted limit indicates statistical discordance between the short-term and annual NO_2 limits in the current WHOAQG, in contrast to other criteria pollutants. Based on public health principles, the short- and long-term epidemiologic evidence and need to ensure validity of health impact assessments, the 1-hr AQG should be between 128 and 140• g/m^3 given the standard deviations observed in typical traffic dense environments. Factors affecting the standard deviation may include number of monitors, sampling locations, pollution sources, and meteorological factors. Data from other cities is needed.

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EFFECT OF PARAOXONASE-1 (PON1) POLYMORPHISM AND PESTICIDE EXPOSURE ON BIOMARKERS OF HEPATOTOXICITY

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Background and aims. Exposure to pesticides which are metabolically activated in the liver may elicit subtle and early biochemical changes of hepatotoxicity. This study assessed whether long-term exposure to pesticides in occupational settings (intensive agriculture within plastic greenhouses) induces changes in liver function parameters. The interaction effect between exposure to pesticide compounds and polymorphisms in pesticide-metabolizing genes is also evaluated.
Methods. A longitudinal study was conducted on a population of intensive agriculture workers from Andalusia (South Spain), during two periods of high and low-intensity levels of pesticide application. A structured questionnaire containing questions on sociodemographic and occupational characteristics was completed by workers. Blood samples were taken for the measurement of biomarkers of exposure (serum and erythrocyte cholinesterases), susceptibility (Paraxonase-1 –PON1-) and effect (liver biochemistry, including aspartate and alanine transaminases –AST and ALT, respectively-, cholestasis enzymes (gamma-glutamyl transpeptidase and alkaline phosphatase) and serum lipids –tryglycerides, total cholesterol, HDL-cholesterol and LDL-cholesterol). Interaction effects between cholinesterases and PON-1 polymorphisms on biological indicators of hepatotoxicity were performed by generalized estimating equations (GEE) models.
Results. Short-term exposure to pesticides as measured by a reduction in serum cholinesterase was associated with decreased levels of liver parameters and serum lipids with the exception of HDL-cholesterol. By the contrast, cumulated exposure to pesticides (as reflected by reduced erythrocyte cholinesterase) was associated with increased levels of AST and alkaline phosphatise and increased levels of serum lipids (tryglycerides, total cholesterol and LDL-cholesterol) and reduced levels of HDL-cholesterol. PON1 polymorphisms significantly contributed to changes in ALT. A significant interaction effect was found between the PON1-192Q allele and erythrocyte cholinesterase on triglyceride and HDL-cholesterol levels.
Conclusions. Pesticide exposure may induce a different profile of hepatotoxicity depending on the exposure (either short- or long-term). In the latter, pesticides exposure was associated with a proatherogenic lipid profile and this involved particularly the PON1-192Q allele.

INTERACTION BETWEEN PESTICIDE-METABOLIZING GENES AND PESTICIDE EXPOSURE ON BLOOD ANTIOXIDANT ENZYMES

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Background and aims. Pesticide-induced oxidative stress may be a possible mechanism of toxicity involved in certain health effects. This study evaluates the potential involvement of pesticide exposure on oxidative damage by assessing levels of erythrocyte antioxidant enzymes and serum uric acid in a population of workers occupationally exposed to pesticides.
Methods. A longitudinal study was conducted on a population of intensive agriculture workers from Andalusia (South Spain), during two periods of high and low-intensity levels of pesticide application. A structured questionnaire containing questions on sociodemographic and occupational characteristics was completed by workers. Blood samples were taken for the measurement of biomarkers of exposure (serum and erythrocyte cholinesterases), susceptibility (Paraxonase-1 – PON1-) and effect (erythrocyte antioxidant enzymes, including superoxide dismutase, catalase, glutathione peroxidase, glutathione reductase, glucose-6-phosphate dehydrogenase) and serum uric acid. Interaction effects between cholinesterases and PON-1 polymorphisms on biomarkers of oxidative stress were performed by generalized estimating equations (GEE) models.
Results. Lower levels of serum cholinesterase (indicating short-term exposure to pesticides) were associated with decreased glutathione reductase, glucose-6-phosphate dehydrogenase and uric acid and with raised catalase and glutathione peroxidase levels. By contrast, cumulated pesticide exposure, as measured by a reduced erythrocyte cholinesterase, was linked to a decreased catalase activity. PON1-192 genotype was associated with catalase and to a lesser extent with uric acid. A gene-environment interaction was found between PON1-192 polymorphism and short-term exposure to pesticides on antioxidant enzymes, because reduced serum cholinesterase was associated with glutathione peroxidase, glutathione reductase and uric acid, especially in carriers of the PON1 102QR genotype.
Conclusions. Pesticide exposure appears to induce oxidative stress particularly after short-term exposure. These results suggest an association between pesticide exposure and enzymatic antioxidant defenses in individuals with certain PON1 polymorphisms, raising the possibility of a genetic risk factor for developing certain oxidative stress-induced degenerative diseases upon exposure to pesticides.

SOCIAL INEQUALITIES IN CHILDREN'S ENVIRONMENTAL QUALITY: THE IMPACT OF INDIVIDUAL SOCIAL CHARACTERISTICS AND FACTORS OF THE NEIGHBOURHOOD SOCIOECONOMIC CONTEXT

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Background: Social disparities in housing conditions and environmental exposures have increasingly been recognized as major contributing factor for health inequalities.
Aim: To simultaneously assess the impact of individual and neighbourhood socioeconomic factors on children's environmental quality.
Methods: Data on perceived exposures to air pollution and noise, impairment due to lack of access to green space, and socioeconomic position were collected by self-administered questionnaires during three consecutive cross-sectional surveys 2004-2007 in the city of Munich, Germany. In total, the study population comprised 3700 children aged 5-6 years living in 19 school districts. Data on neighbourhood socioeconomic factors of the resident population of these school districts were obtained from Munich's statistical office. Adverse environmental quality was defined as parental report of at least 2 out of the 3 items moderate to very strong impairment due to air pollution, noise, or lack of access to green space in the residential environment. Multilevel analysis was applied to analyse the association of individual (level 1) and neighbourhood socioeconomic factors (level 2) with adverse environmental quality.
Results: Bivariate analyses yielded significant relations between individual indicators of low socioeconomic position (parental unemployment, low household income, low parental education, single-parent family, foreign nationality) as well as contextual socioeconomic characteristics of socially disadvantaged residents (high percentage of low-income households, low education) and adverse environmental quality. In multilevel analyses, among the individual indicators only household income was associated with children's adverse environmental quality (low income: OR 1.71, 95% CI 1.23-2.39). Even controlled for the individual characteristics high percentages of low income households in the neighbourhood (OR 2.50, 95% CI 1.24-5.05) and of single parent families (OR 0.39, 95% CI 0.19-0.78) were related to adverse environmental quality.
Conclusions: Parent's perceived adverse residential environmental quality of children is associated with small-area socioeconomic characteristics of the residential population independently of individual socioeconomic position.

FETAL EXPOSURE TO POLYBROMINATED DIPHENYL ETHERS (PBDES) AND ATOPIC DERMATITIS IN INFANTS

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Background and Aims: Polybrominated diphenyl ether (PBDE) is one of the brominated flame retardants. Some of the PBDE congeners or isomers are reported to have high toxicity and endocrine disrupting effects. The health effects of PBDEs have been reported to be different among the congeners and isomers. Our previous studies revealed that Japanese fetuses were exposed to PBDEs. In Japan, the number of allergic disease patients is rapidly increasing among children. To find the reason of this rapid increase, an association between the occurrence of atopic dermatitis (AD) among the infants and the fetal exposure to PBDE congeners and isomers was examined.

Methods: One hundred and thirteen umbilical cords (UC) were collected in Chiba City (Japan) at deliveries. The concentrations of PBDE congeners and isomers in the 55 UC was measured by GC/MS. Medical doctor's diagnosis in follow-up study showed that 18 infants were AD and 37 infants were non-AD at 7-months old. This study was approved by the "Congress of Medical Bioethics" of Chiba University and all the samples were obtained after receipt of written informed consent.

Results: We found significant correlation between the occurrence of AD and the concentration of total PBDEs ($t<0.05$), TriBDE ($t<0.05$), TetraBDE ($t<0.01$), PentaBDE ($t<0.01$) and PentaBDE #99 ($t<0.05$). Our findings indicate that there are strong or weak association between some congeners and isomers of PBDEs and the occurrence of AD in infants.

Conclusions: Our present data suggest the possibility that there is some association between fetal exposure to PBDEs and the occurrence of AD among infants. However, it is unclear if the association is due to combined effects of PBDEs and other chemicals or due to the fetal exposure or exposure though breast milk. We need further studies to clarify this association.

OCCUPATIONAL RISK ASSESSEMENT AND HEALTH MONITORING AMONG VETERINARY DOCTORS

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Background and Aims : The veterinary profession is regarded as a high-risk group for occupational hazards, the most important being the infectious risk (risk of contracting zoonosis).
Methods : A cross-sectional study was carried out among 59 veterinary doctors employed in a veterinary department from Transylvania. A special individual medical questionnaire was individually applied, regarding occupational history, actual and past animal exposure, chemical exposure, work-related health problems, chronic diseases. Clinical examination and blood pressure measurement were performed. Lung function tests, hematological and biochemical tests among laboratory staff were performed.
Results : This professional group is exposed mainly to biological hazards (bacteria, viruses, parasites, mycosis, protozoa), animal allergens and risk of trauma associated with animal contact during occupational activity. Chemical risk exposure was present to the laboratory staff , mainly to volatile organic compounds and respiratory irritants. The results of questionnaire analysis and medical documents have showed that previous diseases and/or accidents related to animal exposure were reported, more frequent among subjects over 10 years of activity. A few cases of rabies contact were reported every year. Allergic diseases due to animals allergens were also reported. The most frequent chronic diseases registered were musculoskeletal disorders (work-related to cold exposure, repetitive musculoskeletal injuries), high blood pressure, ischemic heart disease, obesity and diabetes. Laboratory staff complains of work-related irritative respiratory syndrome in a few cases. Unfortunately in the past these diseases and/or accidents were not registered as occupational diseases or work-related diseases in most cases.
Conclusions : Veterinary doctors are exposed to a multitude of occupational risk factors and they experience a lot of health problems related to their professional activity. A specific methodology for risk assessment and health monitoring for this professional category is necessary to be elaborate and applied.

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AGRICOH, A NEWYLY FORMED CONSORTIUM OF AGRICULTURAL COHORTS

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Background and Aims: Chronic exposure to pesticides has endocrine, immunologic and neurologic disrupting properties and other toxic effects believed to be associated with certain cancers, unfavorable reproductive outcomes, neurologic disorders and other health outcomes. Farming and other agricultural jobs are among the occupations with the highest exposures to pesticides. AGRICOH is a consortium of agricultural cohort studies that offers the opportunity to investigate the role of pesticides, and other exposures, in the etiology of several health outcomes. This poster presentation provides a description of AGRICOH to disseminate its formation and future research plans.
Methods: Characteristics of the cohorts integrating AGRICOH, data harmonization plans and research concepts to be studied will be illustrated in the poster presentation including the construction of pesticide crop exposure matrices.
Results: AGRICOH is a consortium of 22 agricultural cohort studies initiated by the US National Cancer Institute (NCI) and coordinated by the International Agency for Research on Cancer (IARC) since October 2010. The consortium includes cohorts from 9 countries: South Africa (1), Canada (3), Costa Rica (2), USA (6), Korea (1), New Zealand (2), Denmark (1), France (3) and Norway (3). AGRICOH aspires to promote and sustain collaboration and pooling of data to investigate the association between a wide range of agricultural exposures and a wide range of health outcomes, with a particular focus on associations that cannot easily be addressed in individual studies because of rare exposures (e.g. use of infrequently applied pesticides) or relatively rare outcomes (e.g. certain types of cancer, neurologic and auto-immune diseases).
Conclusions: AGRICOH represents a great resource for studying cancer, respiratory, neurologic, and auto-immune diseases as well as reproductive and allergic disorders, injuries and overall mortality in association with a wide array of exposures, prominent among these the application of pesticides.

THE EFFECTIVENESS OF HEALTH-RELATED PHYSICAL FITNESS INTERVENTION PROGRAM TOWARD ELEMENTARY SCHOOL CHILDREN: AN EXPERIENCE OF HEALTH PROMOTING SCHOOL IN TAIWAN

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Background and Aims: For children the elementary school is the important stage to development healthy life-style and exercise habit, that promotes health-related physical fitness. The purpose of this study was to explore the effectiveness of health-related physical fitness intervention program toward Elementary School children.
Methods: The study subject was chosen from Yu Ying elementary school at Changhua County in Taiwan. The participants all are the grades six students a total 136, the health-related physical fitness intervention program was conduct to promotes healthy life-style and develop exercise habit. According to exercise interest of students the school children had set classified into a jogging group and dodge ball group. For the jogging group, the school teacher and exercise tutor lead student to do jogging exercise every morning for 30 minute, for the dodge ball group, the athletics teacher guided they do dodge ball exercise for 60 minutes after finish class everyday. For the other students they have no intervention.
Results: The average BMI of dodge ball group was 19.28, not only lower than jogging group (19.39) and non participants (21.25) but the percentage of overweight of dodge ball group was also the lowers. For the non participants, they have highest percentage of overweight (34.99%). The further evaluation the number of school-children had passed “physical fitness medal”, they get prize ratio for the students who participant in health-related physical fitness intervention program was 18.38%, it’s higher than non participants 8.57%, According to the results, the intervention program had already show an effect.
Conclusions: This study may be of impotence in applied health-related physical fitness intervention program to promote healthy life-style and develop exercise habit among elementary school children. As well as providing health educator with a better understanding of how to promote physical fitness intervention program in elementary school.
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IS THERE AN ADDITIONAL HEALTH EFFECT DUE TO SUSTAINED HEAT DURING HEAT WAVES?

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Background and Aims: studies assessing the health effects of heat typically divide into two categories: episode analysis and continuous-temperature analysis. In the former, the focus is on the increased risk during extreme events of protracted heat, usually defined heat waves. In the latter, temperature is instead modelled as a continuous variable. Few studies have included terms for both factors in a time series analysis, assuming an additional effect during heat waves beyond that explained by temperature. General wisdom dictates that this additional burden, due to sustained heat, is substantial. However, its estimate critically depends on model assumptions and flexibility.
Methods: we address this issue using data from 108 communities in the United States during 1987–2000. The additional wave effect was quantified including an indicator variable defined by combinations of temperature thresholds and days of duration, and then as a smooth function of consecutive heat-wave days. The model also included a main temperature effect estimated through distributed lag nonlinear functions of temperature, summarized for this context as the relative risk between the median city-specific temperature during heat wave days and the 75th percentile of the year-round distribution. City-specific main and added wave effects were pooled through meta-analytic techniques.
Results: the added wave effect was small (0.2%–2.8% excess relative risk, depending on wave definition) compared with main temperature effect during waves (4.9%–8.0%). Using a smooth function of consecutive heat wave days, the added wave effect is null for short episodes and increases only after 4 consecutive days.
Conclusions: the additional health effect during heat waves in United States is limited to very long episodes, and, on average, the excess risk from heat during and outside heat waves is well summarized and predicted by a continuous function of temperature, if non-linearity and lagged effects are allowed for.

THE ASSOCIATION BETWEEN GEOMAGNETIC STORMS, SOLAR PARTICLE EVENTS AND HOSPITAL ADMISSIONS FOR FIRST MYOCARDIAL INFARCTION

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Background and Aims: Recent studies suggested that geomagnetic storms (GS) and Forbuch decreases increase risk of myocardial infarction (MI), cardiovascular death, and stroke. One of product's of eruption in the Sun is solar proton events (SPE). We analyze the association between GS, SPE and daily hospital admission for first MI.
Methods: We use daily number of all emergency admissions for first MI (I21), hospitalized in Kaunas Universality of Medicine clinic during 2004.01.01-2005.12.31. The daily geomagnetic activity we assessed by Ap indices; GS determine as minor or major storm: Ap• 30. The SPE define as proton >10MeV energies fluency > 864 000 proton/(cm^2-day-sr); daily proton fluencies are measured by satellite GOES and presented in NGDC database. Using Poisson regression we assessed risk of admission on MI with ST-elevation (STMI) and on MI non ST-elevation (NSTMI) in days of GS with SPE; GS and no SPE; no GS and SPE, compare with days (no GS and no SPE), controlling for seasonal variation, weekdays and meteorological factors.
Results: We analyzed data of 2 008 patients. STMI composes 1132 (56.4%) and NSTMI – 876 **(**43.6%) of total emergency admissions for first MI. Among patients with MI were 63% men and 52.7% older than 65 years age. During days of GS accompanied by SPE, the risk of admission on STMI increased in 37% (RR=1.37 95% CI 1.00-1.88). Two days after the GS with SPE, GS without SPE, SPE without GS, the relative risk of admission on NSTMI was respectively 1.41 95% CI 1.00-1.98, 0.92 95% CI 0.67-1.26 and 1.75 95% CI 1.26-2.43.
Conclusion: These data suggest that GS with SPE increase the risk of emergency admissions for MI; effect of these events show later for NSTMI. GS without SPE no affect on risk of emergency admission for MI. The SPE without GS increase the risk of NSTMI.

MATERNAL EXPOSURE TO DESINFECTION BY- PRODUCTS DURING PREGNANCY AND MICRONUCLEI IN MATERNAL AND CORD BLOOD LYMPHOCYTES

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Background and Aims: Exposure to disinfection by-products (DBPs) in drinking water has been associated with cancer risk in adults. We evaluated maternal exposure to DBPs in relation to micronuclei (MN) frequency in mother and newborns. MN are formed as a result of chromosome breakage or loss and are a marker of genetic instability. High levels of MN have been associated with increased cancer incidence in adults.
Methods: The mother-child birth cohort in Crete enrolled 1359 women at the third month of pregnancy. Effects on DNA were assessed in lymphocytes from 218 maternal and 239 umbilical cord blood samples, collected at birth, by the cytokinesis-block MN assay. Information on personal water related habits was obtained from questionnaires administered during pregnancy. Tap water samples were collected in representative mother homes, and were analysed for major DBPs including trihalomethanes (THMs). Negative binomial models were used to examine the association between MN in mothers and newborns with estimates of DBP exposure.
Results: A high percentage of women reported using bottled water during their pregnancy at home (72%) and outside of their home (98%). Exposures to THMs in tap water were found to be low (<20 micrograms/L) and were primarily brominated (BR) compounds. A strong positive association ($p=0.004$) was observed in univariate analysis between MN in binucleated cells from the mother's blood and THM or BR levels in tap water. This association was weaker but remained significant ($p=0.02$) after adjustments for maternal age and other potential confounders. MN in the children was not found to increase with any measures of THM exposure.
Conclusion: Findings from this study suggest a potential impact of DBP exposures on the frequency of MN in mothers but not in newborns. Exposures to DBPs were very low in this cohort, which may explain the lack of positive findings in children.

Do satellite tropospheric NO_2 data improve modelling of ground level ambient NO_2 concentrations?

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Background and aims

In recent years, land use regression modelling has increasingly been applied to model the concentration of pollutants such as nitrogen dioxide (NO_2), particles smaller than 2.5 or 10 micrometer (PM2.5 or PM10). For large study areas, modelling the regional background trend is challenging in LUR modelling. The aim of our study is to assess the value of satellite observations of NO_2 in modelling annual average NO_2 concentrations across the Netherlands.

Methods

We used 2007 ground level NO_2 concentrations and geographic information system data from 144 monitoring sites spread over the Netherlands. In total, 26 sites were regional background, 78 sites urban background and 40 were close to major roads. For the 144 monitoring sites, we obtained the annual average tropospheric NO_2 concentration for 2007 from the Ozone Monitoring Instrument (OMI) on board of the NASA Aura satellite. Annual average OMI data reflect a spatial scale of about 10x10 km^2.

We calculated the correlation between measured satellite and ground level NO_2 concentrations for all sites and for background sites only. We next evaluated whether adding satellite observations improved land use regression models.

Results

Annual average satellite observations of tropospheric NO_2 correlated very well with annual average urban and regional background (R=0.74) and especially regional background surface NO_2 concentrations (R=0.88). As expected, fine scale variation in surface concentration related to traffic within 100s of meters was not well represented. A LUR model including satellite NO_2 observations to represent regional variation explained 84% of the variability in surface NO_2 at background locations. LUR models including geographical coordinates or indicator variables instead of satellite NO_2 had lower overall R^2 of 74 and 65%.).

Conclusion

Satellite NO_2 observations agreed well with measured surface concentrations at background locations and improved land use regression models including regional indicators or functions of geographic coordinates.

URINARY COTININE TO ASSESS EXPOSURE TO ENVIRONMENTAL TOBACCO SMOKE

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Background and Aims: Tobacco smoke is a major source of exposure to thousands of chemicals and may represent a relevant confounder in biomonitoring studies aimed to assess exposure to environmental pollutants. In this study we compared urinary cotinine and self-administered questionnaire to investigate tobacco smoke habit and environmental tobacco smoke (ETS).
Methods: One hundred and sixty eight working individuals of a medium size city of Northern Italy entered the study. A self-administered questionnaire was used to evaluate tobacco smoke exposure. Urinary cotinine was measured by LC/MS/MS.
Results: Based on questionnaire 21% of the investigated subjects classified themselves as active smokers, 32% as ex-smokers and 47% as never smokers (total 79% present non-smokers); additionally 13% of subjects declared to be ETS exposed (6% active smokers).
Considering urinary cotinine as a gold standard, subjects were re-classified using a cut-off value of 50 µg/l: on this base 20% and 80% of individuals were identified as true smokers (S) and true non-smokers (NS), respectively. On this base 1.2% of subjects self-classified as never or ex-smokers were identified as S. The false self-classification was confirmed after further interview.
Among NS a further classification in subjects with and without ETS exposure was attempted (yesETS and noETS). Based on questionnaire 69% of subjects declared to be noETS, while 11% yesETS. with median urinary cotinine (5^{th}-95^{th} percentile) of 0.5 (0.2-2.0) µg/l and 1.3 (0.2-38.4) µg/l. Possible cotinine cut-off values to classify ETS exposure of 1.0, 1.5 and 2.0 µg/l were evaluated. In all cases higher specificity than sensitivity was found, with values ranging from 0.83 to 0.95, and from 0.56 to 0.37, respectively.
Conclusions: Our study confirms urinary cotinine as a good biomarker of tobacco smoke exposure, and the cut-off of 50 µg/l appropriate to classify active smokers; the classification of ETS exposure is critical, and needs further investigation.

COMPARISON OF TOENAILS AND URINE AS MATRICES FOR BIO-MONITORING OF METAL LEVELS IN EXPOSED WORKERS

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Background: Urine and blood are the preferred matrices to monitor the presence of metal exposure at the workplace, which for most of the metals represent short term exposure. Toenails would reflect cumulative exposure to longer periods of time. The objective of the present study was to explore the correlation between metals levels analyzed in urine and toenail samples in a group of workers exposed to metals, and a group of unexposed workers.
Methods: We measured metal levels in toenails and urine samples of 56 chemical/metal industry workers and 42 service workers unexposed to metals. Metal levels were measured in both matrices by multielemental analysis with emission spectroscopy by ICP-MS for As, Ba, Be, Cd, Co, Cu, Hg, Li, Mo, Pb, Se, Sr, Tl, V, W and Zn. The median for each metal was compared between the two exposure groups by the U Mann-Whitney test. The correlation between metals measured with the two matrices was estimated with the Spearman's rho.
Results: The comparison of the median levels of metals between the group exposed to metals and the unexposed one resulted in statistically significant ($p<0.01$) differences for toenails measurements in As, Ba, Be, Cd, Co, Cu, Hg, Li, Mo, Pb, Se, Sr, Tl, V, and W. The same comparison using urine samples revealed only statistically significant ($p<0.01$) differences for Li, Pb, Tl and V. We found direct correlations between metals levels in urine and toenails samples in the group of exposed workers for As (rho: 0.43; $p=0.001$), Li (rho: 0.283; $p=0.03$), Pb (rho: 0.56; $p<0.001$), and W (rho: 0.27; $p=0.04$). Only a correlation with borderline significance was observed in the group of unexposed workers for Hg (rho: 0.28; $p=0.069$)
Conclusions: Multielemental analysis of toenail samples properly captures occupational exposure to metals, and might be useful when long term bio-monitoring be of interest.

LEAD EXPOSURE IN AFRICA: GIVE IT THE ATTENTION IT DESERVES

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Background and Aims: Lead is one of the most studied toxicant in scientific literature. Great decreases in lead concentrations in environmental media in developed industrialized countries have been achieved, and therefore, BLLs have decreased drastically in last decades. This has been considered as one of the greatest public health successes. However, in developing world, especially in African countries, lead still being an important public health concern. The demographic transition, in addition to the great efforts maintained to eradicate infectious diseases, gave rise to an epidemiologic transition in African countries, moving to more chronic diseases. The aim of this study was to assess efforts accomplished to eradicate lead poisoning in African countries, evaluate how public health actors deal with this issue and in a wider objective, how environmental health hazards are perceived.
Methods: We have reviewed the literature concerning lead exposure issue in African countries. As conducted studies in these countries are few, we extended the research to reports from international organizations such as WHO, UNEP and UNIDO and some newspaper articles.
Results: Except in South Africa where many studies have dealt with this issue, there is few and sparse data from other counties. Sources of lead exposure in Africa remain various, and range from mining and recycling activities to leaded paints and some cosmetics and medicinal products. No African country has a national lead surveillance program.
Conclusion: As in developed countries, BLLs have decreased in African countries during the last years thanks to ban of leaded gasoline. However, they are still very higher (i.e. 26% of South African children have BLLs>10µg/dL, 2009). In general, environmental health issues are neglected in health politics compared to endemic communicable diseases and new approaches are needed to deal with these issues still considered as inconsequential issues. Lead exposure remains a public health problem of global dimensions in Africa knowing its interactions with educational, social and economic growth. Developed countries have an important role in promoting new visions and to export accumulated knowledge through exchange programs in education, health economics and prevention.

MODIFYING EFFECT OF THE COUNTY LEVEL HEALTH INDICES ON CARDIOPULMONARY EFFECTS ASSOCIATED WITH WILDFIRE EXPOSURE

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Background and Aims: Socioeconomic status (SES) is a known risk factor for cardiopulmonary health and some studies suggest SES may be an effect modifier for health effects associated with exposure to air pollution. We investigated the synergistic impact of health disparities on cardiopulmonary outcomes associated with the 2008 North Carolina wildfire.
Methods: A population-based study was performed using daily Emergency Department visits reported through a syndromic surveillance program. Health disparities were defined through The County Health Rankings based on composite measures of Health Outcomes (mortality, morbidity) and Health Factors (Health Behavior, Clinical Care, SES, Physical Environment). Estimates of $PM_{2.5}$ produced by the HYSPLIT model were used to define exposure. Poisson log-linear regression was used to estimate relative risk.
Results: Significant increases in relative risk for Asthma[8.9% per 10 • g/m^3 increase in two day average $PM_{2.5}$concentration] and heart failure (HF)[6.54%] were observed in the counties ranked below the median in Health Outcomes while no change was observed in the better ranked counties. Similarly, counties ranked below the median Health Factor Index also experienced significant increases for Asthma[9.12%] and HF[7.81%] with statistically significant risk from the better ranked counties. Both indices were independent of the exposure. A significant association was observed for COPD, pneumonia and acute bronchitis, and cardiopulmonary symptoms, but these outcomes were less numerous at the county level to be considered for interaction with health disparity measures.
Conclusions: This study suggests that health disparities may play an important role in the distribution of risk associated with exposure to emissions from wildfires. Climate related changes coupled with human land use practices are expected to increase the frequency of wildfires worldwide. The results of this study support the concern that the health burden may be shared disproportionately among the population.

This abstract of a proposed presentation does not necessarily reflect EPA policy.

TRIHALOMETHANE LEVELS IN RELATION TO RATES OF STILLBIRTH AND LOW BIRTH WEIGHT: AN INTERVENTION STUDY

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Background and aims: In the North West of England, water is supplied to 7 million people by the water company United Utilities. During 2003 and 2004, the company introduced enhanced coagulation (EC) to some treatment works, reducing DBP formation potential. This intervention provided a unique opportunity to study the effect of DBPs on birth outcomes, whilst reducing socioeconomic confounding. The aim was to compare the rates of stillbirth, low and very low birth weight three years before (2000-2002) the treatment changes with rates three years after (2005-2007).
Methods: Exposure metrics for EC and trihalomethane concentration change were created for each water zone. Births and stillbirths were extracted from the national birth registers and linked via postcode of maternal residence at birth to the water zone using geographical information systems. Differences in small-area rates of stillbirth, low and very low birth weight before and after treatment changes were modelled against change to enhanced coagulation and low, medium and high trihalomethane change (all water zones together and then stratified by EC) using Poisson regression. Differences between rate changes were tested using an interaction term between before/after and EC or trihalomethane change.
Results: Change to EC was not associated with a significant reduction in rates of the birth outcomes investigated. Areas with the greatest decrease in chloroform, compared with areas with lower chloroform decrease, showed a greater reduction in rates of stillbirth (non-significant), low birth weight (7 %, p =0.02 areas without EC) and very low birth weight (20 %, p = 0.02 all water zones regardless of EC status).
Conclusion: Chloroform concentration appears to be associated with stillbirth, low birth weight and very low birth weight rates. Although the intervention design reduced potential confounding from deprivation, it is possible that factors related to ethnicity could explain some of the rate reductions.

IMPACT OF SMOKE-FREE LEGISLATION ON CHILDREN'S SECONDHAND SMOKE EXPOSURE

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Background: Exposure to secondhand smoke (SHS) is a serious health hazard for children. Thus, protecting children from SHS is an important public health target. However, smoking bans in public places may lead to changes in parental smoking behaviour and subsequently to even increased SHS exposure of children at home.
Aim: To determine whether smoke-free legislation in Bavaria, Germany, is associated with changes in parental smoking behaviour at home and children's SHS exposure.
Methods: Cross-sectional surveys were performed before and after implementation of smoke-free legislation at 01.01.2008. The study population comprised parents with children aged 5-6 years in three urban and three rural districts. Data were collected with self-administered questionnaires. The response rates were 78% (N=6350, first survey 2004-2005), 73% (N=6206, second survey 2005-2006), and 60% (N=5336, third survey 2008-2009). Exposure to SHS at home was defined as smoking of any person within the home excluding smoking exclusively on the balcony or terrace.
Results: Before smoke-free legislation, 14% (first and second survey) of children were exposed to SHS at home. After implementation of smoke-free legislation, 13% of children were exposed (third survey). SHS exposure in cars slightly decreased from 11% (first survey) and 9% (second survey), respectively, to 6% (third survey). As expected, there was a considerable decrease in children's SHS exposure at hospitality venues from 72% and 68%, respectively, to 24%. Among families with at least one smoking parent, the majority (74%) had smoke-free homes independent of smoking bans in public places. Further 17% reported no change in their smoking behaviour at home since smoke-free legislation and 8% a decrease in the amount or even a stop of smoking at home. Only 1% reported increased smoking.
Conclusions: Restriction of smoking in public places in Germany did not increase children's SHS exposure in their homes or in cars.

WHEN IS A CUCUMBER LIKE A MOBILE PHONE? SCIENCE AND POLICY IN WATER SCARCITY AND WATER REUSE

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Background and aims: Israel is a semi-arid country experiencing water scarcity, with a long tradition of intensive agriculture. Israel is also a world leader in the use of treated wastewater for irrigation. More than 80% of the sewage is treated and reused for irrigation of edible and non-edible crops. The current regulations in Israel and worldwide regarding use of reclaimed wastewater for irrigation largely address microbiological quality and do not address anthropogenic chemical contaminants including pharmaceutical and personal care products (PPCPs). Recent research indicates that some of these chemicals persist in soil, in crops, and infiltrate groundwater. The population is exposed to low levels of these chemicals through the food chain and the drinking water. The health implications of this exposure are not known. There is no comprehensive assessment of the exposure and little epidemiological or toxicological research. Policy recommendations or recommendations to the public have not been made.
Israel is also a leader in the per capita use of mobile phones. Research on the health impact of mobile phone use has yet to reach conclusive results, however the Ministry of Health has issued public recommendations, applying a precautionary approach to justify its recommendations.
Methods: In order to address the question of what a precautionary approach might look like under conditions of water scarcity and intensive water reuse, we conducted an international survey of policy makers and researchers. We ask about the difference between applying precaution regarding mobile phones as opposed to the use of recycled wastewater. We address the issue of how environmental health policy is best determined in such a case of scientific uncertainty.
Results and conclusions: The results of the international survey on applying precaution in developing environmental health policy for the use of treated wastewater will be presented.

THYROID FUNCTION DURING PREGNANCY AND NEURODEVELOPMENT AT 1-2 YEARS: THE INMA PROJECT AND THE RHEA STUDY.

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Background and aims: The fetus is dependent on maternal thyroid hormones during pregnancy and an adequate thyroid function is essential for the normal brain development. The effects of subclinical hypothyroidism and mild hypothyroxinemia during pregnancy are poorly known. We aimed to assess the association between thyroid function in healthy pregnant women from the general population and the neurodevelopment of their children, and the role of the iodine status in this relationship.
Methods: We conducted a population-based cohort in Spain and Greece. Participants included 1638 and 318 children and their mothers from Spain and Greece, respectively. Levels of free thyroxine (free T4) and thyrotropin (TSH) in serum were measured during pregnancy. Urinary iodine concentrations (UIC) were measured in a subsample of 1386 women from Spain. Mental and motor development of their offspring was assessed using Bayley's Scales at 14 (Spain) and 18 (Greece) months of age.
Results: In participants from Spain, low free T4 levels were associated with a decrease in the mental score. When stratifying by urinary iodine level, the highest decrease was observed in those children from mothers with free T4 levels below the 2.5th percentile and UIC above 150µg/L (coefficient (SE): -10.1 (3.6)). No effect of low free thyroxine was observed when UIC were below 150µg/L. In participants from Greece, low free T4 and high thyrotropin levels were also associated with a decrease in some Bayley's scales.
Conclusions: Low free T4 and high TSH levels in healthy pregnant women had an adverse effect on offspring's neurodevelopment. High UIC exacerbate the adverse effect of low free T4 on mental score. This study reinforces the need to screen thyroid function in pregnant women, even in iodine sufficient areas.

EVIDENCE OF OXIDATIVE DNA DAMAGE IN CHILDREN WORKING IN THE SURGICAL INSTRUMENTS INDUSTRY IN SIALKOT, PAKISTAN

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Background and Aims: A considerable part of the worldwide production of surgical instruments takes place in Sialkot. Many children also work in this industry without protective measures. In a cross-sectional study, we investigated the possible health effects of occupational exposure in these children as compared with schoolchildren living in Sialkot, Pakistan.
Methods: We studied 145 male children (mean age 12.1 years): 75 children from a school in Sialkot and 70 children working in surgical instruments subcontracting units. A respiratory questionnaire was administered, spirometry was performed with an electronic hand-held spirometer, and blood pressure was measured with an automated device. Spot urine samples were collected and concentrations of metals were measured by inductively coupled plasma-mass spectrometry (ICP-MS) and 8-hydroxy-2'-deoxyguanosine (8-OHdG) by ELISA. Urinary 8-OHdG is an indirect reflection of oxidative DNA damage.
Results: The working children reported more asthma (7% vs 0%; p=0.01) and dry cough at night (36% vs 20%; p=0.03) than the schoolchildren, but there were no significant differences in spirometry or blood pressure between the two groups. Urinary concentrations of ten metals (Cr, V, Mn, Ni, Cu, Se, Mo, Cd, Sn, and Sb) were higher in children working in surgical instruments manufacturing units than in controls. In the working children, the geometric mean concentration of Cr was 25.6 µg/g creatinine (95% CI 17.8 to 36.8) which was 39-fold the value found in schoolchildren (0.66 µg/g creatinine; 95% CI 0.55 to 0.80). According to the ACGIH, the Biological Exposure Index for Cr is 10 µg/L. For the other metals the fold-differences between working children and schoolchildren ranged from 1 to 7. Urinary levels of 8-OHdG were 24% higher in working children compared with school children (22 vs 18 ng/g creatinine). Urinary 8-OHdG was positively associated with urinary concentrations of Cr (r=0.2; p= 0.01).
Conclusion: This first biomonitoring study of metal exposure among children working in the surgical instruments manufacturing industry reveals a substantial exposure to several metals, especially chromium, which is an established carcinogen. Exposure to chromium was associated with evidence of increased oxidative DNA damage.

HYPOINSULINEMIA IN THE PATHOGENESIS OF PCB-INDUCED TYPE 2 DIABETES

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Background and aims: Some persistent environmental chemicals are suspected of causing an increased risk of type 2 diabetes mellitus. We examined early stages of diabetes development in the elderly of a fishing population with elevated exposure to marine contaminants.
Methods: In 713 Faroese residents aged 70-74 years (64% of eligible population), we determined fasting plasma concentrations of glucose and insulin and the relative concentration of glycosylated hemoglobin. Lifetime exposure to persistent environmental chemicals from pilot whale and other traditional food was determined from dietary questionnaire and by analysis of blood samples for polychlorinated biphenyls (PCBs) and other food contaminants.
Results: Septuagenarians with type 2 diabetes or impaired fasting glycemia tended to have higher PCB concentrations and higher past intakes of traditional food. In non-diabetic subjects, the fasting insulin concentration decreased by 7% (95% CI: -12, -2.1) for each doubling of the PCB concentration after adjustment for sex and body mass index at age 20. Conversely, the fasting glucose concentration in these subjects increased by 6%; (95% CI: -1, 13) for each doubling in PCB.
Conclusions: Exposure to persistent lipophilic food contaminants may contribute to the development of type 2 diabetes through impaired insulin secretion.

RELATIONSHIPS BETWEEN AIR POLLUTION AND ROAD TRAFFIC NOISE

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Background and Aims: One of the objectives of Escape is to assess the health effects of road traffic related air pollution with adjustment of road traffic noise. For four areas in Escape the correlation between traffic-related noise and NO2 was studied.
Methods: In the Netherlands noise levels and air pollution concentrations were predicted for the whole population using the EMPARA-model. In Girona (Spain), a CADNA-A-based noise model and measured annual mean NO_2 concentrations at 83 addresses were used. For two Danish cities the noise model SoundPLAN and the AirGIS dispersion model for NO_x were applied. In the Ruhr area a categorical noise map and land use regression models were used. Noise and air pollution values were assigned to home addresses and the correlation was evaluated.
Results: The noise exposure in the Netherlands has an arithmetic mean of 52 dB (IQR=9), in Girona 63 dB (IQR=8 dB) and in Denmark 58 dB (IQR=10 dB). The majority of the population in the Ruhr Area had the reference value (below 55 dB). The mean NO_2 concentration in the Netherlands was 24.8 µg/m^3 (IQR=7.8 µg/m^3), in Girona 26.9 µg/m^3 (IQR=12.2 µg/m^3), in Denmark (mean NO_x) 30.2 µg/m^3 (IQR=10.2 µg/m^3), and in the Ruhr area 30.2 µg/m^3 (IQR=6.2 µg/m^3). In the Netherlands and the Ruhr area the correlation between the NO_2 concentrations and road traffic noise is fair (0.38/0.34). In more urban study areas, like Girona and Copenhagen, correlations were substantial (0.62 and 0.79). In the Netherlands, in rural study areas in the vicinity of motor ways, the correlation was moderate (0.53).
Conclusions: The correlation between traffic-related noise and NO_2 for mixed study areas is in general fair. However, the correlation is area-specific, thus in urban areas or in the vicinity of motor ways stronger correlations can occur and confounding can not be excluded.

ARSENIC METHYLATION AND SQUAMOUS CELL CARCINOMA IN A US POPULATION BASED CASE-CONTROL STUDY

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Background and Aims: Some studies suggest that increased arsenic methylation ability may reduce the risk of skin cancer, though previous studies failed to differentiate between basal cell carcinoma and the less common, but potentially more agressive, squamous cell carcinomas (SCC). Here, we examine whether arsenic methylation ability, measured as the ratio of dimethylarsinic acid/ monomethylarsonic acid (Secondary Methylation Index, SMI) reduces the risk of SCC in a population with moderate exposure via bedrock wells in the state of New Hampshire (NH), US.
Methods: Cases of primary invasive SCC were identified by a collaboration with dermatologists and pathologist serving the NH population. Potential controls were chosen from the NH Department of Transportation driver's license and Medicare enrolment files of state residents. Urine samples from cases and controls were analyzed for arsenic metabolites using HPLC/ICP-MS, and from which total arsenic (sum of inorganic arsenic, MMA and DMA) and DMA:MMA were calculated.
Results: Of the 354 SCC cases and 339 controls, 88 cases and 87 controls had water levels of arsenic above 1 ug/L, and were included in our investigation of urinary arsenic species. Urinary MMA averaged 7.1 µg/L (range: 0.1, 45.8) and SMI averaged 8.3 (range: 0.8, 97.0) Having a urinary MMA concentration above the mean was associated with a higher odds of SCC (adjusted odds ratio = 1.55, 95% CI: 1.04, 2.32). After adjustment for total urinary arsenic, having a 10 unit higher SMI was associated with a decreased odds of SCC (odds ratio = 0.70, 95%CI: 0.49, 1.00).
Conclusions: This study suggests that the ability to methylate MMA to DMA may reduce an individual's risk of SCC in populations with moderate arsenic exposure in the US.

LONG TERM EXPOSURE TO TRAFFIC RELATED AIR POLLUTION AND MORTALITY IN A GREEK COHORT STUDY

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Background and Aims: Several studies have showed that traffic-related air pollution, using NO_x and particulate matter (PM) concentrations, is a potential risk factor for public health. The present study aims to evaluate the effect of exposure to traffic-related air pollution on all cause, cause specific mortality and incidence in a Greek cohort.
Methods: Data from the on-going prospective study on nutrition and cancer (EPIC Project) in 10 municipalities of the greater Athens area with 2,756 subjects followed from 1997 to 2009 was used. Air pollution exposure was estimated using a Geographical Information System (GIS) approach to link geocoded residential addresses to a road database and estimate the exposure to NO_2 and PM_{10} at the subjects' home addresses. We conducted Cox proportional hazards survival regression analysis, adjusting for potential confounders.
Results: NO_2 and PM_{10} yearly averaged individual exposure estimates were associated with increased cardiovascular (CVD) and coronary heart disease (CHD) mortality. Hazard ratios (95% confidence intervals) for a 10• g/m3 increase in NO_2 and PM_{10} were 1.61 (0.92 – 2.80) and 3.97 (1.06 – 14.84) respectively for CHD mortality. There were no clear associations with respiratory and lung cancer mortality, however the number of events was very small.
Conclusions: The present study suggests that long-term exposure to traffic-related air pollution has an impact on mortality.

JOINT MODELING OF DAILY CRASH COUNTS AND THE RISK IMPACT OF TRAFFIC EXPOSURE AND WEATHER CONDITIONS IN THE NETHERLANDS

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Background and Aims: Various approaches have been suggested to model time-series crash count data. However, most of them do not explicitly account for the significant autocorrelation present in the data. We consider the joint modeling of daily crash counts in Schiphol, De Bilt and Soesterberg, in the Netherlands for the year 2001. Vicinity of the three areas implies that the data share some similar environment, for example weather conditions and road characteristics. Thus, the accidents series are also expected to be cross–correlated. For the above reasons the joint modeling of the three series can prove to be useful in practice. Moreover, we aim to investigate the risk impact of traffic exposure and weather conditions on the daily crash counts.
Methods: Data were modelled through an extension of the recently popular INteger-valued AutoRegressive (INAR) models to the multivariate setting. The models that arise under alternative distributional assumptions were compared in terms of their fit and plausibility. Estimates of the unknown model parameters were obtained through the method of composite likelihood. A binary variable for weekends vs. weekdays was used as proxy for the day-of-the-week variability in traffic exposure. Weather conditions were expressed through the mean daily temperature in degrees Celsius.
Results: The multivariate INAR(1) regression model with trivariate negative binomial innovations proved to be the best model among those fitted to our data. Our findings are consistent with evidence from earlier research and confirm the greater frequency of crashes on weekdays as compared to weekends (• =-0.375, p<0.001) as well as the negative, highly significant relationship between the absolute temperature and the number of crashes (• =-0.015, p=0.001).
Conclusions: Multivariate INAR processes can provide a useful framework for modeling simultaneously more than one correlated count time series. Additional risk factors, e.g. precipitation, sunshine and visibility, could lead to greater improvement in fit, or even remove the need for a complicated distribution like the multivariate negative binomial.

THE INTERACTION OF OZONE AND HIGH SUMMER TEMPERATURES ON DAILY MORTALITY AND THE URBAN HEAT ISLAND EFFECT

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Background and Aims: health effects of ozone and high temperatures on mortality are well-established in the epidemiological literature. However, the extent to which the two exposures act independently or interact synergistically on mortality remains unclear. Furthermore, the spatial distribution of the ozone effects inside urban areas is still unexplored. We aimed at investigating: 1) the effect modification of summer temperatures on the ozone-mortality relationship; 2) the heterogeneity of the ozone-mortality association between nighttime warmer and cooler areas (urban heat island, UHI) of Rome, Italy.
Methods: all subjects aged 65+ years, resident of Rome and deceased in the city during 2001-2009, April-September, were considered. Information on maximum 8-hr daily ozone concentrations was provided by two Regional Environmental Protection Agency monitoring stations. Daily mean apparent temperature (AT) was derived by combining air and dew point temperature from an airport monitoring station. Finally, a two-level indicator of the UHI was obtained at the census-block level from AATSR satellite data. We performed a case-crossover analysis to estimate the effect of ozone on mortality in the whole population, according to daily AT percentiles, and according to the UHI indicator.
Results: 76,056 deaths occurred in the study period: 48% in warmer areas and 37% in cooler ones (15% missing). The overall ozone effect was high (lag 0-5, 1.36% increase of risk, 95%CI=0.63-2.10). It displayed a strong gradient according to daily mean AT levels (0.18%, 0.05%, 1.75% and 3.63% increases of risk in strata of AT below 50^{th} percentile, 50^{th}-75^{th}, 75^{th}-90^{th} and above 90^{th} percentile, respectively). The overall ozone effect was double in warmer areas (2.05%, CI=0.84-3.28) as compared to cooler ones (1.12%, CI=0.06-2.19).
Conclusions: ambient ozone and high temperatures interact on mortality, representing a relevant public health challenge. Ozone prevention measures should be targeted on elderly people residing in the warmest part of urban areas.

LONG TERM EXPOSURE TO ORGANOCHLORINE PESTICIDES AND THYROID HORMONE LEVELS IN CHILDREN FROM CIDADE DOS MENINOS, RJ, BRAZIL

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Background and Aims: Disruption of thyroid hormone (TH) homeostasis by organochlorine compounds (OCs) has been demonstrated in several animal studies. However, a consistent association has not been established yet in humans. We aimed to investigate the effect of exposure to OC pesticides on TH levels in children from Cidade dos Meninos village (Duque de Caxias municipality, RJ, Brazil), an area highly contaminated with OC pesticides since 1961.
Methods: Serum concentration of 19 OC pesticides (HCH, HCB, DDT and others) and TH levels (free T4 [fT4], total T3 [tT3] and TSH) were measured in 193 children <15 years of age from Cidade dos Meninos. Linear regression was conducted to examine differences in TH levels according to quintiles of OC exposure, controlling for age, gender and serum lipid content.
Results: Children presented high prevalence and exposure levels of most of the pesticides; fT4 and TSH levels were within reference values, whereas tT3 was above the reference range (>180 ng/dL) in 28% of the children. Excepting for heptachlor and methoxychlor, tT3 levels showed an increasing linear trend ($p<0.05$) across pesticide exposure categories. Increased fT4 was only related to *p,p'*-DDD, endosulphan I, and dieldrin levels. No significant trend was found for TSH.
Conclusions: Contrary to what has been generally reported in the literature, a consistent increase in tT3 according to OC exposure was observed. Positive associations between OCs and T3 or T4 levels has been scarcely reported, as mentioned according to *p,p'*-DDE and tT3 among adults (Meeker et al., 2007). Long-term continuous exposure to high OC pesticide levels in Cidade dos Meninos has probably generated a quite different exposure setting than that dealt in other studies. Hence, we hypothesize that the thyroid metabolism in children continuously exposed in utero and afterwards to high OC pesticides levels can respond similarly as reported among exposed adults.

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OCCUPATIONAL EXPOSURE AND AMBIENT AIR CONTAMINATION BY NATURALLY OCCURRING ASBESTOS IN VALMALENCO (ITALY)

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Background and Aims: asbestos fibers naturally present in rocks and soils can be released into the atmosphere by occupational and other human activities, as well as by meteorological agents. The aim of this work was the evaluation of the occupational exposure levels and ambient concentrations of airborne fibers of naturally occurring asbestos (NOA) in quarries and processing facilities of Valmalenco serpentinites, in the neighbourhood of the facilities and in the nearest urban centres.
Methods: occupational exposures to NOA were studied through personal and static monitoring carried out during the more critical working activities. An analytical protocol composed by coupled TEM-SAED and SEM-EDS was specifically developed in order to improve specificity thanks to the crystallographic discrimination between chrysotile and other polymorphs. Airborne asbestos fiber concentrations were measured by SEM-EDS and only WHO fibers were counted according to the WHO criteria (length > 5 µm, diameter < 3 µm; aspect ratio > 3).
Results: air contamination from chrysotile fibers (amphiboles were never detected) in the selected occupational and life environments was site-dependent, as the degree of asbestos contamination of Valmalenco serpentinites is highly variable from place to place. Working activities associated with the highest exposures and airborne contaminations included cutting of non-foliated serpentinites with multiple blades or discs and drilling at quarries located in the area with rocks highly contaminated by chrysotile veins. On the contrary, working activities conducted on foliated serpentinites were related with airborne chrysotile concentrations comparable with ambient levels. Environmental chrysotile concentrations were always below 2 ff/l, except for one sample collected on a dirt road.
Conclusions: the present study would be useful for encouraging the development of an effective and harmonized policy for proper use of contaminated rocks and protection of public health. This work was supported by Regione Lombardia.

AIRBORNE moulds measured by quantitative PCR in relation to asthmatic symptoms in school pupils in Taiyuan, China

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Background and Aims: Indoor mould may influence children's respiratory health.
Methods: In this study, we used real-time quantitative PCR to measure fungal DNA in airborne dust collected by Petri-dishes during 7 days in 39 classrooms in 10 schools in Taiyuan city, Shanxi province, China. A questionnaire survey (90.2% response rate) was performed in 1993 pupils (average age 13y).
Results: Totally 29.8% had daytime attacks of breathlessness, 8.4% wheeze (last 12 months) and 39.3% respiratory infections (last 3 months). All classrooms had detectable mould (total mould) (median 626,000, range 1,840~2,410,000 cell equivalents (CE)/m2/day), 72% had mould genera Aspergillus/Penicillum (Asp/Pen) (median 5,410, range 820~85,700 CE/m2/day) and 23% with Stachybotrys Chartarum (median 7,790, range 3,230~22,400 CE/m2/day). The total mould was highly correlated with muramic acid (MuA) in the settled dust ($P<0.01$). By hierarchical multiple logistic regression analyses, airborne total mould was positively associated with pupils' wheeze (odds ratio 1.48, 95% CI 1.03-2.12). MuA was negatively associated with pupils' daytime attacks of breathlessness and wheeze. No significant association was found for Asp/Pen or S.Chartarum.
Conclusions: Petri-dish method can be used to detect airborne fungal DNA. The correlation between airborne mould and microbial components in the settled dust suggested the complexity of indoor exposure to compounds of biological origin.

EMERGENCY AMBULANCE DISPATCHES AND APPARENT TEMPERATURE: A TIME-SERIES ANALYSIS WITH DISTRIBUTED LAG NONLINEAR MODELS

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Background and Aims: To properly understand the full public health significance of heat-related health effects, as well as develop an effective surveillance system, it is important to investigate the impact of stressful meteorological conditions on non-fatal events. The objective of our study was to evaluate the exposure-response curve of ambulance dispatch data in relation to biometeorological conditions by using time series techniques.
Methods: Daily data of Emergency Ambulance Dispatches (EAD) for people aged 35 or older in the summer periods of 2002 to 2006 were collected for the chief towns of the Emilia-Romagna region. The city-specific relationship between daily EAD and increasing apparent temperature (AT), was explored using distributed lag nonlinear functions and then approximated by linear splines in Generalized Additive Models, controlling for air pollution, seasonality, long-term trend, holidays and weekends. The effects of high temperature on health were evaluated for all non-traumatic as well as for respiratory and cardiovascular disease. City-specific effects were then combined in fixed and random effects meta-analyses.
Results: DLNM showed a greater effect of AT on EAD in the current day. The delayed effects decreased with time. On the current day of exposure the percent change in EAD associated with every 1°C increase of mean AT between 25°C and 30 °C was 1.50% (95%CI:0.67,2.34) for non-traumatic disease and 2.90% (95%CI:0.65,5.20) for respiratory disease. The percent rise in risk was greater on days in which the mean AT exceeded 30°C (8.77%, 95%CI:5.87,11.75 for non-traumatic disease EAD). The risks increased with age and reached 12.04% for non-traumatic 75+ EAD compared to 5.63 % for those aged 35-64.
Conclusions: Time series analysis techniques have been adopted for the first time to investigate EAD data to evaluate risks associated with biometeorological discomfort. Our findings show a strong relationship at short lags between ambulance dispatches and biometeorological conditions.
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SIZE-FRACTIONED PARTICULATE AIR POLLUTION AND CARDIOVASCULAR EMERGENCY ROOM VISITS IN BEIJING, CHINA

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Background and Aims: Associations between particulate air pollution and cardiovascular emergency room visits and hospital admissions have been consistently shown. It is, however, still not fully investigated which size fraction of particles might be responsible for this relationship, especially in Asia. We explored the association between daily cardiovascular emergency room visit counts and number concentrations (NC) or mass concentrations (MC) of particles of different size fractions in Beijing, China.

Methods: Standard medical forms recording date of visit and diagnosis were obtained. Cases of all cardiovascular diseases and cause-unknown sudden deaths together were referred as “total circulatory emergency room visits, ERVT”; severe cases of ischemic heart diseases, arrhythmia, heart failure and cerebrovascular diseases together were referred as “circulatory emergency room visits, ERV”. Particle number size distributions were continuously measured

between 3nm to 10µm and the data was used to calculate daily mean NC and MC by size fraction. Confounder-adjusted semi-parametric Poisson regression models were used to estimate the effects of lag 0 to lag 4, as well as the 5-day moving average NC and MC.

Results: Mainly particle NC of the size-fractions 10 to 30nm, 30 to 50nm, and 50 to 100nm showed adverse delayed effects (with lag 4) on ERV and ERVT; the relative risks (RR) ranged from 1.03 (95% confidence intervals (CI): 1.00-1.06) to 1.06 (95% CI: 1.02-1.10). For MC, most size-fractions showed significant effects on ERVT, predominantly at lag 0 with RR of about 1.03 (95% CI: 1.00-1.06). With MC in the size fraction 1000-2500nm also significant 1-day, 2-day and 4-day lagged effects (RR 1.02 (95% CI: 1.00-1.04) each) on ERVT were observed. However, no effects of MC were found for ERV.

Conclusions: Results from this analysis show an elevated risk of cardiovascular emergency room visits from short-term exposure to different size-fractions of particle NC and MC.

NONRESPONSE BIAS IN EPIDEMIOLOGICAL SURVEYS: DIFFERENCES BETWEEN RESPONDERS AND NON-RESPONDERS ACCORDING TO CHRONIC CONDITIONS AND ENVIRONMENTAL EXPOSURES

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Background and Aims: in the last decades, several cross-sectional studies have been designed to investigate the association between air pollution and respiratory or cardiovascular diseases. However, the differences between responders and nonresponders according to the study outcome and exposure have been neglected. Our aim was to address the nonresponse bias issue in the PREDICTOR study.
Methods: the PREDICTOR study is a population-based survey designed to estimate the prevalence of heart failure in the population aged 65-84 years in Rome. Subjects received an invitation to perform a clinical examination and an echocardiogram at the local hospital. For each subject, information was available on: age, gender, a list of chronic conditions derived from the past 9-year hospitalizations. In addition, multiple air pollution indicators were collected at the census-block level: proximity to high traffic roads; meters of streets and traffic density within a 150-m buffer; average NO_2 concentrations as estimated from land-use regression; average concentrations of PM_{10} and ozone, as estimated from dispersion modeling. Odds ratios of nonresponse were estimated in relation to individual and environmental variables, from logistic regression models adjusted for age and gender.
Results: the study population consists of 3,753 subjects: 1,512 responders and 2,241 nonresponders. Responders were younger (mean age=73 years) than nonresponders (mean age=75), and were males in higher proportion (52% versus 40%). Patients with previous respiratory failure, cerebrovascular, and neurological disorders were less likely to respond. No difference emerged in the responding rate of patients with or without past heart failure. With regard to air pollution exposure, responders and nonresponders were similar for all the parameters collected.
Conclusions: we found a differential response rate with regard to demographic and some disabling chronic conditions, but not to air pollution exposure. The health effects of air pollution in the PREDICTOR study should not be affected by differential response rate.

SOCIOECONOMIC STATUS AND ENVIRONMENTAL TOBACCO SMOKE EXPOSURE OF CHILDREN IN KOREA.

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Background and Aims: Exposure to environment tobacco smoke (ETS) can have serious health consequences, especially for children. It was reported that most of ETS exposure occurred at home and lower parental socioeconomic status (SES) increased a risk of ETS exposure at home. This study aims to investigate the relationship between individual level SES of parents and children's ETS exposure, to examine the effects of individual level SES depending on the characteristic of residential areas, and to evaluate the interactive effects of area level and individual level SES in Korea.
Methods Whether ETS exposure was associated with parental SES was evaluated using information on 7,059 children aged 6–13 years from the Children's Health and Environment Research (CHEER) study in Korea. First, bivariate and multivariate associations between parental SES and children's ETS exposure were examined using logistic regression analysis. Secondly, to evaluate the effects of parental SES on children's ETS exposure by deprivation level of residential areas, we estimated the model including the interaction term of deprivation level of residential areas with parental SES.
Results: After adjustment for possible confounding variables, paternal education was found to be highly correlated with children's ETS exposure, especially among children whose father had less than 12 year education living in the most deprived area (Odds ratio=2.82, 95% CI=(2.02–3.94)).
Conclusions: Our findings suggest that characteristics of residential areas may influence ETS exposure of children directly and interactively with parental SES in Korea. Findings from this study could inform policy decision making of evidences regarding the associations of community as well as individual level socioeconomic factors with ETS.

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TRAFFIC NOISE AND CARDIOVASCULAR HEALTH IN SWEDEN: THE ROADSIDE STUDY

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Background and Aims: Long-term exposure to community noise has been suggested to contribute to the development of cardiovascular diseases. However, the evidence is inconclusive. We investigated cardiovascular effects of living near busy roads and railways with regard to noise exposure.
Methods: The study population consists of 25.851 men and women, aged 18-80 years, who had lived in Sweden for at least five years. All subjects participated in a National Environmental Health Survey, performed in Sweden in 2007 (response rate 59.4%), in which they reported on health, annoyance reactions and environmental factors. Self-reported doctor's diagnosis of hypertension and/or of cardiovascular disease were used as outcomes. Exposure to road traffic was assessed as Road Traffic Work, expressed as millions of vehicle kilometers per year (Mvkm/y), within radii 50, 250 and 500m around each participant's residential address. For a subsample (n= 2.496), we also assessed road and railway noise as the L_{den} level at the most exposed façade of the dwelling, based on digital noise maps produced in accordance with the European Environmental Noise Directive. Multiple logistic regression was used to assess prevalence Odds Ratios and 95% Confidence Intervals.
Results: No statistically significant associations were found between Road Traffic Work in any of the three radii (average 0.02, 0.81 and 3.42 Mvkm/y) and self-reported hypertension or cardiovascular disease, adjusting for sex, age, country of birth, education, smoking and air pollution (PM_{10} and NO_2). In the subpopulation, there were no associations between road traffic noise (average 56 dB) and the outcomes. A borderline statistically significant trend was found per 5 dB increase in railway noise in relation to cardiovascular disease (OR 1.21; 95% CI 0.99 to 1.48), however, there was no clear dose-response pattern.
Conclusions: In this study, community noise exposure was not significantly associated with an increased risk of hypertension or cardiovascular disease.

THE STUDY OF IMPACT OF BATHING IN RESERVOIRS ON THE PROBABILITY OF ADVERSE HEATH EFFECTS IN CHILDREN

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Background and Aims: The objective was to assess children's health risks related to the chemical contamination of local reservoirs and accidental swallowing of water when bathing in them.
Methods: The studies have been conducted in 2006-2011 in the city of Yekaterinburg, a large industrial center of the Sverdlovsk Region, Russian Federation. Chemical contamination of 5 natural reservoirs has been studied for the past 5 years. We assessed the total mutagenic activity of waters using the Ames mutagenicity test, the ecotoxicity using the Ecolum test-system and a Daphnia magna survival test. In order to specify the exposure parameters (the duration and frequency of exposure, and the body weight) to assess the oral exposure, we questioned 198 children aged 8-9. The health risks were assessed based on the highest and average exposure values.
Results: Concentrations of some chemicals in the study reservoirs exceeded Russian permissible levels. The maximum concentrations found (in mg/dm^3) were 0.05 for lead, 0.002 for cadmium, 0.01 for arsenic, and 3.2 for aluminum. Concentrations of copper, nickel, and lead exceeded their permissible values in silt and sediments. The Ames test registered the excess (compared to background) number of reverse mutants without metabolic activation on stains of microorganisms TA-98 (1.8-2.26) and TA-100 (2.08-2.69); the death rate of Daphnia magna exceeded 50 % (52-75%). The cumulative personal cancer risks from cadmium, arsenic, and lead varied from $1.53 * 10^{-7}$ to $6.30 * 10^{-6}$ based on maximum exposure values and from $1.37 * 10^{-8}$ to $5.38 * 10^{-7}$ based on average exposure values. Hazard indices of contaminants were <1.
Conclusions: Taking into account a short duration of summer exposure and oral exposure only, chemical contamination of water reservoirs posed children's health risks close to acceptable ones. The findings are used to identify sources of contamination and to develop health risk management actions.

RISK OF METABOLIC SYNDROME AMONG PEOPLE PARTICIPATED IN CLEAN-UP WORK 1 YEAR AFTER HEBEI SPIRIT OIL SPILL

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Background and Aims: Since many kinds of hazardous substances were released by oil spill accident, various potential health effects including cardiovascular and metabolic effect may have occurred. However, few studies have been conducted on the medium and long-term health effects of oil spill. We aimed to assess the risk of metabolic syndrome in people exposed to the spilt oil during clean-up work 1 year after the accident of Hebei Spirit oil spill in 2007, Taean, Korea.
Methods: The study was carried out from February 2009 to August 2009. A total of 9,035 adults including 3,755 males and 5,280 females participated in the study. Health examination (height, weight, blood pressure, body mass index) and blood test (total cholesterol, Triglyceride, HDL, fasting blood sugar) were performed. The information of duration of the clean-up work, drinking, smoking, physical exercise, and health behavior were obtained by a questionnaire interview. The logistic regression model adjusted for age, gender, smoking history was used to estimate the risk of metabolic syndrome associated with the level of oil spill exposure.
Results: The prevalence of metabolic syndrome was 24.6% in the males and 26.8% in the females. High blood pressure showed the highest prevalence among the risk factors of metabolic syndrome (46.8%), followed by body mass index, hypertriglyceridemia, low HDL-cholesterol, and high fasting blood sugar level. High blood pressure, hypertriglyceridemia, and high fasting blood sugar level showed a higher prevalence in the males and at the ages of fifties and sixties. The metabolic syndrome prevalence was higher according to the increase of duration of the cleaning work. The risk of metabolic syndrome in people who participated in the clean-up work for more than 125 days, compared with people who did not participate in the cleaning work was significantly higher (OR=1.45, 95% CI=1.20-1.74), with a significant dose-response relationship for days of clean-up work (p-trend<0.001). Moreover, the risk of metabolic syndrome in people who reside in the region within 0.5 km from the coastline, compared with those who reside in the region far from the coastline by more than 2.5 km was significantly higher (OR=1.35, 95% CI=1.18-1.55), with a significant inverse trend with distance from coastline (p-trend<0.001).
Conclusions: This study showed that there was a significant association between exposure to oil spill during the clean-up work and the risk of metabolic syndrome with a dose-response manner.

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SHIFT-WORK AND CANCER RESEARCH: PRINCIPLES, PITFALLS AND PERSPECTIVES OF „WHITE-BOX“ EPIDEMIOLOGY

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Background and Aims: The 2007 IARC [International Agency for Research on Cancer] classification “Shiftwork that involves circadian disruption is probably carcinogenic to humans (Group 2A)” substantially rests on “sufficient evidence in experimental animals for the carcinogenicity of light during the daily dark period (biological night)”. Remarkably, a series of biologically plausible causal mechanisms suggested by experiments provides a unique case for “white-box” epidemiology. This presentation identifies principles, pitfalls and perspectives of necessary epidemiological research in coming years.
Methods: A synthesis of key results from a selective literature search into the issues concerned will be provided.
Results: That epidemiologists can use tantalizing mechanistic and experimental findings to refine studies is an asset of “white-box” epidemiology. Clearly, studies can be enhanced by employing biological insights to improve measurements of exposure, relevant covariates, cancer endpoints, and their relation. Equally clearly, strong experimental evidence should not mislead us to accept lower quality and replication standards of observational studies in this research area. In this vein, a critical pitfall to avoid is that biological plausibility may be invoked to facilitate publication of studies of inappropriate quality.
Conclusions: To contribute to much-needed quality studies, recommendations regarding how epidemiological research into biologically plausible links between shift-work and cancer should be (i) designed, (ii) reported and (iii) interpreted are provided. Key information to include in future studies will be the chronotype which may determine the susceptibility of individuals to work conditions at unusual biological times. Moreover, industry-based studies should be pursued with priority, allowing us to consider shift-work but also other occupational factors in appropriate detail, completeness and accuracy. Ultimately, individual shift-work histories that were collected in an independent fashion, rather than relying on post-hoc interview information, will be imperative to reliably assess - or exonerate - possible cancer risks for shift-workers.

ARSENIC BIOMONITORING IN RURAL NOVA SCOTIA, CANADA

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Background and Aims

Groundwater arsenic remains a significant global public health concern. Rapid, portable, noninvasive biomonitoring methods to assess chronic exposures in human populations are not currently available. The purpose of this investigation was to survey arsenic exposures for selected subjects in communities with historically elevated groundwater arsenic concentrations. Collaborators tested biological samples for arsenic concentration and genetic damage to determine relationships among the laboratory test results and survey exposures.

Methods

Study participants (n=179) were from 2 Nova Scotia communities, selected in consultation with government hydrogeologists, with documented high levels of arsenic in drinking water from residential wells. Participants completed a previously validated, 24-hour recall dietary survey (adapted for Nova Scotia based on pilot study responses), and allowed collection of a well water sample, which was tested by inductively coupled plasma mass spectrometry. Other possible arsenic exposures (eg. medications, smoking) were also included in the survey.

Results

Water arsenic concentrations ranged from below detection limits (0.07 µg/L) to 309 µg/L (median: 4.00 µg/L, 95% CI: 1.03 – 8.27 µg/L), with 41% ≥10 µg/L. Daily water arsenic consumption ranged from 0 µg – 1,799 µg (median: 2.86 µg, 95% CI: 1.1 – 12.9 µg). Estimated daily food arsenic consumption ranged from 0 µg – 1,606 µg (median: 19.6 µg, 95% CI: 14.70 – 59 µg). Estimated total arsenic ingestion ranged from 0 µg – 2,874 µg (median: 80.2µg, 95% CI: 53.6 – 125 µg). Linear regression analyses indicated that water arsenic concentration, rice consumption, and seafood consumption were significant predictors of total arsenic consumption (*p-value* <0.01), with no other exposure, demographic or location factors remaining significant in the final model.

Conclusions

The study population had 41% of water arsenic concentrations ≥10 µg/L (recommended maximum, World Health Organization), but well within reported levels for Canadian populations. The main sources of arsenic in this population were water, seafood and rice.

AMBIENT AIR POLLUTION MODELS: IMPACT ON ESTIMATED EXPOSURE AND RELATIONSHIP WITH FETAL GROWTH, THE EDEN MOTHER CHILD COHORT

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Background and Aims: We previously reported that, although moderately correlated, nitrogen dioxide (NO_2) atmospheric levels estimated by air quality monitoring stations (AQMS) and a geostatistical model, showed similar associations with birth weight (BW). We extended this comparison by also considering a dispersion model, and PM_{10} levels.
Methods: We focused on women from the Eden cohort recruited in two French maternity hospitals, living less than 5km away from a permanent monitoring station in two areas of about 500km^2 in which we implemented dispersion and geostatistical models. NO_2 and PM_{10} pregnancy average levels were available for 770 and 452 women, respectively. We estimated Kappa coefficients of concordance (K) to compare the exposure estimates (categorized in tertiles), and used adjusted linear regression to estimate the association between exposure levels and BW.
Results: Mean ±sd exposure levels (µg/m^3) during pregnancy were 29±10 for NO_2 and 19±2 for PM_{10}, as estimated by the AQMS model, 24±8, and 18±3 respectively for the dispersion model, and 24±5 for NO_2 as estimated by the geostatistical model. The dispersion model showed a stronger agreement with the geostatistical (K_{NO2}=0.52) than with the AQMS model (K_{NO2}=0.37 K_{PM10}=0.41). Agreement between dispersion and AQMS models improved within 2 and 1km of an AQMS. Each PM_{10} increase by 10µg/m^3 during the pregnancy was associated with an adjusted BW decrease of 123g (95% confidence interval, -273; 27g) as estimated by the AQMS model and 79g (-202; 44g) as estimated by the dispersion model. Results for NO_2 showed statistically weaker associations with BW, but were consistent among the three exposure models.
Conclusion: Dispersion model NO_2 estimates were in moderate agreement with the geostatistical model but exhibited similar associations. PM_{10} levels from the AQMS and the dispersion models were fairly concordant, and associations with BW were somewhat statistically stronger for the AQMS model.

Reference

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MERCURY EXPOSURE DATA FROM GOLD MINERS IN INDONESIA, MONGOLIA, PHILIPPINES, TANZANIA AND ZIMBABWE

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Background and aims: In many developing countries, gold mining is performed using mercury. Mercury is used to extract gold from ore. Mercury exposure leads to negative health effects. The aim of this study was to provide a common data base using data from existing studies in gold mining areas to be able to compare with data from other areas.
Methods: Data of several existing studies from Indonesia, Mongolia, Philippines, Tanzania, and Zimbabwe were combined to analyze the relation between exposure in small-scale gold mining areas and body burden (n=1278). Relating to their intensity of contact with mercury four groups were formed: (i) a non exposed control group; (ii) a low exposed group with participants only living in mining areas, but not working as miners; (iii) a medium exposed group, miners living in exposed areas and working with mercury without smelting amalgam; and (iv) a high exposed group, miners living in exposed areas and smelting amalgam. Kruskal–Wallis test was used to test for possible differences over all groups. Mann-Whitney U test was used to compare the different exposure groups with the control group.
Results: Participants living in exposed areas and miners working in highly exposed areas have significant higher levels of mercury in urine, hair and blood compared to the non-exposed control group ($p < 0.001$). In urine the median mercury value is < 0.2 µg/l for the control group and 11.9 µg/l (max. 5240 µg/l) for the high exposed group. In blood the median mercury value is < 1 µg/l for the control group and 7.61 µg/l (max. 429 µg/l) for the high exposed group. In hair the median level is 0.21 µg/g for the control group and 2.43 µg/g (max. 792 µg/g) in the high exposed group. The mercury levels are different between the different countries. Reasons are diverse background burdens due to different fish eating habits and different work place methods. The mercury levels of exposed participants are in a high percentage above threshold limits.
Conclusions: Gold miners in small scale gold mining areas in Indonesia, Mongolia, Philippines, Tanzania and Zimbabwe have high levels of mercury in urine, blood and hair.

COMPARISON OF 3 EUROPEAN COUNTRIES (UNITED KINGDOM, THE NETHERLANDS AND FRANCE) IN TERMS OF EPIDEMIOLOGICAL RESPONSE AND PREPAREDNESS FOR A DISASTER

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Background and Aims: Disasters constitute a major public health challenge as they can have direct and indirect consequences on the health of the populations and consequently impact health systems. After a disaster, governmental and relief organizations must identify the priorities needed for orientating actions in order to limit health consequences at short- and long-term. Health risk assessment and epidemiology can be useful tools to obtain information for such a task.
Based on the comparison of responses to three disasters in three European countries, the objective was to identify and discuss common epidemiological challenges that public health institutions around Europe face in their response to disasters.
Methods: The disasters chosen for comparison were the 2001 AZF factory explosion in Toulouse (France), the 2000 Enschede fireworks disaster (the Netherlands) and the 2005 London Bombings (United Kingdom). A literature review was done and exchanges between public health institutes were made.
Results: The three case studies stressed the same key points: acute health risk assessment, adequate and timely environmental samples, health registering in emergency, interaction with local stake holders and victims, finding reference levels for comparison, low participation rate to epidemiological studies… Some interesting solutions could be identified as answers to these issues: steering and scientific committee, field Advice-Information Centres, Automatic Medical Registrations.
Conclusions: The comparison has stressed the fact that the challenge of assessing the health situation can only be addressed by a combination of methods (health risk assessment, surveillance and surveys). Furthermore strong interaction between local stakeholders, decision makers and epidemiologists is the only way to guarantee relevant, in time, high quality and useful health impact information. Such targets can only be reached by a strong upstream preparation of post-accident management organisations. Institutes must reinforce their sharing of methodologies and their cooperation at the European level for improving post disaster epidemiological preparation.

COARSE AND TRAFFIC-RELATED PARTICULATE MATTER AND THE HUMAN MICROVASCULATURE *IN VIVO* ASSESSED VIA RETINAL IMAGING: THE MULTI-ETHNIC STUDY OF ATHEROSCLEROSIS

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Background and Aims: Airborne particulate matter may affect cardiovascular health via underlying vascular disease. While recent evidence links fine particles ($PM_{2.5}$) to microvasculature changes, associations with larger coarse particles ($PM_{10-2.5}$) and traffic-related particles remain unknown.
Methods: Associations between retinal arteriolar diameters, a microvasculature measure, and chronic residential concentrations of $PM_{10-2.5}$ mass, $PM_{10-2.5}$ copper (an indicator of motor vehicle brake wear), and residential proximity to major roadways were examined among Chicago-based Multi-Ethnic Study of Atherosclerosis participants. Subjects aged 46 to 87 years and without clinical cardiovascular disease at enrollment (2000-2002) underwent retinal photography between 2002-2003. Participant-specific concentrations were estimated using speciated $PM_{10-2.5}$ data and a universal kriging spatial prediction model. A binary nearness to major roadways variable was also calculated. All associations were examined using linear regression models adjusted for age, sex, race/ethnicity, education, income, smoking status, alcohol use, physical activity, body mass index, family history of cardiovascular disease, diabetes, serum cholesterol, glucose, blood pressure, emphysema, C-reactive protein, and medication use. Secondary analyses included control for long-term concentrations of $PM_{2.5}$.
Results: Among 779 participants with complete data, retinal arteriolar diameters were not associated with $PM_{10-2.5}$ concentrations but were associated with traffic-related exposures. Narrower arterioles were found among persons residing near roadways (-3.0 µm, 95% CI: -5.1 to -0.8) and among persons living in areas of higher $PM_{10-2.5}$ copper concentrations (-1.2 µm per 4 ng/m^3, 95% CI: -2.7 to 0.2). Control for $PM_{2.5}$ strengthened the associations with $PM_{10-2.5}$ copper (-2.4 µm per 4 ng/m^3, 95% CI: -4.7 to -0.1), whereas associations with residential proximity to roadways were unaffected.
Conclusions: Higher exposures to traffic as assessed by residential proximity and $PM_{10-2.5}$ copper concentrations, but not $PM_{10-2.5}$ mass, were associated with narrower retinal arteriolar diameters in older individuals. This suggests that the retinal microvasculature is sensitive to traffic pollution but not coarse particulate mass.

ROAD TRAFFIC NOISE AND SOCIOECONOMIC STATUS: ENVIRONMENTAL INEQUALITIES AT THE SMALL-AREA LEVEL IN MARSEILLES, FRANCE

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Background and Aims: Although numerous studies show that ethnic minorities and people with low socioeconomic status (SES) are more exposed than others to some environmental risks (e.g., proximity to hazardous facilities and air pollution), few have focused on environmental noise exposure despite its significant potential non-auditory health effects (sleep disturbance, psychological distress, and cardiovascular diseases). This study analyzed the associations between SES and potential exposure to road traffic noise at the small-area level in Marseilles, France's second largest city.
Methods: Five SES variables were constructed at the census block level from census data: a deprivation index, 3 thematic indicators (economic, social, and national origin), and a residential mobility index. In accordance with European Directive 2002/49/EC, we calculated two indicators of potential exposure to road traffic noise with the noise propagation prediction model CadnaA: L_{den} for 24-hour and L_n for night periods. Loess diagrams described the associations between SES and noise exposure, which were further analyzed by regressions controlling for spatial autocorrelation (simultaneous autoregressive or SAR models). Sensitivity analyses were conducted with different models (SAR_{lag}, SAR_{err}, and SAR_{mix}) and neighborhood matrices.
Results: Only the mobility index was linearly related to noise indicators. SAR models showed that L_{den} and L_n were both higher in the intermediate than in the least deprived class. Results were similar for the economic index, and no relation at all was observed for the social index. A significant link with noise was found for areas with the lowest, but not the highest, percentages of non-French residents. L_{den} and L_n increased with residential mobility. Sensitivity analyses confirmed these results.
Conclusions: This study reports original results about noise-related environmental inequalities and about methods of adjustment for spatial autocorrelation. The results are discussed in relation to theoretical mechanisms of environmental inequalities and Marseilles's historical development.

IMPACT OF BIOGAS DIGESTERS ON COOKHOUSE VOC EXPOSURE IN KENYAN FARMWOMEN

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Background and Aims: Women living on rural Kenyan farms rely on wood for cooking. These women are exposed to elevated concentrations of volatile organic compounds (VOC) and respirable particles due to a combination of poor ventilation in the cookhouse and inefficient wood combustion. Biogas digesters anaerobically convert livestock manure into methane for cooking, reducing the need for traditional open-fire cooking, and potentially reducing wood smoke exposure. The objective of this project was to compare VOC exposure for Kenyan smallholder farmwomen with and without biogas digesters.
Methods: A sample of 31 farms with biogas digesters and 31 farms without digesters (matched on family size, farm size, and the age of the cooking woman) were selected. The woman responsible for the majority of the cooking on each farm wore a passive thermal desorption tube (TDT) for 7 days whenever cooking. The TDTs were packed with a Tenax TA™ polymer sorbent. Participants recorded the time spent each day cooking with either wood or methane. The TDTs were analyzed, in Canada, by thermal desorption-gas chromatography with flame ionization/electron capture detection to determine the VOC concentrations in each cookhouse.
Results: The control group spent significantly more time ($p<0.01$) exposed to wood smoke compared to the biogas group, but similar amounts of time cooking ($p>0.2$). Of the 54 individual VOCs tested, 20% ($n=11$) had concentrations that were significantly different between the two groups ($p<0.05$), with X VOCs being significantly higher in the control group. These concentrations were also significantly higher than levels in the ambient environment ($p<0.05$).
Conclusions: Compared to women without biogas digesters, women with biogas digesters spent less time exposed to wood smoke, and had lower concentrations of some VOCs in their cookhouses. Continual off gassing from the cookhouse structures could be responsible for the similarities in the other VOC concentrations.

IMPACT OF CLIMATE CHANGE ON HEAT RELATED MORTALITY AND MORBIDITY IN EUROPE

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Background and Aims: Public health concerns about the health effects of extreme temperatures have risen because of the intense heatwaves of 2003 and 2006 in Europe. Climate change projections indicate that average temperatures are rising and that the intensity, frequency, and duration of extreme heat events will increase. As a part of the Climate-TRAP project we used emission scenarios, models and epidemiological data to assess heat related health impacts under a changing climate.
Methods: Gridded climate data were obtained as a 50x50km grid for Europe using two global climate models (HADCM3 and ECHAM4) regionally downscaled over Europe with the RCA3. Modelled temperature and humidity data for the time periods 1961-1990 and 2021-2050 was used to represent the recent and future climatic conditions. Data for the A1B and A2 greenhouse gas emission scenarios (modelled with HADCM3 and ECHAM4 respectively) were used to illustrate possible outcomes for different climate scenarios. We used exposure response functions determined for a number of European cities within the PHEWE-project.
Results: Future temperatures are predicted to increase the expected annual mortality for Europe in 2021-2050 compared to 1961–1990 by 1.15% and 1.28% for the A1B and the A2 scenarios, respectively. The increase differs between countries, with a range from no increase in heat-related mortality for the Baltic countries to increases above 3% for Spain, Slovenia and Portugal. For hospital admissions, the expected increase is substantially lower than the estimations for mortality with increases ranging up to 0.66% in Spain.
Conclusions: This study suggest that the expected annual increase in heat related mortality in 2021-2050 compared to 1961–1990 in Europe is in the same order of magnitude as the excess number of heat related deaths during the 2003 heatwave over Europe .

URINARY BISPHENOL-A AND HEMOGLOBIN A1C LEVELS IN U.S. ADULTS USING DATA FROM NHANES 2003/08

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Background: Bisphenol A (BPA) is a ubiquitous environmental contaminant. Low dose negative effects of BPA have been demonstrated in many organ systems, especially as an endocrine disruptor. BPA exposure may lead to insulin resistance and development of type-2 diabetes through its over-activation of the insulin-producing pancreatic β- cells. Previous epidemiological studies have linked urinary BPA and type-2 diabetes.
Methods: We examined 4,389 adults who participated in the National Health and Nutrition Examination Survey (NHANES) from 2003 to 2008 to further explore the association between BPA exposure and type-2 diabetes. We investigated if higher urinary BPA was associated with higher hemoglobin A1c (HbA1c), a biological measure of the glycemic index, using survey-weighted generalized linear models.
Results: For the total sample of 4,389, log-transformed urinary BPA levels were highly associated with HbA1c (β estimate= 0.034% (95% confidence interval (CI), 0.002% to 0.066%) for an interquartile range increase in log(BPA), 1.41 ng/mL), after controlling for age, sex, race/ethnicity, education, household income, smoking, body mass index, waist circumference, and urine creatinine concentrations. However, such a significant association was found only in the 2003/04 cycle of NHANES (n=1,364) (β=0.097% (95% CI, 0.040% to 0.154%)). No association was found in NHANES 2005/06 or 2007/08. The observed significant association in NHANES 2003/04 seems to be driven by a larger significant association among participants who were taking diabetes medication (n=119, weighted percentage=6%, β=0.324% (95% CI, 0.055% to 0.592%)); for non-medication-users (n=1,245, weighted percentage=94%, β=0.003% (95% CI, -0.042% to 0.047%)).
Conclusions: Although we found a significant association between higher urinary BPA and elevated HbA1c in a pooled analysis, this was driven by data from only one NHANES cycle. Additional studies, especially with a longitudinal design, are needed to further elucidate the association between BPA and HbA1c and type-2 diabetes.

MATERNAL OCCUPATION AND THE RISK OF PRETERM BIRTH AND LOW BIRTH WEIGHT IN LOS ANGELES COUNTY, CALIFORNIA

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Background and Aims: Several studies from different countries have linked certain maternal occupations during pregnancy with adverse birth outcomes, though some reports showed no associations. We investigated risks associated with a range of maternal occupations for preterm birth (PTB) and low birth weight (LBW) in a population based nested case-control study in Los Angeles County.
Methods: From 58,316 birth records for children born in 2003 to mothers residing in 111 Los Angeles County zip codes, we selected all cases of LBW (<2500 g) and PTB (<37 weeks completed gestation) and an equal number of randomly sampled matched controls (weight ≥2,500g and full-term). We conducted a survey 3 to 6 months after birth with 2,543 of the 6,374 women originally sampled from the cohort asking about their primary job (defined as the job where she worked the longest and for the most hours per week during pregnancy); other demographic and pregnancy-related variables were collected by survey and from birth certificates. We classified women according to occupation with a coding scheme adapted from the U.S. Census Occupational Category Codes. Effects of various occupational exposures on PTB and LBW were examined using multivariable logistic regression models.
Results: Preliminary findings indicate that most examined occupational categories were not associated with an increased risk for PTB and LBW. However, there was some suggestion that nurses may have higher odds of preterm delivery compared to clerks (presumably low exposed) with an odds ratio of 2.50 (95% CI 0.95, 6.60), adjusted for relevant confounders.
Conclusion: Preliminary findings suggest that in our sample the odds for PTB or LBW were not increased for the investigated occupations during pregnancy. This may indicate a 'healthy pregnant worker' effect.

HOSPITAL ADMISSIONS AND MORTALITY AS COMPLEMENTARY OUTCOMES IN EVALUATING THE SHORT-TERM EFFECTS OF AIR POLLUTION ON RESPIRATORY HEALTH

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Backgrounds and aims: It is well known that air pollution affects respiratory health, increasing both hospitalisation and mortality. To complete a previous assessment of air pollution effects on respiratory mortality in Italy (Faustini et al, ERJ, 2011), we studied the impact of particles (PM_{10}) and nitrogen dioxide (NO_2) on hospitalisations. A combined outcome, including both hospitalisations and deaths, was also analysed for chronic obstructive pulmonary disease (COPD).
Methods: We analyzed emergency hospitalizations and out-of-hospital deaths for respiratory diseases among those aged 35+, who resided in six Italian cities. The associations with PM_{10} and NO_2 in the years 2001-2005, using a time-stratified case-crossover analysis, was evaluated.
Results: There were 106,792 hospitalisations for respiratory diseases and 5,490 respiratory deaths. The risk of hospitalisation for respiratory diseases increased by 0.63% (95% Confidence Intervals, CI, 0.18-1.09) for a 10• g/m^3 PM_{10} increase and by 1.14% (95% CI, 0.26-2.03) for a 10• g/m^3 NO_2 increase, both at lag 0. The strongest associations were observed between NO_2 and hospitalizations for COPD (1.27%; lag 0) or pneumonia (2.34%; lag 2-5). Lower effects, but with the same pattern, were observed for PM_{10}. The risk of dying increased by 4.72% for PM_{10} and by 7.44% for NO_2, both at lag 2-5. The combined outcome showed an increased risk at lag 0 for PM_{10} (0.67%) and at lag 0-5 for NO_2 (1.58%). In the warm season (April-September) all the effects were stronger than in the cold season.
Conclusions: We confirmed a respiratory health effect of air pollution in Italian cities. The combined effect was present for both PM_{10} and NO_2; they were immediate for COPD hospitalisations and delayed for hospitalisations due to respiratory infections and out-of-hospital deaths in COPD patients.

THE CONTRIBUTION OF WITHIN AND BETWEEN VARIATIONS OF URINARY METABOLITE MEASUREMENTS IN PREDICTING CHILDREN'S PESTICIDE EXPOSURES

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Background and Aims: Organophosphate pesticides are employed in wide broadcast agricultural use, and while some are banned for use in households, off market use and residues from imported fruits and vegetables provide additional sources of exposure to children. At acute exposure levels, these pesticides are known for their neurological and neurodevelopmental effects and evidence is building for neurological affects with chronic low level exposures. Studies of children's pesticide exposures often use models utilizing single spot urine sampling and boost study power by increasing enrollment. However, this design has the central assumption of greater between subject than within subject variances. With the availability of repeated measures data over a 12-month period, this assumption can be tested.
Methods: Repeated measurements of urinary metabolite data from the Children Pesticide Exposure Study - Washington (CPES-WA) was employed for an analysis of dietary malathion exposure with linear mixed effects modeling including season, age, and gender as covariates and accounting for values below the limit of detection with maximum likelihood estimation.
Results: Within subject variance exceeded between subject variance by a factor of eight: 16 versus 2. Season is a significant contributor to the model at $p<0.001$, while gender and age were not statistically significant covariates.
Conclusion: Analysis of components of variance for repeated measures showed eight-fold greater contribution of within subject variation to predicting malathion pesticide exposure levels than between subject. Therefore, repeated measures with fewer subjects may be a more efficient design for understanding children's pesticide exposure levels than single spot urine measurements involving a great number of study participants.

EXPOSURE ASSESSMENT OF A RETROSPECTIVE COHORT OF RESIDENTS NEAR INCINERATORS IN ITALY: A GEOGRAPHICAL APPROACH

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Background and Aims: Health effects of exposure to incinerators are controversial. In Emilia-Romagna region (northern Italy), a multisite project (MONITER project) is focusing on the environmental and health impact of eight municipal solid waste plants (MSW). Effects of past exposures on mortality and cancer incidence are under study. In the first stage a large retrospective cohort of residents has been set up and characterized.
Methods: Study areas were defined as the 4 km zones around the six MSW incinerators, that were already active before 1995. Follow-up period ranged from 1995 (first availability of health data) to 2006. Exposure assessment to incinerators was performed by means of pollution map of particulate, provided by ADMS dispersion model outputs. Collection of past emission data were used as inputs for models. Different models were constructed for each plant, according to renewals during study period. Exposure levels at enrolment (1995) were used, since cumulative exposure could not be estimated as complete residential history since start of the plants were not available. Simulations of pollutants dispersion were also performed for all other sources in the areas (traffic, heating, industries, agriculture). Deprivation index was calculated at census tract level. Exposure estimates at home location were calculated using G.I.S.
Results: A total of 219,615 residents were involved (2,157,390 person/years). During the study period 27,573 deaths for natural causes (mortality rate: 1278x100.000pys), and 14,287 cases of cancer occurred (incidence rate: 758x100.000pys). Mean exposure to particulates from incinerators at enrolment was 6.24 nanograms/m3 [s.d. 14.29]. Mean exposure to NO2 from all other sources was 56.63 micrograms/m3 [s.d. 32.09]. No relation between deprivation index and exposure to incinerators was observed.
Conclusions: We constructed a large retrospective cohort of residents near incinerators with a geographical approach for exposure assessment. Possible misclassification due to assignment to exposure at a specific time (enrolment) is under study.

ARE HEAT PREVENTION PROGRAMS EFFECTIVE? A PRE-POST ANALYSIS OF THE EFFECT OF TEMPERATURES ON MORTALITY OF THE ELDERLY IN 16 ITALIAN CITIES

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Background and Aims: Since 2004, Heat Health Warning System (HHWWS) and heat prevention programs have been implemented in Italy. This study evaluated changes in the impact of temperature on summer mortality among elders, before and after the introduction of heat plans.
Methods: We analyzed daily all-cause mortality of 65+ years old residents in 16 Italian cities with an active HHWWS at summer 2004. Studied years were 1996-2002 and 2006-2009 for the period preceding and following the HHWWS start, respectively. Exposure was defined as the difference between maximum apparent temperature (tappmax) and a city-specific threshold (90^{th} percentile of June; range 29.9°-35.2°). The lag for exposure was defined for each city using a constrained distributed-lag model. We performed a non-linear city-specific analysis using a generalized Poisson equation, with a penalized cubic smooth function with 6 df for exposure. We predicted the percent (%) change in mortality for three-degree step variations in the exposure. We used a random effect meta-analysis to produce the overall estimate.
Results: No differences in the overall percent increase in mortality were observed between the two periods for increases in the tappmax below the threshold. On the other hand, above this point a significant reduction in the effect of heat was observed in the post-period. An increase in tappmax over the threshold of 3° C was associated with a %change in the pre and post period of 16.73% (IC95%:13.90–19.56) and of 5.26% (IC95%:3.14–7.38), respectively. The reduction was greater when considering more extreme temperatures, ranging from +46% for temperature around the threshold to +70% for higher values.
Conclusions: The study shows a reduction in the effect of high temperature on mortality, when HHWWS are activated, suggesting that heat prevention programs can mitigate the impact of heat on health. Alternative explanations should be evaluated, including use of air conditioning.

LONG-TERM EXPOSURE TO AIR POLLUTION ($PM_{2.5}$ AND NO_2) AND MORTALITY: RESULTS OF THE ROME LONGITUDINAL STUDY (ROLS)

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Background and aims: There are few longitudinal studies evaluating the role of chronic exposure to air pollutants within the same urban setting. We analyzed the association of long-term exposure to $PM_{2.5}$ and NO_2 with mortality in a large cohort.
Methods: The Rome Longitudinal Study is a fixed cohort enrolled at the 2001 census. We selected subjects aged 45-80 years at the baseline who had not changed their address in the previous five years (n=684,204). Exposure at residence to $PM_{2.5}$, was predicted by means of a chemical transport model (FARM) (1 km^2 grid) using 2005 emissions data. Spatial levels of NO_2 were derived from a specific land use regression model (R^2=0.66). We had information on age, gender, education, occupation, place of birth, and area-based socioeconomic position at baseline. All subjects were followed till December 31, 2006. Cox regression models were used to study the association between the exposure and cause-specific mortality, taking several confounders into account.
Results: During the study period, 45,006 natural deaths occurred (33% cardiovascular, 5% respiratory disorders, 3.3% diabetes, and 12% lung cancer). The average exposure was 23 (sd 4) $\mu g/m^3$ for $PM_{2.5}$ and 44 (8) $\mu g/m^3$ for NO_2. The correlation of the two exposure indicators was 0.75. With increased exposure of $PM_{2.5}$ and NO_2 there was an increased risk of dying for natural causes: 7% (95%CI:4%-9%) for 10$\mu g/m^3$ increase of $PM_{2.5}$, and 9% (95%CI:6%-13%) for 10$\mu g/m^3$ increase of NO_2. The relationships were linear with no evidence of a threshold. The strongest associations were found for cardiovascular diseases and diabetes.
Conclusions: This is one of the largest European urban cohort study on $PM_{2.5}$. The results indicate that long-term exposures to $PM_{2.5}$, and NO_2 at residence are associated with mortality in Rome and the effect estimates are very similar to what has been suggested in studies from the USA.

TRANSPORTION, AIR POLLUTION AND PHYSICAL ACTIVITIES (TAPAS), A 6-CITY INTEGRATED HEALTH RISK ASSESSMENT PROGRAM OF ACTIVE TRAVEL POLICIES: THE WARSAW CASE STUDY

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Background and Aims: Within the TAPAS research program, quantitative assessments are developed for six case study cities in Europe, linking determinants of active travel to potential co-benefits and co-risks of modal shifts from motorized to non-motorized modes of travel. We describe here the Warsaw case study.

Methods: The collection of required data is made as collaboration between different research institutions and city authorities. In addition to already existing data, data from measurements and from the questionnaires will be collected in this and in connected projects. The stakeholder will be contacted in the near future to discuss the data, available policy options and the use of the results. The assessing of uncertainties in the TAPAS model will be special focus.

Results: Warsaw, capital city of Poland, has officially 1.7 million inhabitants. The total population of the city is unknown and it is possibly much larger than official one. During the week days and weekends only 0.9% and 1.7% of the trips, respectively, are made with bicycles. Approximately 20% of the trips are made by foot. Large different between walking and bicycling activity is likely to be due to infrastructural issues. The climate in Warsaw is typical central-European climate with daily mean temperature of 8.2°C and annual Precipitation of 495 mm. Thus, the climate is good for both walking and for cycling most of the year. However, Warsaw bike lane network is fragmented and safe bicycle parking places are rare. Both of these will decrease the usability of bicycles inside the city. Therefore the relevant policies we are considering for assessment include 1) the development of the bike lane network; 2) bicycle parking; 3) bicycle renting system.

Conclusions: Warsaw is an interesting case for studying a city where the use of bicycles is low but on the same time bicycle infrastructure is under construction.

VARIATION OF ELEMENTAL COMPOSITION OF PARTICULATE MATTER BETWEEN AND WITHIN 20 STUDY AREAS IN EUROPE

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Background and Aims:
Recent research has indicated the importance of particulate matter (PM) composition on adverse health effects. Furthermore, knowledge of PM composition can be used to apportion pollution to its sources. In 20 study areas of the ESCAPE project, 2-week integrated PM sampling was conducted in 3 different seasons at 20 locations per area in 2008-2010. At the European level, these filters will reveal differences in elemental composition by city, season, size fraction, and site type; thereby, allowing potential determination of likely sources. Moreover, if elemental data can be spatially modelled, it can be linked with health data from cohort studies within ESCAPE.

Methods:
The filters from PM areas are being analyzed by x-ray fluorescence (XRF) to determine their elemental composition. Currently, a total of 1043 filters have been analyzed from the 1st year of sampling for 48 individual elements. As more analyses results are received and data are linked with filter information, trace element data will be examined by city, season, size fraction, and site type. We expect to observe groupings of correlated elements related to different sources; eg, traffic impacts reflected in Fe/Ba/Zn/Cu. Other aspects examined will include: mass contribution of elements to total PM; seasonal contributions of biomass burning (K) and road-salt use (NaCl).

Results:
An overview of all 950 analyzed sample filters, with an average mass of 535.5µg, shows an average elemental contribution of 14.2% of total mass. A correlation matrix of these filters already indicates several common groupings: Al/Si/Ca/Fe/Ti (crustal), Fe/Zn/Cu (traffic), Na/Cl (road/sea-salt). The strength of these correlations is currently buried by the aggregation of all filters.

Conclusions:
Examination of trace element composition of PM will reveal within and between area compositional differences over Europe, which may be associated with health effects. This is particularly notable as all the monitoring was done in a harmonized manner.

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MATERNAL CONTAMINANT EXPOSURE IN CANADA: CONVENIENCE AND RANDOM SAMPLING COMPARISONS

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Background / Aims

Recently the Canadian Health Measures Survey (CHMS) and a Health Canada study have examined in southern Canada a similar group of contaminants in women of child bearing age (WCBA) and mothers, respectively. This paper will examine the differences in these contaminants between a random sample of WCBA and a convenience sample of mothers, both Canadian born and non-Canadian born.

Methods

The CHMS a national health survey of over 5000 individuals has concentrations of contaminants in women of child bearing age in a stratified random population sample (n=285, 2007-2009). The Health Canada study has collected a convenience sample of first time mothers from five Canadian centres and includes both Canadian born and non-Canadian born mothers (n=125, 2005-2007). Concentrations of total mercury, lead, several polychlorinated biphenyl congeners, and various organochlorine pesticides are compared.

Results

Initial data analysis has found that the concentrations for many of these contaminants are age dependent, increasing with age and that mothers born in Canada had lower concentrations of many contaminants compared to mothers not born in Canada. The concentration of many of these contaminants in WCBA from the CHMS is intermediate between these two groups of mothers. Further analyses of the WCBA will explore the differences seen in the Canadian vs non-Canadian born mothers to see if there are contaminant pattern differences between mothers and WCBA.

Conclusions

Both women of child bearing age and first time mothers have a similar suite of contaminants in their blood. In-depth analysis has found that there are significant differences between mothers born in Canada and mothers born outside of Canada

VARIATION AND LAND USE REGRESSION MODELS FOR PM_{10}, $PM_{2.5}$ AND SOOT CONCENTRATIONS IN 19 EUROPEAN STUDY AREAS

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Background and aims :ESCAPE will assess the relationship between long-term exposure to outdoor air pollution using prospective health studies in different European countries, to contribute to revisions of PM standards in the European Union. We will report on between and within study area variation of measured concentrations and performance of the land-use regression (LUR) models.

Methods: We measured $PM_{2.5}$, $PM_{2.5}$absorbance and PM_{10} between October 2008 and April 2011 in 19 European study areas in a harmonized manner. In each study area, 20-40 sites were selected to represent a range of within-city contrasts in population density and nearby traffic intensity. Each site was measured during three 14-day periods spread over the year, using Harvard impactors. Results were averaged, correcting for temporal variation using a centrally located reference site, which was operated year-round. LUR models were developed to explain spatial variation as a function of population density, land-use and traffic intensity near the site.

Results: In all study areas currently available (Ruhr area, Munich, Catalunya and The Netherlands) we found substantial variability of annual averages between and within study areas. For all components, contrasts between background and traffic concentrations were greatest in Barcelona, with ranges of 8.45-24.39µg/m³ for $PM_{2.5}$, 17.78-49.27µg/m³ for PM_{10} and 0.93-4.93m^{-1} for $PM_{2.5}$absorbance). For $PM_{2.5}$, spatial contrasts were smallest in Munich (9.75-17.64ug/m3), while for PM_{10} and $PM_{2.5}$absorbance spatial variation was lowest in Ruhr area (22.50-33.60µg/m³ and 1.04-2.58m^{-1} respectively). Explained variance of LUR models ranged from 71% in The Netherlands to 88% in Ruhr area for $PM_{2.5}$, and from 69% in Ruhr area to 90% in Barcelona for PM_{10}. $PM_{2.5}$absorbance models explained 86% of spatial variation in Barcelona and 97% in Ruhr area.

Conclusion : Contrasts between background and street sites within cities were greater than contrasts between the background levels of different cities. LUR models explained a large amount of spatial variation within all study areas.

DIFFERENT LAG EFFCTS OF ASIAN DUST EVENTS ON CARDIORESPIRATORY MORBIDITY AND MORTALITY IN SEOUL, KOREA

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Background and Aims: The effects of Asian dust events on morbidity and mortality has been assessed in the previous studies from East Asia. However, only a few studies have evaluated the effects of Asian dust events on both morbidity and mortality.
Methods: We investigated the associations between Asian dust events and mortality and hospital admissions in Seoul, Korea for the periods 1992–2009 and 2001–2006 after adjusting for daily mean PM10 concentration, temperature, relative humidity, day of the week, trends in time. We employed generalized linear model with natural cubic splines.
Results: During study period, a total of 173 Asian dust events were observed and 596,549 deaths were identified along with 797,021 and 894,907 admissions for cardiovascular and respiratory diseases, respectively. We found that the Asian dust events causes 2.57% (95% CI: -1.28~6.58) increase in cardiovascular admissions at lag 3 day and 3.93% (95% CI: 0.03~7.97) for deaths due to cardiovascular disease at lag 6 day.
Conclusions: This study suggests that Asian dust events have short lag effects on morbidity than mortality. .

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HAIR AND URINE SPECIMENS FOR BIOMONITORING SHORT AND LONG TERM TERBUTYLAZINE EXPOSURE IN AGRICULTURE WORKERS AND RURAL RESIDENTS

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Background and Aims: Terbuthylazine (TBA) is a herbicide widely used in maize cultivation, one of major crop in Northern Italy. Aim of this work was to evaluate short-term and long-term exposure to TBA in agriculture workers and in rural residents.
Methods: Ten farmers, 13 rural residents, and 17 urban residents entered the study. Urine samples were collected before starting the application season for all subjects (March, T0) and after the application of TBA in farmers only, in two moments: at bed time the day of the application (April, T1), and the next day in the morning (T2). Hair samples were collected for all subjects at T0, and at the end of the application season (July, ES). TBA and its metabolite desethylterbutylazine (DET) in urine and hair were measured by LC/MS/MS in the presence of deuterated internal standards.
Results: At T0 median urinary TBA and DET was <0.25 µg/L in all subjects; in farmers urinary DET significantly increased to 1.81 and 2.95 µg/L at T1 and T2, respectively ($p<0.001$), urinary TBA was always <0.25 µg/L.
Hair DET was always <0.010 ng/mg. At T0 median TBA in urban residents was <0.010 ng/mg hair, such level was lower than 0.010 ng/mg measured in both farmers and in rural residents ($p=0.004$). At ES median TBA was 0.073>0.011>0.010 ng/mg hair in farmers, rural residents and urban residents, respectively ($p<0.001$).
No correlation was observed between urinary DET and hair TBA, while significant or borderline significant correlations were found between hair TBA and age or application time ($p = 0.021$ and p 0.081).
Conclusions. Urinary DET and hair TBA seem to be promising candidates for biomonitoring short- and long-term exposure to TBA. The use of this herbicide in agriculture impacts the exposure of rural residents.

SPATIAL CLUSTERING ANALYSIS OF NON-HODGKIN'S LYMPHOMA IN DOGS AND IN HUMANS IN THE CITY OF SAO PAULO, BRAZIL.

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Background and Aims: Lymphoma is a malignant clonal expansion of lymphoid cells. This paper aimed to study lymphoma both in humans and in dogs, showing areas of low and high risk in different regions of the city of São Paulo through the mapping Geographic Information System (GIS).
Methods: It was collected 556 cases of lymphoma in dogs and 629 cases of lymphoma in humans. Data included were race, gender, age, anatomic localization, stage of lymphoma and the zip code. Simultaneously, 84 control cases and 83 dogs diagnosed with lymphoma were analyzed through an epidemiological questionnaire applied to their owners.
Results: The spatial clustering analysis showed a similarity in distribution of lymphomas in both species which showed a higher prevalence of the disease in the areas with higher socio-economic development. The distribution cartographic showed a weak association between slums, sewers and water and the lymphoma clusters. It showed that infectious and parasitic diseases probably could not be correlated with the development of lymphomas, enhancing the cartographic standard for chronic diseases. The strong socio-economic factor of patients and of the owners of dogs with lymphoma may be related to areas with increased urbanization and pollution.
Epidemiological results of the questionnaire showed that dogs with lymphoma over 10 kg which are permanently kept outdoor and near busy street or avenue had a higher risk for development of this disease (OR: 3.1, 95% CI:1.4 – 6.9, p=0,005) suggesting that there is a strong correlation with external environmental factors, like pollution.
Conclusions: These findings suggested that environmental factors, such as pollution, may increase the risk of developing canine and human malignant lymphoma. This reinforces the need for further investigations to clarify such evidence and the relationship between environmental contaminants and lymphoma in humans and in dogs.
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A LONGITUDINAL STUDY OF EXPOSURE TO LIVESTOCK ODOR AND SYMPTOM REPORTS IN CHILDREN

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Background and Aims: Industrial livestock operations are sources of dusts and gasses that can affect respiratory health. Associations between school proximity to industrial hog operations and prevalence of asthma-related illness in children have been seen in cross-sectional studies. We conducted a longitudinal study of air pollution from industrial hog operations and symptom reports.
Methods: 340 children aged 11-15 attending schools near industrial hog operations completed daily diaries in science class for 3-5 weeks in February-November 2009. Odor was reported for the previous 24 hours in each diary record. Participants recorded the current strength of eleven symptoms on a five-point scale (none, barely there, present, strong, or very strong). Logistic fixed effects models were used to examine within-person associations between livestock odor and binary symptoms with adjustment for concurrent reported odors of vehicle exhaust and smoke from fires.
Results: Livestock odor was reported by 255 participants (75%) during follow-up. The median proportion of study days participants reported livestock odor and strong livestock odor was 29% and 12%, respectively. Reported livestock odor in the previous 24 hours was associated with increased symptom reports for respiratory and irritation symptoms. Log odds (±standard error) following exposure to livestock odor were 0.44±0.25 for chest tightness, 0.57±0.26 for shortness of breath, 0.40±0.13 for cough, 0.36±0.15 for sore throat, and 0.46±0.18 for burning eyes or nose. Children reporting current wheeze at baseline (N=65) experienced stronger effects of livestock odor on chest tightness, shortness of breath, and wheeze than children not reporting current wheeze. Among participants with allergies (N=83), logs odds for burning eyes or nose increased to 0.97±0.29, while other associations were similar.
Conclusions: These associations are consistent with cross-sectional studies of respiratory conditions in children and a previous longitudinal study of symptoms in adults living near industrial hog operations.

STUDYING POTENTIAL HEALTH EFFECTS IN CLEAN-UP WORKERS INVOLVED IN THE GULF OF MEXICO DEEPWATER HORIZON OIL SPILL: THE GULF STUDY

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Background and Aims: The Gulf Long-term Follow-up Study (GuLF STUDY) will investigate potential short- and long-term health effects associated with clean-up activities following the Deepwater Horizon disaster in the Gulf of Mexico. Crude oil, burning oil, and the dispersants used during clean-up efforts contain a range of known and suspected toxins. Over 100,000 persons have participated in clean-up activities related to the spill. While most of these individuals participated in active clean-up efforts, others did not. Exposures among clean-up workers range from negligible to potentially significant, especially for those involved in tasks associated with direct exposure to crude or burning oil, or to chemical dispersants. The potential health effects associated with the levels of exposure experienced by clean-up workers are largely unstudied. Heat and stress experienced by these workers may also have adverse long-term health effects. In addition to the oil itself, the widespread economic and lifestyle disruption caused by the oil spill may contribute to mental health problems among this population.
Methods: The GuLF STUDY has begun enrollment of 55,000 workers and controls across the United States through a telephone interview. Approximately 20,000 of these workers will undergo additional follow-up through a home visit where anthropometric, physiologic, biologic and environmental measurements are collected. We intend to study a wide range of health outcomes particularly respiratory, neurological, hematologic, and psychological or mental health.
Results: We will present preliminary results from the first six months of enrollment and data collection.
Conclusions: The GuLF STUDY is the largest study of its kind and will provide valuable information on potential exposures and health effects associated with this and future oil-spill clean-up efforts.

PHTHALATES IN FOOD ON THE BELGIAN MARKET: OCCURRENCE AND POSSIBLE CONTAMINATION PATHWAYS

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Background and Aims: Phthalates are used in many industrial and consumer products. High-molecular-weight phthalates are primarily used as plasticizers to soften PVC products, while low-molecular-weight phthalates are widely used as solvents to hold colour and scent in products. Phthalates have been detected in food and also measured in humans.
This study investigated phthalates in food products on the Belgian market in order to explore possible contamination pathways.
Methods: 650 Representative samples of widely consumed foods were purchased in Belgian shops. The levels of eight phthalates were determined and product specific properties were stored in a database. This database was used to explore the contamination pathways by identifying relations between sample properties (e.g. fat content, pH and packaging) and measured phthalate concentrations.
Results: The results of the measurement campaign show a wide variety of phthalate concentrations in the food samples. Concentrations are higher in high-fat food products like butter, oil and cheese compared to low-fat food products, like vegetables and juices. Higher phthalate concentrations were also detected in some cardboard packed food, probably due to migration from inks and glues. Aluminium inner package seems to be a good barrier for migration. A wide range of phthalate levels in bread was found and further research is necessary.
Conclusions: A wide variety in phthalate concentration was found. The fat content of the food product, the composition of the food as well as the composition and properties of the packaging material have been identified as possible contamination causing conditions. In a next phase of this study, we will use these data to quantify the dietary intake of phthalates for the Belgian population.
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SIZE DISTRIBUTION OF PARTICLE-BOUND *n*-ALKANES AND POLYCYCLIC AROMATIC HYDROCARBONS AT AN URBAN MEDITERRANEAN LOCATION

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Background and Aims: Different studies have demonstrated that the hydrocarbons present in the atmospheric particulate matter (PM), specifically those with anthropogenic origins, are primarily associated with particles smaller than 1.5 µm and, as such, pose elevated risks to human health. These studies have been conducted in highly populated and industrialised cities, in which the fine particle concentration to the total atmospheric particulate matter is very elevated. In the south Spanish Levant, however, the contributions of coarse particles (>2.5 µm) from natural phenomena, like resuspension or Saharan intrusions, can be very significant. This could change the hydrocarbon contribution to different size fractions of suspended particles.
Methods: PM1, PM2.5 and PM10 samples collected with low volume samplers (2.3 m^3/h) at two sites in the city of Elche (southeastern Spain) from October 2008 until March 2009 were analyzed to determine the concentrations of 11 polycyclic aromatic hydrocarbons (PAHs) and *n*-alkanes from C_{20} to C_{40}. One sampling site, classified as urban background, was located on the roof of a building at the Miguel Hernández University, adjacent to a major city avenue, in a highly ventilated area. The other was placed at a palm tree garden in the city centre.
Results: Average total PAH concentrations were 0.99, 1.36 and 1.16 ng/m^3 for PM1, PM2.5 and PM10, respectively. The dominant PAHs in the three size fractions were benzo[*b*]fluoranthene, benzo[*k*]fluoranthene and chrysene, representing ~ 40% of the total PAH content. The benzo[a]pyrene equivalent concentration, used as an indicator of the PAH toxicity, was 0.11, 0.13 and 0.11 in PM1, PM2.5 and PM10, respectively. Mean total *n*-alkane levels in PM1, PM2.5 and PM10 were, respectively, 14.0, 20.2 and 21.3 ng/m^3. The *n*-alkanes C_{29} and C_{31} were the most abundant congeners in PM10, while PM1 and PM2.5 fractions were dominated by *n*-alkanes C_{23}-C_{25}. The average CPI (carbon preference index), similar for all size fractions, was ~ 1.5. The plant wax contribution to odd carbon numbered homologues was 37% for PM10 and ~ 31% for PM1 and PM2.5.
Conclusions: Approximately 70% of PAHs were mainly associated with submicron particles (<1 µm) which can easily reach the alveolar region of the respiratory system increasing their potential health effects. The major source of PAHs in the city was traffic since the most abundant congeners (benzo[*b*]fluoranthene and benzo[*k*]fluoranthene) have been identified as tracers of vehicle emissions.
CPI values and percentages of plant wax *n*-alkanes showed predominant contributions of anthropogenic sources during the cold season, although biogenic emissions must not be considered negligible, especially in inner city sampling sites with high vegetation.

7-Year Neurodevelopmental Consequences of Prenatal Exposure to Chlorpyrifos, a Common Organophosphate Pesticide

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BACKGROUND AND AIMS: First registered in 1965 for agricultural and pest control purposes, chlorpyrifos is a broad-spectrum, chlorinated organophosphate (OP) insecticide. Early concerns about the possible neurotoxicity of OP insecticides for humans derived from animal studies showing that prenatal and early postnatal exposures to CPF were associated with neurodevelopmental deficits. In humans, prenatal exposures to chlorpyrifos (CPF) have been associated with neurodevelopmental problems in young children from different populations. The goal of the study was to determine the relationship between prenatal CPF exposure and 7-year neurodevelopment in an urban population.

METHODS: In a sample of 265 children (participants in a propsective study of air pollution), we measured prenatal CPF exposure in umbilical cord blood (pg/g), and 7-year neurodevelopment,using the Wechsler Intelligence Scales for Children (WISC-IV). Estimates of effect were obtained from multiple and logistic regression, adjusted for income, sex, race/ethnicity, home environment, child anxiety, secondhand smoke (ETS) and polycyclic aromatic hydrocarbons (PAH).

RESULTS: Prenatal CPF exposure was associated with 7-year deficits in Full-Scale IQ (p=0.02), Working Memory (p=0.002), and Verbal Comprehension (p=0.08). On average, for each standard deviation (4.61 pg/g) increase in exposure concentration, Full-Scale IQ declined by 1.7%, and Working Memory declined by 2.7%. CPF increased the risk of borderline function (< 80) on Full-Scale IQ (OR=1.13, 95% CI 1.04--1.23, p=0.005), Working Memory (OR=1.10, 95% CI 1.01--1.19, p=0.03), and Verbal Comprehension (OR=1.09, 95% CI 1.00--1.18, p=0.05).

CONCLUSIONS: We report significant 7-year deficits in Full-Scale IQ and Working Memory, as a function of prenatal CPF exposure. Higher exposure increased risk of borderline function in IQ, Working Memory, and Verbal Comprehension, with implications for learning and school achievement. These findings are important in light of continued widespread use of CPF in agricultural settings.

AIR POLLUTION AND RISK OF PARKINSON DISEASE IN A LARGE PROSPECTIVE STUDY OF WOMEN

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Background: Very little is known about the effects of air pollution on neurological outcomes, particularly in the area of Parkinson's disease (PD) epidemiology. The toxins in air pollution are thought to cause damage to human health by evoking an inflammatory response[19] and by increasing oxidative stress, and inflammation is thought to play an important role in the pathogenesis of PD.
Methods: We assessed whether exposure to air pollution is related to risk of PD in the Nurses Health Study (NHS), a large prospective study of women. Data on cumulative exposure to air pollution before onset of PD was obtained using geographical information systems (GIS) to link an individual place of residence at different ages with location-specific air pollution levels. We prospectively followed 121,701 women in the NHS and used Cox proportional hazards models to estimate the risk of PD associated with exposure to PM_{10} (particulate matter less than 10 micrometers in diameter) and $PM_{2.5}$ (particulate matter less than 2.5 micrometers in diameter) air pollution.
Results: In models adjusted for age in months, and pack years of smoking, we did not observe a significant association between PM_{10} or $PM_{2.5}$ air pollution and risk of incident PD. The relative risk (RR) for a 10 ug/m^3 increase in PM10 was 1.01 (95% CI: 0.82, 1.24). For a 10 ug/m^3 increase in $PM_{2.5}$, the RR of incident PD was 1.14 (0.70, 1.77).
Conclusions: In this study, exposure to PM_{10} and $PM_{2.5}$ was not related to risk of PD. Other measures of air pollution, such as exposure to specific pollutants with relation to risk of PD should be further explored.

TRIGGERING OF TRANSMURAL INFARCTIONS BY AMBIENT FINE PARTICLES, ROLE OF SECONDARY VERSUS PRIMARY PARTICLE SPECIES MASS FRACTIONS

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Background: Previously, we reported an increased risk of transmural, but not non-transmural, infarctions associated with increased $PM_{2.5}$ concentrations in the previous 24 hours. We then hypothesized that this acute response to $PM_{2.5}$ differed by $PM_{2.5}$ species.

Methods: We used all ER admissions for first myocardial infarctions (2004-2006) of New Jersey residents living ≤10km from a $PM_{2.5}$ monitoring site (n=1563), measured daily $PM_{2.5}$ mass concentrations, and daily $PM_{2.5}$ species mass fractions estimated by Community Multiscale Air Quality modeling (CMAQ). Using daily bias adjusted CMAQ mass and species averages we calculated the mass fractions of sulfate, nitrate, ammonium, elemental carbon (EC), and organic carbon (OC) and ranked each daily species mass fraction into tertiles. Using a time-stratified case-crossover design and conditional logistic regression adjusted for apparent temperature, we then estimated the risk of a transmural infarction associated with each 10.8 $\mu g/m^3$ increase in measured $PM_{2.5}$ concentration in the previous 24 hours within each tertile of each species (e.g. high, middle, and low sulfate; high, middle, and low EC, etc.).

Results: We found the largest relative risk estimates on the days with the highest tertile of sulfate (OR=1.13; 95% CI = 1.00, 1.27), nitrate (OR=1.15; 95% = 0.98, 1.35), and ammonium (OR=1.13; 95% CI = 1.00, 1.28), and the lowest tertile of EC (OR=1.17; 95% CI = 1.03, 1.34). "High ammonium" and "low EC" appear to represent the same days, as they have the same mean temperature (15 ± 11°C) and $PM_{2.5}$ composition (29% sulfate, 21% OC, 15% ammonium, 14% nitrate, 7% EC, 14% other).

Conclusions: EC is a tracer for primary $PM_{2.5}$ (including primary OC) and secondary OC is often correlated with sulfate. Thus, this suggests the acute effect of ambient $PM_{2.5}$ on transmural infarctions is greatest on days with a larger fraction of secondary PM (sulfate, nitrate and/or secondary OC).

PAEDIATRIC COMPUTED TOMOGRAPHY EXPOSURE AND RADIATION-INDUCED CANCER: SETTING UP OF THE FRENCH COHORT OF CHILDHOOD CT SCAN

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Background and aims: The increased use of computed tomography (CT) scans for paediatric patients raises the question of a possible impact of such ionising radiation (IR) exposure on the occurrence of secondary leukaemia and cancers. We describe the preliminary results of an ongoing cohort study of children exposed to CT in France, performed in collaboration with the "Société Francophone d'Imagerie Pédiatrique et Prénatale". This cohort will be included in the trans-national collaborative EPI-CT project.
Materiel and Methods: In 19 of the most important French paediatric radiology departments, demographic and IR exposure information concerning children less than 5 years, who underwent at least one CT scan between 2000 and 2006, were collected. Inclusion of patients will continue from 2007 to 2013 according to the EPI-CT project. Absorbed organ doses are calculated with the "CT-expo" software.
Results: Until now, 28,190 children free of cancer or leukaemia at the first CT scan examination have been included. Age at first CT scan exposure was less than 1 year for 42% of the population. The mean number of CT examination per child was 1.5 (min 1, max 30) and concerned head in 66% of the cases, thorax in 22%, abdomen and pelvis in 10% and other localisations in 2%. Highest cumulated organ doses were observed for brain and lens during head exposure and mean absorbed doses were 27 mGy (range: 2.8 - 478 mGy) and 30 mGy (0.5 -620 mGy), respectively.
Conclusion: This cohort allows to better characterizing organ doses associated with CT scan exposure in childhood. Relatively high doses to radiosensitive organs (lenses, ovaries, breast, etc…) have been observed, as well as large dose ranges according to the protocols used. The follow-up of the cohort will be first based on cancer incidence up to age 15 to quantify a possible excess paediatric cancer risk.

METHODS FOR TRACKING EXPOSURES TO DRINKING WATER CONTAMINANTS IN CALIFORNIA

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Background and Aims: While infrastructure and regulations help assure the quality of drinking water to millions of California citizens, there continue to be areas where existing contaminant levels may pose residual risks to the population. To assess the extent of suspected exposures to continuing waterborne hazards, and the concurrent linkages to disease, requires several pieces of information. We aimed to enumerate this information in the context of available exposure assessment methods and with the goal of developing an ongoing tracking system.
Methods: Through literature review, targeted communications with technical experts, and needs assessment, we identified and prioritized methods for linking individuals or small populations to specific water supplies and for estimating exposures to contaminants, given available water quality observations. We assessed the feasibility of developing a drinking water quality tracking system in terms of cost, effort, expertise, information systems infrastructure, and external factors which affect the ability to use a method or to acquire additional related drinking water quality and delivery information.
Results: In California, 85% of the population receives its drinking water from regulated community water systems, while 15% use unregulated private sources. The most promising method for assessing exposures to populations on regulated water supplies involves modeling tap water quality from existing water quality monitoring records. The primary impediment to implementing this method is the lack of complete and high resolution geospatial information available for describing water purveyor service boundaries and for characterizing zones of homogeneous water quality within distribution systems.
Conclusions: To better analyze water contaminant exposures in California, a frequently updated and time-dependent geospatial reporting system is proposed for capturing water system service areas and hydraulically isolated distribution sub-zones. Once a complete statewide coverage of regulated supplies is attained, the remaining unregulated areas can be analyzed with respect to disease outcomes and risk-attributable ambient conditions.

INFLAMMATORY RESPONSES TO AMBIENT ULTRAFINE AND FINE PARTICLES IN PATIENTS UNDERGOING CARDIAC REHABILITATION

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Background: Airborne particle concentrations have been associated with myocardial infarction and cardiac arrhythmia, but the mechanisms underlying these associations are not completely understood. Therefore, we examined associations between markers of inflammation and ambient concentrations of fine and ultrafine particles in a panel of exercising patients with recent acute cardiovascular events.
Methods: We enrolled 75 patients from the Cardiac Rehabilitation program at the University of Rochester Medical Center, who had a recent coronary event (myocardial infarction or unstable angina). Ninety percent had undergone stenting or bypass. Counts of particles 10 to 500 nm were measured continuously outdoors at the site. Fine particle concentrations ($PM_{2.5}$) were measured continuously ~5km from the site. The exercise program involved supervised, graded twice weekly exercise sessions for 10 weeks, with fibrinogen, white blood cell count (WBC), and C-reactive protein (CRP) concentrations measured in blood samples taken once/week. Using mixed models, we examined changes in fibrinogen, CRP, and WBC associated with interquartile range (IQR) increases in mean ambient concentrations/counts of PM2.5 and particles 10-500nm (UFP) over the previous five 24 hour periods (lag hours 0-23, 24-47, 48-71, 72-95, and 96-119).
Results: Each IQR increase in UFP was associated with significant increases in CRP (lag hours 0-23; 0.067 mg/L; 95% CI = 0.000-0.133 mg/L) and fibrinogen (lag hours 24-47; 0.13 g/L; 95% CI = 0.05-0.21 g/L), while each IQR increase in PM2.5 concentration was associated with a significant increase in fibrinogen (lag hours 24-47; 0.09 g/L; 95% CI = 0.01-0.16 g/L). Smaller non-significant increases in fibrinogen and CRP were observed at other lag times. WBC was not associated with UFP or PM2.5 at any lag time.
Conclusions: In patients undergoing cardiac rehabilitation, ultrafine/fine particles were associated with increases in inflammation markers, factors predisposing to increased risk of cardiovascular events in post-infarction patients.

THE ASSOCIATION BETWEEN SHIFT WORK SCHEDULE AND SLEEP QUALITY AND MENTAL HEALTH IN SOUTH OF TAIWAN FEMALE NURSES

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Background and Aims: To investigate the relation between shift work, and sleep quality and mental health in female nurses in south Taiwan. Meanwhile, the nurses with rotation shift were further explored the association between types of shift work schedule and sleep quality and mental health and one year to understand the association between the variances of sleep quality and mental health and change of nightshift days
Methods: This study recruited 1360 female nurses registered in Kaohsiung area and 407 with rotation shift working schedule were followed and responded the second questionnaires. Data was measured by a self-administered questionnaire including demographic variables, shift type, sleep quality and mental health. The sleep quality was measured by Pittsburgh Sleep Quality Index (PSQI) and mental health measured by Chinese Health Questionnaire-12 (CHQ-12).
Results: The nurses with rotation shift appeared to have the worst sleep quality and mental health than nurse with day work. Compared to nurses with day work, nurses of nightshift were associated with increased odds ratio of reporting poor sleep quality and mental health (OR: 2.26, 95%CI: 1.57~3.28; OR: 1.91, 95%CI: 1.39~2.63 respectively). Among rotation shift nurses, we found that 2 days off after the last night shift, the sleep quality and mental health were significantly improved, with decreased of 1.23 on PSQI and 0.86 on CHQ-12 score, respectively, after adjustment of other factors. Compared with the first and second survey of sleep quality, the sleep quality was aggravated among nurses with increased nightshift days only.
Conclusions: Female nurses of rotation shift are experiencing poor sleep quality and mental health and 2 or more days off after the last nightshift might improve their sleep quality and mental health. The 2 days off after the last nightshift need application to the manger of nursing department of the hospital and a suitable load of cumulative nightshift days was also considered.

HEALTH IMPACT ASSESSMENT OF A CADMIUM, ARSENIC AND LEAD SOIL POLLUTION, CASSIOPÉE STUDY, AVEYRON, FRANCE

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Background and Aims
Important pollution was observed in Viviez (south-west of France) due to 150 years of smelting activity. Median concentration in surface soil of private gardens was respectively 20, 3 and 5 times higher than the reference value for cadmium, arsenic, and lead. Maximum cadmium concentrations in locally-homegrown vegetables reached 11 times the European regulation value. Thus, a global public health assessment was carried out in order to estimate the health impact of this pollution and to formulate recommendations.

Methods
Data from a regional register of renal insufficiencies and national data on causes of deaths were analysed to describe geographical variations in incidence or mortality. A screening for lead poisoning was proposed to children and pregnant women of Viviez. A measurement of urinary cadmium was proposed to all inhabitants in order to estimate the proportion exceeding a medical threshold. Finally, an exposure study to cadmium and arsenic was carried out in order to better understand residents' exposure.

Results
As compared with other parts of the district, no excess incidence of renal insufficiencies was observed in Viviez, but excess of mortality due to renal diseases particularly in the oldest periods. No case of lead poisoning was identified among 14 participants. Among 596 adult residents, 5% exceeded 2µg of cadmium/g.creatinine and 23% 1µg/g.creatinine: they were recommended to consult their doctor. These proportions were higher than those observed in an unexposed population (4% and 0%). Results of the exposure study suggested the influence of environmental factors such as ingestion of local food and inhalation or ingestion of polluted dust and soils.

Conclusions
Results of this assessment establish the health impact of the soil pollution among the residents of Viviez. This warrants to propose medical follow-up for the exposed population, and to limit further exposure by implementing soil treatment of private gardens, stopping the consumption of locally-homegrown products and adopting hygiene precautions.

PAEDIATRIC COMPUTED TOMOGRAPHY AND SUBSEQUENT CANCER: SETTING UP OF THE EUROPEAN PROJECT EPI-CT

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In behalf of the EPI-CT project group

Background and Aims

The growing use of computed tomography (CT) scans for paediatric patients raises the question of a possible impact of ionising radiation exposure on leukaemia and other cancers. The European collaborative EPI-CT project aims to pool data from several national cohorts of children having undergone a CT examination.

Material and methods

Following recommendations of a pilot study (Child-Med-Rad) which demonstrated the feasibility of setting up an international cohort study of paediatric CT patients and developed a common protocol, the project EPI-CT was launched in February 2011. EPI-CT will build or extend national cohorts with the aim of performing pooled analyses. Children, exposed in nine European countries to CT scan, will be included both retrospectively and prospectively until 2013. About one million children (Belgium, Denmark, France, Germany, Netherlands, Norway, Spain, Sweden and the United Kingdom) will be recruited. Individual patient dose reconstruction will be performed using hybrid mathematical phantoms of children of various ages. Cross-linkage with national cancer registries will allow to calculate cancer incidence in the pooled cohort and to compare it to baseline rates. In parallel, the biological effect of CT-scan will be estimated on blood and saliva.

Results

The study methodology and details of the biological studies will be presented. Patterns of use of CT scanning in different countries and over time will be assessed. Analyses planned for the year 2015 will have sufficient statistical power to evaluate the risk between exposure to CT scans in childhood and the cancer risk, particularly leukaemia.

Conclusion

This project will provide, for the first time, direct epidemiological evidence on the potential cancer risk due to ionising radiation exposure from paediatric CT scans in a large multinational European cohort. Results will inform radiation protection and patient dose optimisation. This project is supported by the EU FP7 Euratom grant agreement n°269912.

LONG-TERM CONCENTRATIONS OF AMBIENT AIR POLLUTANTS AND RISK OF DEATH AMONG SUBJECTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD).

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Background : Studies show mixed results concerning the association between ambient particulate matter (PM) air pollution and outcomes among persons with chronic obstructive pulmonary disease (COPD). These variations could be due to the challenges in estimating accurate ambient air pollution levels for each subject. The AHSMOG study (N=6,338) has previously found associations between ambient air pollution and COPD using the inverse distance weighted (IDW) interpolation method from the nearest fixed monitoring station to residence and workplace.
Methods : Using data from the Adventist Health Study-2, a cohort of 97,000 US subjects, we identified 5,494 subjects with self-reported doctor- told COPD at baseline who have had the same residence address throughout follow-up. Subjects were enrolled between 2001 and 2006 and completed a 50 page questionnaire at enrolment including medical history, time spent outdoors, exercise, smoking and diet. A total of 159 subjects have died of natural causes during an average of 7 years of follow-up. The analyses controlled for a number of potential confounding factors including age, race, education, BMI, smoking and lifestyle. The Cox proportional hazard model was used for survival analysis. Inverse distance weighting (IDW) with interpolation to residence address was used to estimate individual level ambient air pollution. Cumulative monthly averages from 12 months prior to enrolment until one month before censoring were used.
Results and Conclusion: For each 10 • g/m^3 increase in $PM_{2.5}$, the hazard ratio (HR) for death due to any cause was 2.35 (95% confidence interval (CI): 1.08-5.13) in the single-pollutant model and 2.40 (95 % CI: 1.10-5.23) in the two-pollutant model with O3. No associations were found with each 10 ppb increase in Ozone either in single or two-pollutant models (HR's and 95 % CI were 1.15 (0.71-1.89) and 1.20 (0.74-1.94) respectively). These findings could have implication for policy regulations.

PERSISTENT NEUROBEHAVIORAL EFFECTS IN SCHOOLCHILDREN AND ADULTS AFTER THREE DECADES OF EXPOSURE TO DRIFT CONTAINING ORGANOPHOSPHORUOS PESTICIDES

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Background and Aims: Studies by our group in 1987-1991 showed in-season reversible neurobehavioral effects of low-level, long-term exposure to organophosphorous (OP) pesticides in a cohort of agricultural workers and residents of rural communities in the Hula Valley, Israel. The residents were exposed to pesticide-drift caused by the proximity of the communities to the sprayed fields. This study aimed to review the neurobehavioral effects after three decades in the same cohort and in 8-12 years-old schoolchildren, 75% of whom are "second generation", as at least one of their parents belonged to the original adult cohort.
Methods: Neurobehavioral tests included questionnaire, Trail Making Tests A and B, Digit Span (forward and backward), Digit Symbol Tests and Purdue Pegboard.
Results: Cognitive changes were observed in 98 individuals of the original adult cohort. Performance on both Trail Making Tests was significantly poorer than in the general population. The performance in Trail Making Test B was inversely correlated with the duration of OP pesticide exposure ($r=-0.231$; $\alpha<0.01$). Digit span tests were poor. Females were affected but yet performed better than males in all the tests.Preliminary analysis suggests that approximately 40% of the tested children or one of their siblings was diagnosed in the past with attention span and concentration deficits or Attention Deficit/Hyperactivity Disorder (ADD/ADHD).
Conclusions: The preliminary results demonstrate persistent late neurotoxic effects of lengthy daily OP pesticide exposure in both children and adults. There may be environmental-susceptibility interactions mediating the emergence of ADHD in populations with low-level endemic exposure to OP pesticides.
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INDOOR AIRPOLLUTANTS ANDRESPIRATORY HEALTH IN THE UNITED ARAB EMIRATES (UAE)

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Background and Aims:In the last forty years, the UAE has undergone rapid transition to become an industrialized nation. Little is known about theindoor air pollutant exposures and potential health effects in the Arab Gulf region.
Methods: We conducted a cross-sectional study in a stratified sample of 628 households in urban and rural areas and all seven emirates in the UAE from October 2009 to May 2010.Indoor air pollutants (nitrogen dioxide NO_2, sulfur dioxide SO_2, hydrogen sulfide H_2S) were measured using passive diffusion samplers over a seven-day period in a common living area.Information on environmental exposures, respiratory symptomswas collected from selected household members in each family via in-person interviews using validated questionnaires.
Results: A total of 1590 adults (n=1009), adolescents (n=330), and children (n=253) from 628 households were surveyed. Thirty percent (n=548) of our study sample lived in households with detectable sulfur dioxide (range 0.010-0.507ppm), and 9% lived in households with detectable indoor NO2 (range 0.006-048ppm). Indoor SO_2 was associated with ever wheezing, Prevalence odds ratio (POR) 1.79 [95% confidence interval (CI) 1.05, 3.05];wheezing in the last 4 weeks POR 4.63 [95% CI 1.33-16.19]; speech limiting wheeze in the last 12 months 3.53 [95% CI 1.06-11.74]; and diagnosed asthma POR 1.95 [95% CI 1.13-1.36]. Indoor NO_2 was associated with diagnosed asthma(POR) 2.34 [95% Confidence Interval (CI) 1.11, 4.93];dry cough not from cold, POR 1.90 [95%CI 1.0-3.60];and sinus infections in the last 12 months POR 1.77 [95% CI 1.07-2.94].
Conclusions: Our research found in this Gulf nation population, those living inhouseholds with measurable SO_2 and NO_2 experienced increased frequency of respiratory related symptoms and diagnosed asthma.Further research is needed to better characterize both the sources of exposure and the health effects of indoor air pollutants in the home.

MERCURY EXPOSURE OF BREAST FED INFANTS IN A SMALL SCALE GOLD MINING AREA IN ZIMBABWE

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Background and Aims: In Kadoma (Zimbabwe) gold is extracted from ore based on a simple technology using mercury. Women are exposed whilst living in an exposed area, or even more working directly with mercury. Breast fed infants are burdened via contaminated milk and the general environmental exposure. The aim of the study was to prove the hypothesis that the uptake of mercury via breast milk is a relevant pathway of exposure.
Methods: In 2006, an environmental epidemiological field study with 120 mother –child pairs was conducted. A non exposed control group (n=42) was compared medium exposed group (n=51) and a high exposed group (occupational exposure, n=27). Urine and hair samples from mother and infants plus breast milk samples were analyzed for total mercury. 120 breast milk samples were analyzed. Chi-square (Pearson), ANOVA, T-test Kruskal Wallis, Mann-Whitney test, and Spearman's rank correlation coefficient test were used. The daily uptake of mercury via breast milk was calculated. The reference dose of 0.3°[µg Hg/kg BW/d] was used to compare the burden of the infants.
Results: Breast milk median (maximum) concentrations [µg Hg/l] were (i) control group < 0.50 (1.55), (ii) medium exposed group 1.10 (10.48), (iii) high exposed group 1.20 (24.80) ($p<0,001$). Urine and hair results are distributes similarly for infants and mothers. All specimen results correlated significantly with another, indicating that the exposure of the infant correlates with the burden of the mother and the breast milk. No infant from the control group, but 17.6% of the medium and 18.5% of the high exposed group were above the reference dose ($p<0.001$).
Conclusions: Mercury in breast milk is generally elevated in small scale gold mining areas. Breast fed infants are burdened with toxic mercury via breast milk, which is an important public health issue.

ASSOCIATION BETWEEN TRAFFIC-RELATED BLACK CARBON EXPOSURE AND THE CONNER'S CONTINUOUS PERFORMANCE TEST (CPT) AMONG URBAN CHILDREN IN A PROSPECTIVE BIRTH COHORT

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Background and Aims: Associations between ambient air pollution exposure and children's cognitive domains are only beginning to be examined and analyses have not accounted for community-level psychosocial stressors that may co-vary with pollution exposures. We assessed the relationship of exposure to black carbon (BC), a marker of traffic particles, with attention and vigilance domains while adjusting for exposure to community violence (ETV), among 192 children aged 6-12 years in a Boston-based prospective birth cohort.
Methods: BC levels were estimated using a validated spatio-temporal land-use regression model based on residence during the child's lifetime, then categorized into quartiles. Exposure to violence (ETV) in these neighborhoods was ascertained using the My Exposure to Violence survey, which was categorized into tertiles. Attention and vigilance were measured using the Conner's Continuous Performance Test (CPT). Primary outcomes included: omission errors, commission errors, hit reaction time (HRT), HRT standard error (SE), HRT block change, and HRT SE block change (higher scores indicating worse performance or slower reaction time). Multiple regression analyses were used to determine effects of BC levels on outcomes.
Results: Children were primarily Hispanic (55%) and Caucasians (42%). We found a positive association between BC levels with commission errors and HRT ($p<0.05$), adjusting for age, gender, maternal education, ETV, and blood lead level. Higher-level ETV was associated with lower commission errors ($p<0.05$). Additional inclusion of children's IQ, prenatal smoking, and postnatal secondhand smoke exposure did not alter these results. Gender-stratified analysis suggested that the effects of BC on CPT measures were stronger in boys ($p<0.05$) for both commission errors and HRT, than in girls ($p>0.2$).
Conclusions: In this population of urban children, we found a relationship between increased BC exposure with increased commission errors and slower reaction time. Effects of traffic-related pollution on attention domains may be stronger in boys.

SMALL-AREA STUDIES OF ENVIRONMENT AND HEALTH IN ITALY: ACCOUNTING FOR SOCIOECONOMIC DEPRIVATION

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Background and Aims: Data for small-area studies in Italy are available at census tract and municipality level. The aim of the present contribution is to ascertain whether an *ad hoc* developed Deprivation Index (DI) can adjust for deprivation in SENTIERI, a multicentric small-area study at municipality level in Italian Polluted Sites – IPS.
Methods: The DI adopted in SENTIERI is based on four socioeconomic variables from the 2001 census, already included in a National DI. Each IPS' municipality was assigned to a quintile of DI on the basis of the distribution of the sum of Z scores, for the selected variables computed at regional level. Standardized Mortality Ratios (SMR) (1995-2002) with regional reference were computed for either gender, for each municipality, both crude and adjusted for deprivation. Conditions for potential confounding were verified by selecting outcomes with probable causal association with both pollution and socioeconomic status, and by analyzing the most and the less deprived municipalities.
Results: First results for lung cancer in two IPSs selected as above explained, showed a change in SMR estimates as expected when adjusting for DI. In the selected least deprived municipality crude and adjusted SMR were respectively 123 (IC 90% 108-138) and 131 (116-147) for males; the corresponding estimates for females were 148 (109-197) and 155 (114-207). In the most deprived municipality crude and adjusted SMR were respectively 120 (109-132) and 106 (96-116) for males; the corresponding figures for females were 134 (115-156) and 102 (87-119).
Conclusions: The results suggest that the adopted DI adjusts for socioeconomic status. The interaction between deprivation and environmental exposures should be better investigated. Also the effect of *resilent* areas and reverse causality phenomena on risk estimates should be better clarified.
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AMBIENT AND PERSONAL PM_{10} EXPOSURE IN WOMEN IN RELATION TO TIME ACTIVITY, SOCIOECONOMIC STATUS, AND LOCATION OF RESIDENCE IN DELHI, INDIA.

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Background and Aims: Many megacities in developing countries are undergoing rapid economic growth, with direct effects on their air quality particularly particulate matter (PM). In Delhi reductions in PM_{10} after 2001, when all modes of Public Transport (PT) in Delhi were converted to compressed natural gas (CNG), have since been outweighed by the increase in car ownership (average annual Delhi PM_{10} levels: in 1994, before PT ran on CNG, around 275µg/m3; in 2001 when all PT was converted to CNG, around 125µg/m3; levels in 2010, around 225µg/m3). A previous study investigated indoor and outdoor PM_{10} levels (Kulshreshtha), however, there are no studies of *personal* exposure. This study aims to quantify PM_{10} levels in women with different individual and area characteristics of socio-economic status (SES). This pilot study aims to inform future, large scale investigations.

Methods:

- 'Shadowing' 6 women (2 with high personal SES living in rich areas, 2 from low SES living in rich areas, and 2 from low SES living in poor areas), and recording their personal PM_{10} exposure using a 'Sidepak' monitor for 6 hours (10am to 4pm), on 3 days.
- Time Activity Diary filled every 15 minutes during recording period.
- Systematic neighbourhood observation using proforma.

Results: Personal and Ambient PM_{10} exposure affected by residential location, and socioeconomic status. Time activity diary, proforma reveal when and why personal PM_{10} levels vary through the study period.

Conclusions: This study contributes to the observation of the relative impact of economic growth, socioeconomic status, and residential location on personal PM_{10} exposure, emphasising the need for continued vigilance, and larger scale studies on the topic. Also, perhaps studies need to be done at different seasons. Seasonal differences in indoor and outdoor PM_{10} levels we recorded in previous studies.

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*This study is part of an MSc research project (Master of Health Sciences) at Newcastle University, done with IIT Delhi. Supervisors: Prof. Tanja Pless-Mulloli. (Newcastle University), Professor Mukesh Khare (IIT Delhi).

CARDIOVASCULAR EFFECTS IN A GROUP OF SUGARCANE WORKERS

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Background and Aims: Brazil is the world's largest sugarcane producer. The predominantly manual harvesting exposes workers to a series of health risk factors, such as physical exertion, heat and pollutants. This study aimed to evaluate the occurrence of adverse cardiovascular effects and possible mechanisms involved in these events on sugarcane workers.

Methods: Twenty-eight sugarcane harvesters, Caucasian, healthy, male, and residing in the countryside of São Paulo state were evaluated in the harvest period (when the sugarcane is burned) and in the non harvest period (when the sugarcane is not burned) through blood markers, twenty-four hours ambulatory blood pressure monitoring, heart rate variability by twenty-four hours electrocardiography monitoring, and muscle sympathetic nerve activity in the peroneal nerve. We measured fine particles and weather variables in the sugarcane fields in both periods. Data were compared using statistical tests for repeated measurements. Multivariate linear regression analyses were used to evaluate the effect of working during the harvest period controlling for covariates.

Results: The participants aged 31 ± 6.3 years and had worked for about 9.8 ± 8.4 years in this activity. During the harvest period, the concentration of fine particles was higher (84.7 ± 23.9 vs 53.2 ± 14.8, $p<0.001$), and workers presented lower serum levels of C-reactive protein (0,25 *vs* 0,44 mg/dl, $p<0,001$). However, working in the harvest period was significantly associated with higher systolic blood pressure (120.1 ± 10.3 *vs* 117.0 ± 10, $p= 0.047$). The reduction of 10 ms in SDNN was associated to increases of 0.73 and 0.62 mmHg in systolic and diastolic blood pressures, respectively. Also, an increase of 10 burst/min in sympathetic activity led to increases of 1.8 and 1.6 mmHg in systolic and diastolic blood pressures, respectively.

Conclusions: Work in burnt sugarcane harvesting was associated with higher blood pressure which may be linked to autonomic imbalance.

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A SIMPLE DEVICE FOR TEACHING CAUSAL CONCEPTS

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Background and Aims: We present a simple device for teaching causal concepts in epidemiology. Originally developed for a lay audience, it has proven to be illuminating for graduate students also.
Methods: We use a simple, non-health example so that: (1) "truth" is known, and (2) the conditions that cause valid and invalid results can be easily understood. Let the total study group consist of 4 flashlights. The question we ask is, "Does moving the switch from the 'off' position to the 'on' position cause a flashlight to light?" We know that the simultaneous occurrence of the following conditions is sufficient to produce light in a flashlight (when switched "on"): (1) good battery; (2) good bulb; (3) unbroken circuit from switch to battery to bulb to switch; and (4) good switch. Let one of the flashlights have all four of these component causes in place; let the other three be missing one or two of these component causes. We vary the definition of the target population to illustrate different concepts.
Results: We show how, with this device, it is easy to illustrate the following: what is a causal contrast; the importance of the target population in causal inference; what is effect-measure modification; counterfactuals; that confounding results from imperfect substitution for a counterfactual outcome frequency; and the combined impact of confounding, selection errors and measurement errors on study results. In addition, we show with this device the following, which some find surprising: an observed effect measure can be simultaneously confounded and unconfounded, matching on causal factors does not guarantee that confounding is absent, absence of perfect matching on causal factors does not guarantee that confounding is present, and in some situations it appears that a DAG can give the wrong indication about the presence of confounding.

NANOTECHNOLOGY AND HUMAN HEALTH: SCIENTIFIC EVIDENCE AND RISK GOVERNANCE

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Background and aims: Besides the promise of great benefits of nanotechnology, concerns exist on adverse health consequences. As complexity and uncertainty are large, evidence-based policy will be elusive, and models of risk governance are needed.
Methods: WHO/EURO is conducting a critical assessment of key evidence on possible health implications of nanomaterials, with a view to identify options for risk governance and policy formulation.
Results: Current evidence is far from being conclusive but a cautionary approach in policy may be appropriate for several reasons: (i) humans have limited evolutionary experience of nanomaterials- a possible reason for the diminishing ability of cells to interact with particles as their size decreases to nanoscale; (ii) nanoparticles can enter the body relatively easily, especially through inhalation and gastro-intestinal assimilation, and are very mobile once inside the body; (iii) several chemical-physical mechanisms resulting in cell damage have been reported; (iv) effects are often dependent on particle size, with a tendency to become more active as the particle size decreases; (v) population exposure to nanomaterials is not well known, but may be or become high, for example through cosmetics, food additives, or from airborne nanoparticles; (vi) potential adverse effects include a broad spectrum of adverse effects, specific and a-specific. The need for caution is reinforced by the reported asbestos-like action of carbon nanotubes in animal models and, to a lesser extent, by a few episodes of human health impacts following localised acute exposures.
Conclusions: Assessing the risks for human health impacts of nanotechnology is challenging. One must take into account the unique complexities of the interaction between nanomaterials and the human body. Innovative models and frameworks for risk assessment and risk governance are being developed and applied in order to organise the available evidence on biological and health effects of nanomaterials in ways to inform policy.

THE RELATIONSHIP OF BREAST CANCER SURVIVAL WITH TRAFFIC-RELATED POLLUTION EXPOSURES

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Background and Aims: In the US, breast cancer is the most frequently diagnosed cancer among women, and African-American (AA) women have much worse than average survival. Few studies have examined the relationship of breast cancer with air pollution exposures, which can lead to inflammation and lowered immune response. Fewer still have explored the additional impact of race on breast cancer survival and air pollution exposure.
Methods: Using data from the SC Central Cancer Registry, we examined the relationship of breast cancer survival with residential proximity to roads, a proxy for traffic-related air pollution exposures, and potential effect modification by race. This study included all cases of breast cancer among female residents >19 years old, diagnosed from 2000 to 2006. A Geographic Information System (GIS) was used to determine distance from the geocoded residence at diagnosis to the nearest US Census feature class A1-3 road (interstates - secondary roads). Women were followed until a second cancer, the end of the study, loss to follow-up or death through 2007. Deaths were determined from the SC Vital Registry.
Results: Of the 11,573 women with available geocoded residential and smoking status classified as AA (23.4%) or European-American (EA) 949 developed a second cancer, and 1,657 died during the follow-up period. Mean age was ≈60 years, and the median distance to nearest A1-3 road was 636.3 meters. In models adjusting for age, race, and smoking status, women living 50 to 99 meters from roads were more likely to die (Hazard Ratio: 1.30, 95%CI: 1.05,1.62) than women living 200 or more meters away. Models stratified by race, showed AA women were disproportionately impacted (AA HR: 1.54, 95%CI: 1.11,2.14 versus EA HR: 1.19, 95%CI: 0.90,1.58).
Conclusions: Our preliminary study findings suggest that AA women living closer to roads may experience worse survival rates from breast cancer.

TERRESTRIAL GAMMA RADIATION IN RELATION TO THE POPULATION DISTRIBUTION IN WESTERN SWEDEN

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Background and Aims: After excluding contribution from radon, 42% of the average effective dose from natural background radiation in Sweden comes from terrestrial gamma radiation (TGR). In the county of Vastra Gotaland, western Sweden, the TGR is relatively high and originates mainly from granite, but the county has also areas with low TGR (0-500 nGy/h). This study aims to investigate the distribution of TGR in relation to the population (population-weighted average).

Methods: Data for the study comes from aerial measurements in the database at the Swedish Geological Survey. The digital database has unique measurements for each 200 x 200 meter grid for uranium, thorium and potassium, respectively. TGR can be calculated in nGy/h with conversion factors for the three nuclides. Each individual in Vastra Gotaland (n=1.5 million) was retrieved from the population registry with the dwelling coordinates. Using the Geographical Information System the coordinates of the individual's home was matched with the level of TGR. TGR for each municipality in the county was calculated as 1) an average of the grid cells (surface-weighted average) and 2) the population-weighted average, respectively.

Results: The population-weighted average of TGR for Vastra Gotaland was 56 nGy/h. There was a tendency of higher population-weighted municipality average compared to the surface-weighted average i.e. the population distribution was skewed towards regions with higher TGR. In the 49 municipalities the median population-weighted average was 55 nGy/h, Sotenas had the highest 118 nGy/h and the Trollhattan municipality had the lowest average of 37 nGy/h.

Conclusions: This study shows that the population-weighted average of TGR for the municipalities in Vastra Gotaland was higher than the surface-weighted average. This is probably a random phenomenon, but important to keep in mind when designing and evaluating ecological studies.

SEXUAL DIFFERENCES IN THE ACCUMULATION OF MERCURY IN THE INFANT POPULATION OF MENORCA

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Background and Aims: Mercury can cause severe neurological damage to children (Grandjean *et al*., 1997). Humans are exposed to mercury basically through fish consumption. This research focuses on the presence of mercury in the infant population of Menorca, in the Western Mediterranean area, whose inhabitants are usual fish and seafood eaters.
Methods: The research is based on 198 hair samples of four-year old children from the Menorca island collected within the INMA study (Ribas-Fito *et al*., 2006). Determination of total mercury (tHg) in hair was performed using inductively coupled plasma mass spectrometry.
Results: The mean tHg in hair of children from Menorca was 1.3 µg/g. Girls had higher tHg levels than males (1.4 vs. 1.1 µg/g, statistically significant). The observed differences were also maintained when controlling for diet (fish consumption) and breastfeeding. Regarding fish intake, mean tHg values among frequent fish consumers (more than three times per week) were almost three-fold higher than among non-consumers (1.6 vs. 0.58 µg/g).
These results have been compared with those of other organic persistent pollutants, such as organochlorine compounds (OCs). As described by Grimalt *et al.* (2010), female children could have a higher retention capacity for the incorporation of OCs through breastfeeding. Mercury could also have a sexual accumulation pattern similar to OCs, but in this case, fish consumption is the main ingestion route. In any case, comparison with gender differences observed from other cohorts (Batista *et al*., 1996; Kim *et al*., 2008) shows that more research is needed to identify the cause of this differential accumulation.
Conclusions: The present study identifies a case of significant differential accumulation of tHg in children, by gender. The main causes of this difference are explored considering dietary habits (mainly fish intake) and breastfeeding. Gender differences in the accumulation of other persistent pollutants, such as organochlorine compounds, in the same population are also considered.

ASSOCIATION BETWEEN THYROID HORMONE LEVELS AND POLIBROMODIPHENYL ETHER CONCENTRATIONS IN PREGNANT WOMEN FROM VALENCIA, SPAIN

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Background and Aims: Some studies have suggested that polybromodiphenyl ethers (PBDEs) may alter thyroid function during critical periods of thyroid hormone-dependent brain development. The aim of the present study was to investigate the association between maternal concentrations of PBDEs and thyroid hormone status during the first trimester of pregnancy.
Methods: The study sample (n=159) was drawn from a prospective mother-infant cohort established in Valencia as part of the INMA (Environment and Childhood) project. Thyroid-stimulating hormone (TSH), total triiodothyronine (TT3) and free thyroxine (FT4) were measured as biomarkers of thyroid function in maternal serum samples at 12 weeks of pregnancy. PBDE concentrations (PBDE 47, 99, 153, 154, 209) were measured by gas chromatography (GC) coupled to a mass spectrometer (MS) operating in negative ionization mode (NICI). Association among maternal PBDE serum concentrations and thyroid hormone levels were assessed using multivariate linear regression analyses adjusting for potential confounders.
Results: Serum TT3, FT4, and TSH concentrations ranged from 1.5 to 4.1 nmol/L, 8.1 to 16.4 pmol/L and 0.05 to 9.3 µU/mL respectively. Median of total PBDEs was 7.6 ng/g lipid (range between not detected and 87.4 ng/g lipid). A significant positive association was found between total PBDEs and TSH (β=0.30; 95% CI=0.07-0.53) after adjustment for confounders. FT4 tended to be lower in mothers with higher PBDE concentrations but the trend was not statistically significant. No association was found between PBDEs and TT3.
Conclusions: PBDE concentrations in maternal serum were positively associated with increases in maternal TSH levels. Concentrations of FT4 were negatively, but not statistically significant, associated to PBDE concentrations. TT3 levels did not seem to be influenced by exposure to PBDEs. These findings suggest that PBDEs may interfere with the thyroid system of pregnant women.

THE USE OF CLEANING PRODUCTS DURING PREGNANCY AND LOWER RESPIRATORY TRACT INFECTIONS AND WHEEZING IN THE FIRST YEAR OF LIFE

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Background and aims: Analysis of the ALSPAC birth cohort (UK) study suggested that the use of household chemicals during pregnancy may increase the risk of wheeze in the offspring. We aimed to evaluate the effects of household use of cleaning products during and after pregnancy on wheezing and lower respiratory tract infections (LRTI) during the first year of life in the INMA project.
Methods: In the Spanish INMA birth cohorts of Asturias (n=450), Gipuzkoa (n=556), Sabadell (n=578) and Valencia (n=707), the use of 9 cleaning products in the home was reported during the third trimester of pregnancy in the four cohorts, and at infant's age of 12-14 months in Asturias and Valencia cohorts. Respiratory symptoms and LRTI were reported by the mothers when the infants were 12-14 months old. Logistic regression analyses adjusting for potential confounders were performed for each of the 4 cohorts, and the combined Odds Ratios (OR) were obtained by random-effects meta-analyses.
Results: Prevalence of LRTI during the first year of life was overall 32% and was higher if the mother had used sprays (OR 1.3; 95% confidence interval (CI) 1.0-1.6) or air fresheners (OR 1.3; CI 1.0-1.6) during pregnancy. Prevalence of wheezing was 35% and the risk increased with household use of sprays (OR 1.4; CI 1.1-1.7) and solvents (OR 1.3; CI 1.0-1.6). These results were homogeneous across the four cohorts (p for heterogeneity >0.3). Analyses excluding specific use during the first year of life showed an increased risk of LRTI and wheezing when sprays or air fresheners had been used only during pregnancy.
Conclusion: The use of cleaning sprays, air fresheners or solvents during pregnancy may increase the risk of respiratory symptoms and infections in the offspring. This effect is unlikely to be fully explained by post-natal use of these products in the home.

INFLUENCES ON PERSONAL AIR POLLUTION EXPOSURE. HOW CAN WE REDUCE EXPOSURE MISCLASSIFICATION?

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Background and Aims: Most epidemiological studies today work with exposure estimates that are at best based on outdoor air pollution averages at address locations. The aim of this study is to increase the knowledge of personal exposure, and to reduce potential exposure misclassification.
Methods: High resolution monitoring data of PM2.5 and PM10 has been simultaneously collected for personal, indoor, and outdoor pollution levels during 43 days of a daily routine for one individual; the indoor and personal monitoring data are accompanied by diaries. Relationships of personal, residential outdoor and residential indoor pollution are analyzed. Furthermore campaigns of simultaneous monitoring in transport micro-environments have been undertaken for bus-cycling comparisons (2 routes, 18 repeats each), as well as for walking-cycling comparisons (2 routes, 8 repeats each), accompanied by GPS recordings. Influences of traffic environments on personal exposure are investigated.
Results: Major differences between personal and residential outdoor pollution can be observed for the range and standard deviation of PM2.5 and PM10 levels, with personal exposure to PM2.5 showing a range (R) of 38.64µg/m³ and a standard deviation (St. D.) of 4.17µg/m³ (PM10: R = 175.13µg/m³, St. D. = 18.26 µg/m³) compared to 15.78µg/m³ (R) and 3.12µg/m³ (St. D.) at the residential outdoor location (PM10: R = 40.25µg/m³, St. D. = 8.74µg/m³). Comparisons both for the cycle-bus, as well as for the cycle-walk campaign show a higher mean and higher variation of pollution for the cyclist on all routes.
Conclusions: Comparing personal and residential outdoor pollution indicates that using residential outdoor PM levels as a proxy for personal exposure ignores the variation and the peak values of exposure a person might be exposed to during a daily routine, i.e. in traffic environments.

ROAD TRANSPORT'S NOISE IMPACT ON POPULATION HEALTH IN A RISKY ENVIRONMENTAL AREA IN THE REPUBLIC OF BULGARIA

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Background and aims: Noise, as a factor in the contemporary urban environment, is characterized by multifaceted influence, equivalent on negative effect of the rest environmental contaminants.
The largest share of noise has the road transport. Constant increasing traffic from vehicles and mistakes in urban planning create the unfavourable acoustic environment in urban settlements.
The combined impact of environmental components, especially in ecologically vulnerable areas, such as area of the town of Kardzhali (with mining processing and metallurgical industry) increases the morbidity of the exposed population.
The purpose of this study was to determine the impact of transport noise on human health in the town of Kardzhali the period 2001-2010.
Methods: Analyzed were the data from the monitoring of street noise in the town for the period 2001-2010 and morbidity of the population (0-17 and over 18 years old) from Municipality of Kardzhali in the same period in the main classes of diseases ICD provoked by noise pollution, followed in dynamics.
For statistical processing of data is using nonparametric correlation of Spearman.
Results: Adverse trends in factors influencing the acoustic environment in the town are confirmed by the noise characteristics for the past ten years. They show sustained increasing of noise pollution, and prevailing are rates in the range 68-72 dB (A), at the limit rate of 55-60 dB (A).
The data analysis shows a large significant correlation (• • 0.01) for both age groups between the average level of noise and diseases of the nervous system. Among the adult population with such a correlation are diseases of the ear and mastoid process.
Conclusions: The assessment is a base for implementation of mandatory measures related to the optimization of the acoustic environment to improve the health of the population in the area, exposed parallel and to air pollution.

CONCENTRATION-RISK RELATIONSHIP FOR VOLATILE ORGANIC COMPOUNDS IN INDOOR AIR AND RESPIRATORY HEALTH OF CHILDREN IN LEIPZIG, GERMANY

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Background and Aims: To assess the form of associations between respiratory illness in young children and domestic exposure to volatile organic compounds (VOC) and to apply a novel approach to reduce exposure-misclassification.
Methods: Data were gathered in 2004/2005 from the Life style Immune System Allergy (LISA) birth cohort in Germany, which investigates the influence of life style and environmental factors on the maturation of the immune system and the allergy risk in childhood. The present analysis includes only healthy full-term neonates of German descent living in Leipzig. Selected items from parent-completed questionnaires of the health status of their child in the 4th year of life are combined with VOC measurements collected by passive samplers during a 4-weeks period starting 2 (±1) weeks before the 3rd birthday.
Results: Rumchev et al. (2004) suggested an exponential concentration-risk relationship for the respiratory effects of VOC in children. This relationship is empirically validated in the present study by means of (i) a minimum-criterion approach and (ii) a generalized additive model, accounting for the confounding of gender, educational level, domestic animals, and atopic predisposition. 463 datasets were used for the statistical analysis. Associations between respiratory symptoms and VOC concentrations are significant, but only when the seasonal correction suggested by Schlink et al. (2004) was applied. Especially benzene and chloro-benzene are associated with adverse effects, such as wheezing (OR=1.5 per 1 µg benzene / m³).
Conclusions: Our empirical results confirm the previously postulated exponential concentration-risk relationship and suggest that no thresholds can be observed that might be easily used for the definition of limit values for health protection. An important pre-processing of VOC data measured in Germany, which avoids exposure misclassification, is to adjust for the strong seasonal variation of indoor VOC concentrations. The occurrence of this seasonality, however, depends on the geographical region (Jia et al., 2008).

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PESTICIDE HANDLING AND ASSOCIATED HEALTH RISK AMONG AGROCHEMICAL RETAILERS IN OSUN STATE, NIGERIA

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Background and Aims: In Nigeria, agriculture provides revenue for farmers and field workers. In order to maintain or improve crop yield on both small and large scale farms, agrochemicals are extensively used. The distribution of pesticide for agricultural purposes is mainly through privately owned retailing shops. The aim of the survey was to assess the knowledge, attitude and practice of agrochemical retailers in Osun State, Nigeria with respect to pesticide handling and their associated health risks.
Methods: The study was conducted in retail outlets of agrochemicals in nine towns in Osun state, southwestern Nigeria. A structured questionnaire was used to collect quantitative information from selected agrochemical retailers and supplemented with oral interviews.
Results: Pesticides of different brands comprising organochlorines, organophosphates, carbamates, pyrethroids and fumigants were stocked for sale by the retailers. Personal habits like eating, chewing kolanut and cigarette smoking were observed among the retailers in their shops with Personal Protective Equipments (PPE) not commonly used by them. The various symptoms experienced by some of the retailers include feeling dizzy or dazed (33%), severe headache (26%), feeling weak (23%), nausea (20%) restlessness (20%) among others are all indicators of possible poisoning due to exposure to organophosphate pesticides.
Conclusions: The evidence from this study shows that the retailers were likely to have been exposed to pesticide mainly through inhalation as a result of continuous exposure to these chemicals in the course of running their business. It is suggested that the existing legislation on pesticide registration in Nigeria should be enforced to control the irresponsible marketing strategies by pesticide companies that promote inappropriate purchasing and distribution. Regular training of the retailers on pesticide handling and management by chemical companies should also be emphasized and monitored while regular biological monitoring study to ascertain the exposure level and possible health effects on the retailers are strongly advocated.

Association between particulate air pollution and methylation of transcript variants of mRNA in an elderly cohort: Veterans Administration Normative Aging Study

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Background and Aims: The mechanisms of particle effects are still being elucidated but may include epigenetic changes. We investigated the association between exposure to $PM_{2.5}$ and methylation of transcript variants of mRNA in the elderly, a suspected risk group.
Methods: We examined the relationship between $PM_{2.5}$ and methylation of transcript variants of mRNA in leukocytes in 141 men participating in the NAS study (1999-2007). We selected 1258 transcripts variants of mRNA (out of 24211) that displayed the largest variance across participants. We randomly split our data set in a test set (n=79) and a validation set (n=62). We investigated the intermediate- (24h-mean, 2, 7, and, 30 days moving average (MA_{2days},MA_{7days},MA_{30days})), and long-term (1 year moving average (MA_{1year})) effects of $PM_{2.5}$ adjusting for age, body mass index, smoking, temperature, season, and percentages of neutrophil and lymphocyte in differential blood count.
Results: We found a significant positive association between $PM_{2.5}$ (MA_{7days}) and methylation of ubiquitin-conjugating enzyme E2A (p_{test}=0.017,$p_{validation}$=0.009). This enzyme is required for post-replicative DNA damage repair and plays a role in blood pressure regulation. We observed a significant positive association between $PM_{2.5}$ (MA_{7days}) and methylation of ATP-binding cassette (p_{test}=0.032,$p_{validation}$=0.007).
$PM_{2.5}$(MA_{30days}) was associated with methylation of dual specificity phosphatase 10 (p_{test}=0.010,$p_{validation}$=0.015).
We found a significant negative association between $PM_{2.5}$ (MA_{1year}) and methylation of microsomal triglyceride transfer protein (MTTP) (p_{test}=0.035,$p_{validation}$=0.011). MTTP is a common genetic variation in multiple metabolic pathways which influences susceptibility to low HDL-cholesterol and coronary heart disease. We observed a significant positive association between $PM_{2.5}$ (MA_{1year}) and methylation of immunoglobulin-like and fibronectin type III domain containing 1 (p_{test}=0.0008,$p_{validation}$=0.0313). We obtained a significant positive association between $PM_{2.5}$ (MA_{1year}) and methylation of cerebellin 1 precursor, a cerebellum-specific protein (p_{test}=0.005,$p_{validation}$=0.019).
Conclusions: Our results suggest an association between intermediate- and long-term exposures to particulate air pollution and methylation transcript variants of mRNA.

ARE OBESITY AND OVERWEIGHT CLUSTERED? SPATIAL EXAMINATION OF OLDER WOMEN IN THREE STATES

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Background and Aims: Spatial analyses have been applied to examine relationships between the built environment and obesity. However, few studies have examined this relationship from the aspect of spatial clustering. The purpose of this study was to identify spatial clustering of obesity and overweight/obesity in relation to demographics and the built environment.
Methods: Data for 23,449 Nurses' Health Study participants (mean age = 70.3 ± 6.9 years) in California, Massachusetts, and Pennsylvania were used in this analysis. Binary outcomes were created for obesity (BMI≥30.0) and overweight/obesity (BMI≥25.0). Built environment variables were created for population density, intersection density, and densities of facilities (e.g., restaurants, physical activity facilities). A spatial scan statistic was used to test for spatial clustering (i.e., areas with high or low risk at county level) of obesity and overweight/obesity in unadjusted models and models adjusted for demographic (e.g., age, education) and built environment variables.
Results: Statistically significant ($p<0.05$) spatial clusters of high and low risk of obesity and overweight/obesity were identified in California and Pennsylvania. Of the two high-risk clusters identified in California, participants had a 34-36% greater risk of overweight/obesity, and in the other a 16-17% greater risk. Of the high-risk clusters in Pennsylvania, participants had a 14-16% greater risk of obesity. Of the one low-risk cluster in California, participants had a 25% lower risk of overweight/obesity. Of the two low-risk clusters in Pennsylvania, participants had a 19-20% lower risk of obesity and in the other, a 12% lower risk of overweight/obesity. Adjusting for demographic and built environment variables did not alter the locations of clusters.
Conclusions: Preliminary findings suggest that obesity and overweight/obesity outcomes were spatially clustered and that clusters were not explained by the covariates examined. However, further investigation of neighborhood socioeconomic and built environment variables that might account for clustering needs to be conducted.
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The Beijing HEART Study: The Health Effects of Air Pollution Reductions Trial

CARDIO-RESPIRATORY BIOMARKER RESPONSES OF HEALTHY YOUNG ADULTS TO DRASTIC AIR QUALITY CHANGES

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Background and Aims. Associations between air pollution and cardio-respiratory health have been well established; but direct human data to support biological mechanisms are limited. We investigated biological responses, at the biomarker level, to air quality changes brought by unprecedented control measures implemented during the Beijing Olympic period, compared with before and after periods.
Methods. Biomarkers reflecting multi-pathways hypothesized to underlie adverse cardio-respiratory effects of air pollution were serially obtained in 125 non-smokers. We used mixed-effects models to estimate changes in biomarker levels by period and to examine associations between biomarkers and pollutants, controlling for ambient temperature, RH, sex, and day of week.
Results. We observed 13% to 60% decreases in mean concentrations of particulate and gaseous pollutants in During-Olympic Period compared to Pre-Olympic Period. In Post-Olympic Period, mean concentrations of most pollutants increased to levels similar to or higher than Pre-Olympic levels. Simultaneously we observed significant decreases from Pre-Olympic Period to During-Olympic Period in levels of FeNO (-51%), exhaled breath condensate (EBC) nitrate (-38%), nitrate + nitrite (-26%), and malondialdehyde (-26%), plasma sCD62p (-34%) and sCD40L (-6%), and von Willebrand factor (-13%). The proportions of above-detection values for EBC 8-isoprostane and plasma C-reactive protein were lower in During-Olympic Period than in Pre-Olympic Period. We observed significant increases in levels of many of these from During-Olympic Period to Post-Olympic Period. Moreover we found most biomarkers significantly associated with $PM_{2.5}$ mass and constituents and/or gaseous pollutants measured on the same day and/or 1 to 5 days prior to biomarker measurement. We observed weak associations for a few autonomic tone biomarkers.
Conclusions. In response to drastic air quality changes**,** healthy young adults demonstrated changes in biomarkers of pulmonary and systemic inflammation, oxidative stress, and platelet activation. Our findings provide mechanistic data to support actions to improve air quality and public health.

ABSTRACT - DEMOGRAPHIC DETERMINANTS OF EXPOSURE TO HAZARD IN FOODS IN ISRAEL

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Background and Aims: Effectively addressing exposures to hazardous substances in foods, including pesticides residues and other environmental contaminants, requires accurate information on the diets of individuals, which vary widely. Aggregating consumption data across a population can obscure different patterns of diet and of corresponding dietary risk. Neither the central tendency nor the extreme values of the overall population are likely to be representative for members of the subgroups comprising that population.

In the development of the latest generation of probabilistic dietary exposure assessment models, a need was identified to replace a priori groupings with an analysis of the demographic factors that actually distinguish between dietary consumption patterns.

Methods: Our study population included 3,246 Arabs and Jews, from a representative sample of Israeli adults. An extended set of statistical tools, including innovative data mining tools, allowed characterization of the natural sub populations.

Results: The most important drivers of consumption patterns were not consistent with previously defined subgroups. For example, season was found to be a more important determinant of the amount of fresh (unprocessed) vegetables and fruit eaten than region, nationality (Jews and Arabs), ethnicity, or sex, despite the year-round availability of many, if not most, foods.

Conclusion: A natural binning of population, for exposure to environmental contaminators reveals different binning than traditionally believed. This contributes to a more accurate risk assessment of environmental contaminants in Israel.

Keywords: environmental exposure assessment, dietary patterning, sensitive subpopulations, pesticides, contaminants.

PESTICIDE SALES AND PARKINSON DISEASE IN BRAZIL

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Background and Aims: Pesticide exposure has been implicated in several environmental and health problems, including Parkinson's disease (PD). Pesticide use in Brazil has increased so significantly in the last 2 decades that it is been considered the top consumer of these substances in the world. The present study aimed at evaluating the association between the per capita sales of pesticides in 1996 and hospitalization rates by PD between 1997 and 2007.
Methods: Data on every hospitalization by PD, between 1997 and 2007, among individuals 20 years or older, were retrieved from Brazilian Hospitalization System, and used to estimate PD hospitalization rates in each of the 500 Brazilian micro regions. Spearman correlation coefficients were than calculated between PD hospitalization rates and the per capita sales of pesticides in the same micro regions. Correlation coefficients were calculated according to three age strata (20-49; 50-69; and _ 70 years old), sex, and rural/urban micro region status. In addition, micro regions were grouped based on quintiles of per capita pesticide sales, PD hospitalization rates were calculated for each quintile. Rate ratios (RR) were then calculated using the first quintile as reference.
Results: Correlation between per capita sales of pesticide and PD hospitalization rates for all 500 micro regions was just moderate (20-49: $r=0.336$, $p<0.001$; 50-69: $r=0.418$, $p<0.001$; ≥ 70: $r=0.490$, $p<0.001$). However, when correlation analysis was performed only for the rural micro regions, the magnitude of the coefficients slightly increased (20-49: $r=0.383$, $p<0.001$; 50-69: $r=0.450$, $p<0.001$; ≥ 70: $r=0.540$, $p<0.001$). Finally, it was observed that the higher the per capita sales of pesticides in rural micro regions, the higher the risk to be hospitalized by PD (2nd vs. 1st quintile: RR 1.14; 3rd vs. 1st quintile: RR 3.18; 4th vs. 1st quintile: RR 6.05; and 5th vs. 1st quintile: RR 5.84). Risk estimates were even higher among women, when,
depending on quintile, it was 7 fold higher.
Conclusions: In agreement with recent international evidences, our results suggest that pesticide exposure may increase the risk of PD.

CHANGES IN WOMEN'S WATER USAGE DURING PREGNANCY IN THE BORN-IN-BRADFORD (BIB) COHORT

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Background and Aims: We study the relation between prenatal exposure to chlorination disinfection by-products (DBPs) in tap water and reproductive outcomes, in a prospective cohort of 13,750 women recruited in Bradford between 2007 and 2010.
To assess exposure to tap water, we have developed an exposure metric which combines area-level DBP concentrations modelled over each woman's gestation period, with individual water use information collected via questionnaire at enrolment (second trimester).
Because earlier work demonstrated that individual water usage is the main driver of differences in exposure between individuals in Bradford (due to limited spatial variability), we collected repeat questionnaire data to assess variability in water usage over the course of late pregnancy.

Methods: We mailed out 619 and 617 repeat water use questionnaires, modelled on the baseline questionnaire, in hard-copy to English speaking women between 29-32 ("Q1") and 35-38 ("Q2") weeks pregnant, respectively. This work was approved by the Bradford Research Ethics Committee.

Results: Overall response rate was 26% as of January 2011. Of the total number of Q2 responses received to date (N=66), 85% were repeat responses.
The responses showed that women in their late third trimester of pregnancy (mean= 37.30±1.12 weeks) increased their tap water intake at home compared to women earlier in their third trimester (mean=31.34 ±1.32 weeks).
Overall, women ingested less liquids of any sort (tap water/bottled water/tea/coffee/squash) at work per day, showered more often and for longer, but swam less often and for shorter times as pregnancy progressed.
Full results will be presented.

Conclusions: Little is known about women's water use behaviour in late pregnancy, a critical window of exposure as the rate of foetal growth dramatically accelerates. This study provides new information regarding third trimester water use behaviours, to be incorporated in our epidemiologic models and help minimise exposure misclassification.

Association Between Blood Lead and Walking Speed in the National Health And Nutrition Examination Survey (NHANES)

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Background and Aims: Walking speed is increasingly used as a simple and reliable measure of motor function in older people. Slower walking speed is associated with adverse health effects including falls, disability, admission to hospital and mortality. Lead is a toxicant that has been shown to adversely affect human health, particularly the neurological and vascular systems. We explored the hypothesis that lead can adversely affect the motor system manifesting as slower walking speed.
Methods: We used US National Health and Nutritional Examination Survey (NHANES) cross-sectional data from 1999-2002. The time to walk 20ft (walking speed) was measured among 1,795 men and 1,798 women 50 years of age and older. The association with blood lead concentration (sex-specific quintiles) was assessed with linear regression separately in men and women, adjusting for age, education, ethnicity, alcohol use, smoking status, height and waist circumference.
Results: Mean blood lead was 3.26 (sd=2.79) ug/dl in men and 2.21 (sd=1.86) ug/dl in women. Mean walking speed was 3.27 ft/s (sd=0.76) in men and 3.15 ft/s (sd=0.82) in women. Among women, walking speed decreased steadily with increasing blood lead quintile. Women in the highest quintile of blood lead had a walking speed that was 0.107 ft/s slower (95% CI:-0.008, -0.206) than women in the lowest quintile. Walking speed was 0.032 ft/s slower (95% CI: -0.049,-0.015) per ug/dl of blood lead, the same as 1 year of age in these data. Among men, walking speed increased through quintile 4 of blood lead (0.14 ft/s faster [95% CI: 0.05, 0.24] than those in quintile 1), but quintile 5 was not different from quintile 1.
Conclusions: We found higher blood lead level to be associated with decreased walking speed in women. The pattern in men was less clear. A contribution of healthy-worker effect to the pattern in men cannot be ruled out.

SERUM DIOXIN CONCENTRATIONS AND RISK OF DIABETES IN THE SEVESO WOMEN'S HEALTH STUDY

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Background and Aims: 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (TCDD), a widespread environmental contaminant, is a known endocrine disruptor. Animal evidence suggests TCDD affects glucose transport and increases lipids and blood pressure. Limited epidemiologic studies suggest an association between dioxin and diabetes, but no studies have included women.
On July 10, 1976, as a result of a chemical explosion, residents of Seveso, Italy, experienced the highest levels of TCDD in a human population. In 1996, we initiated the Seveso Women's Health Study (SWHS), a retrospective cohort study of the reproductive health of the women. In 2008, we followed up the SWHS cohort. We examined the relation of TCDD exposure with diabetes over the 32 year follow-up period.
Methods: In 1996, we enrolled 981 women who were 0 to 40 years in 1976, resided in the most contaminated areas, Zones A and B, and had adequate archived sera collected soon after the explosion. For each woman, TCDD concentration was measured in archived serum by high-resolution mass spectrometry. A total of 833 women (85%) participated in the 2008 follow-up study. Diabetes cases were defined by self-report of diagnosis or fasting serum glucose ≥126 mg/dL at follow-up. We examined the relation of serum TCDD with diabetes using the Cox proportional hazards regression model.
Results: In total, 53 (5.4%) cases of diabetes were diagnosed. The geometric mean serum TCDD level for the 53 cases (45.9 ±3.6 ppt, lipid-adjusted) was significantly lower than for non-cases (n=927, 71.2 ±4.2 ppt) (ANOVA for $\log_{10}$TCDD: p = 0.03). The unadjusted hazard ratio for diabetes associated with a ten-fold increase in serum TCDD concentration ($\log_{10}$TCDD) was non-significantly decreased to 0.78 (95% CI 0.47, 1.31).
Conclusions: Preliminary analyses suggest an inverse association between serum TCDD and diabetes in the SWHS. Multivariate results will be presented and interpreted in light of study advantages and limitations.

HOME INDOOR AIR QUALITY EFFECTS ON A COHORT OF NEW SOUTH WALES PRIMARY SCHOOL CHILDREN

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Aim: To determine whether, in children aged 7 to 11 years, the presence and use of an unflued gas heater in the home and the use of gas cookers in the home result in worse respiratory health outcomes.
Methods: Primary school children from 22 schools in colder areas of New South Wales were recruited (n=418). We collected information about use of unflued gas heaters (UFGH) and/or gas for cooking. We recorded FEV_1, peak expiratory flow (PEF), respiratory symptoms and use of bronchodilators twice daily for six weeks at school. Atopic status was assessed by skin prick tests. Analysis was by generalised estimating equations.
Results: The prevalence of reported asthma was 15% and 44 % were atopic. The presence of UFGH was associated with lower FEV_1 measured in the morning (-0.087 L, 95% CI -0.167 to -0.007 L) and in the afternoon (-0.072 L, 95% CI -0.142 to -0.002). The effect of UFGH on daytime cough differed between atopic and non-atopic subjects (P=0.038), with a trend towards a more adverse effect in atopic subjects. However, the effect of UFGH on cough during the day was not significant in either atopic subjects (odds ratio 1.53, 95% CI 0.78 to 3.02) or non-atopic subjects (OR 0.66, 95% CI 0.35 to 1.24). Use of gas for cooking was associated with increased reliever use during the night (OR 3.61, 95% CI 1.34 to 9.77) but the effect on use of reliever during the day differed between atopic and non-atopic subjects (P=0.019) and was more adverse in non-atopic subjects. No significant adverse effects were noted for wheeze or cough during the night.
Conclusions: Exposure to gas appliances in the home has an adverse effect on symptoms and lung function with some evidence that these effects are modified by atopic status.

MATERNAL EXPOSURE TO POLYCHLORINATED BIPHENYLS AND LOW BIRTH WEIGHT AMONG RESIDENTS OF ANNISTON, ALABAMA

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Background and Aims: Previous studies suggested an association between polychlorinated biphenyls (PCBs) and birth weight. We investigated the association between maternal PCBs, preterm birth and low birth weight (<2500 grams) in a population with elevated exposure to PCBs.
Methods: From 2005-2006, the Anniston Community Health Survey collected maternal blood for total PCBs (sum of 35 congeners) and self-reported information on potential sources of PCB exposure including consumption of local fish, livestock and clay by in-person questionnaire. For each child born between 1936 and 2006, women self-reported information on preterm births (yes vs. no) and birth weight. Multiple imputation was used to impute missing values for PCB's, birth weight, and covariates. This resulted in a sample size of 604 mothers and 1477 infants. To take into account the correlation between infants with the same mother we included a random intercept for each mother using generalized estimating equations, specifying a binomial distribution and logit link.
Results: Adjusted for covariates, we did not observe an association between log transformed total PCBs and preterm births, low birth weight, or low birth weight among term infants. However, consumption of local fish was associated with an increased adjusted odds of low birth weight (OR=1.9, 95% CI: 1.2, 3.1) and low birth weight among term infants (OR=2.1, 95% CI: 1.1, 3.9). Consumption of local livestock was associated with an increased adjusted odds of preterm birth (OR= 2.3, 95% CI: 1.4, 3.7), low birth weight (OR= 2.2, 95% CI: 1.3, 3.5), and low birth weight among term infants (OR= 1.8, 95% CI: 0.96, 3.2).
Conclusions: In the Anniston population, maternal consumption of local fish and livestock was associated with infant preterm birth and low birth weight. Questionnaire responses regarding local exposure routes may be a better proxy for historical PCB exposures than current serum concentrations.

ENDOTOXIN EXPOSURE, TLR4 MUTATIONS, SMOKING, AND WORK-RELATED BEHAVIORS: PULMONARY FUNCTION DEFICITS AMONG POTENTIALLY SUSCEPTIBLE SUBGROUPS OF AGRICULTURAL WORKERS IN COLORADO AND NEBRASKA

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Background and Aims: Organic dust inhalation has been associated with adverse respiratory responses among agricultural workers. Susceptibility to the adverse health effects resulting from these agricultural exposures may be related to: constituents of the dust, e.g. endotoxin; intrinsic factors, e.g. genetic traits; and extrinsic factors, e.g. smoking and work-related behaviors.
Methods: This study quantified breathing-zone personal work shift exposures to inhalable dust, endotoxin, and its 3-hydroxy fatty acid (3-OHFA) constituents, and evaluated pulmonary function before and after the work shift among 136 cattle feedlot, dairy, grain elevator, and corn farm workers. General linear models were used to assess the multivariable relationships between dust exposures and lung function (forced vital capacity, FVC; forced expiratory volume in 1 second, FEV_1; and the FEV_1/FVC ratio). Genotyping of SNPs in two polymorphisms in the TLR4 gene (TLR4 299 and 399) was performed.
Results: Geometric mean dust levels were similar among feedlot (1.53mg/m^3; n=59), dairy (1.45mg/m^3; n=15), and farm (1.58mg/m^3; n=9) employees and elevated among grain elevator operators (2.03mg/m^3; n=53). Endotoxin concentrations were similar across all facility types. Increased dust exposure was associated with work shift decrements in FVC and FEV_1. These relationships were stronger among current smokers and those reporting application of pesticides/herbicides at work or home (interactions between dust and smoking and between dust and pesticide use, p• 0.05); however, no evidence of increased susceptibility was observed among those living on a farm. Interactions between dust/endotoxin exposures and genetic mutations were observed ($p<0.05$), although the small number of participants with genetic mutations limits interpretation. Further analyses will identify additional factors that may confer increased susceptibility to the adverse pulmonary effects (cross-shift and pre-shift) of agricultural exposures.
Conclusions: A better understanding of factors leading to increased susceptibility for the development of adverse respiratory outcomes is needed to optimize prevention strategies among agricultural workers.

SELENIUM AND MERCURY OPPOSING INFLUENCES IN FISH-EATING POPULATIONS OF THE BRAZILIAN AMAZON

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Background and Aims: Amazonian riverside communities have the highest reported mercury (Hg) exposure in the world today. Selenium (Se), an essential element, is involved in several body functions through selenoprotein expression. Some studies suggest that selenium (Se) may be protective for Hg toxicity, however, data from animal and human studies are inconsistent and some epidemiological studies show toxic effects of elevated Se, notably hyperinsulinemia, aloplecia and paraesthesia. The objective of the present study was to examine the relations between biomarkers of Se and visual and motor functions, taking into account co-variables and Hg exposure.
Methods: Participants (n = 448, 15-87y), were recruited from 12 communities along the Tapajós River. B-Se, P-Se and blood Hg (B-Hg) were measured by ICP-MS. Interview-administered questionnaires served to collect information on socio-demographics and medical history. All participants underwent a complete visual examination and performed several tests of motor functions.
Results: Se status ranged from normal to high (B-Se median: 228µg/L, range 103-1500µg/L). Few participants reported diabetes (1.1%), and despite high levels of Se in some individuals, no signs and symptoms of Se toxicity were observed. P-Se concentrations were associated with beneficial outcomes: lower prevalence of age-related cataracts, better near visual acuity and motor performance; regression estimates were stronger when adjusting for B-Hg. When stratifying at the median B-Hg concentrations, P-Se consistently presented associations with the outcomes only at high B-Hg concentrations.
Conclusions: In this population with high Hg exposure, Se intake may play a role in offsetting some deleterious effects of Hg, but the beneficial effects of Se may not be present in populations with low Hg exposure, and Se may not offset all Hg-induced toxic effects in fish-eating populations. Further studies should address the risks and benefits of dietary Se in order to better understand the complex Se-Hg interactions in human populations.

ASSESSMENT OF VOLATILE ORGANIC COMPOUNDS IN NEWBORN BABIES' HOMES: AN ENVIRONMENTAL INVESTIGATION IN THE PARIS BIRTH COHORT

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Background and Aims: There is a growing public health concern about indoor air quality. Until now few data on indoor chemical pollutants in dwellings are available, although relations between exposure to indoor chemical air pollutants and respiratory/allergic diseases are suspected. Moreover exposure in the first months of life is determinant because of the infants' vulnerability. The aim of this study was to document airborne volatile organic compounds (VOCs) levels in Paris dwellings.

Methods: An environmental investigation was conducted in homes of a random sample of newborn babies (n=196) from the PARIS *(Pollution and Asthma Risk: an Infant Study)* birth cohort. The VOCs measurements were repeated at 1, 6, 9 and 12 months of age. Air samples were collected in the child's bedroom, over one week using passive devices (Radiello®). Twelve VOCs were identified and quantified by gas chromatography/mass spectrometry. Annual levels defined as average of seasonal levels were calculated for all compounds to assess exposure to VOCs throughout one year.

Results: Aromatic hydrocarbons (benzene, toluene, *m,p*-xylenes, *o*-xylene, 1,2,4-trimethylbenzene, ethylbenzene, and styrene), aliphatic hydrocarbons (decane, undecane), and chlorinated hydrocarbons (trichloroethylene, tetrachloroethylene, and 1,4-dichlorobenzene) were quantified in all dwellings. Toluene was the most abundant compound, its annual median level was 17.2$\mu g/m^3$ (interquartile range-IQR: 12.8-24.6$\mu g/m^3$) followed by aliphatic compounds. Median levels of decane and undecane were 7.6$\mu g/m^3$ (IQR: 4.9-13.9$\mu g/m^3$) and 9.3$\mu g/m^3$ (IQR: 6.4-17.5$\mu g/m^3$) respectively. Trichloroethylene levels were the lowest indoors, its median was 0.7$\mu g/m^3$ (IQR: 0.5-1.0$\mu g/m^3$). The highest range of VOCs values was for chlorinated hydrocarbons. Trichloroethylene, tetrachloroethylene and 1,4-dichlorobenzene levels ranged from 0.25 to 104.7$\mu g/m^3$, 0.6 to 124.2$\mu g/m^3$ and 1.3 to 783.4$\mu g/m^3$ respectively, the highest levels being probably due to specific occupants activities.

Conclusion: This study provides helpful information on chemical contamination in dwellings. Identification of determinants levels will allow the building of predictive models to estimate infant exposure to pollutants.

THE POPULATION-LEVEL ESTIMATE OF THE EFFECT OF PRENATAL EXPOSURE TO TRAFFIC ON PRETERM BIRTH

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Background and Aims: Preterm birth is an important marker of health both in the neonatal period, through childhood and possibly into adulthood. In the U.S., 12-13% of births are preterm (Goldenberg 2008) – a public health problem that costs society at least $26 billion a year (Behrman 2007). Associations between prenatal exposure to traffic and a variety of adverse birth outcomes including preterm birth have been reported (Shah 2011), but a causal relationship has not been established (HEI 2010). The aim of this study is to use causal inference estimators to evaluate the marginal (population-level) effect of traffic density on preterm birth in a cohort of over 300,000 births in four counties in the Central Valley of California during years 2000-2006.
Methods: Preterm birth was defined as less than 37 weeks gestation as reported on the birth certificate. Traffic density was based on distance-decayed annual average daily traffic volumes. Targeted maximum likelihood estimation (TMLE) was applied to estimate the counterfactual probability of preterm birth had everyone been exposed to each quartile of traffic density. In addition, a population intervention model (PIM) was applied to estimate the potential change in preterm birth given a hypothetical intervention in which traffic density in the population was fixed at each quartile.
Results: The estimated probability of preterm birth is 11.9% had everyone been exposed to the highest quartile of traffic density, compared to 10.8% had everyone been exposed to the lowest quartile of traffic density. The PIM showed that if a hypothetical intervention could reduce the entire population's exposure to that of the lowest quartile, the population would have a reduction in preterm birth of 0.45% compared to what is observed.
Conclusion: Semi-parametric causal inference methods applied to these data support findings from previous studies that prenatal exposure to traffic adversely affects birth outcomes.

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COMBINING NEWBORN BLOOD CONCENTRATIONS AND QUESTIONNAIRE DATA TO ESTIMATE INDIVIDUAL CUMULATIVE PRENATAL METHYLMERCURY EXPOSURE AMONG CHILDREN WITH AUTISM, DEVELOPMENTAL DELAY, AND TYPICAL DEVELOPMENT

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Background and Aims: Methylmercury (MeHg) is an environmental contaminant and a known developmental neurotoxicant. Because biomarker and questionnaire data have different limitations as estimates of exposure, there is increased interest in methods that combine these two types of information in order to gain the advantages of both. The aim of this study is to estimate the cumulative gestational dose of MeHg for each individual in our study population using both newborn bloodspots and seafood consumption questionnaire data collected from the Childhood Autism Risks from Genetics and the Environment (CHARGE) study, and to compare the cumulative dose among cases and controls.
Methods: CHARGE is a comprehensive, population-based case-control study with participants sampled from three strata: children with autism, children with developmental delay but not autism, and the general population. We measured total mercury concentrations in newborn bloodspots using inductively coupled plasma mass spectrometry (ICP-MS). To estimate seafood MeHg concentrations and corresponding doses for each study participant, we utilized a regression model based on a discrete one-compartment pharmacokinetic model that assumed a piecewise-constant ingestion rate. Cumulative dose was estimated based on the area under the exposure-time curve over the gestational period. Cumulative exposure was compared among the autism, developmental delay, and typically developing groups using the Kruskal-Wallis test.
Results: The regression-estimated average consumed MeHg fish concentration was 0.045 ppm. Cumulative dose did not differ significantly among the three developmental groups (p=0.97).
Conclusions: Our regression model estimated an average MeHg fish concentration that is consistent with several commonly consumed species in the United States, especially those that are lower in MeHg. Although cumulative exposure may be a more relevant exposure metric than biomarker concentration alone, neither measure was associated with neurodevelopmental outcomes in the CHARGE study.

NEWBORN BLOOD MERCURY CONCENTRATION AND AUTISM RISK

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Background and Aims: Because mercury is a neurotoxin, it has been investigated as a potential cause of autism, but little information is available on the association with prenatal mercury exposures. In this study, we (1) addressed the relationship between maternal third trimester fish consumption (the primary source of methylmercury) and bloodspot mercury concentration, (2) determined if there is an association between bloodspot mercury concentration and the development of autism, and (3) assessed if child's glutathione S-transferase class M1 (GSTM1) genotype modified the relationship between bloodspot mercury concentration and autism risk.
Methods: Childhood Autism Risks from Genetics and the Environment (CHARGE) is a comprehensive, population-based case-control study with participants sampled from three strata: children with autism, children with developmental delay but not autism, and the general population. We measured total mercury concentrations in newborn bloodspots (representing prenatal exposures) using inductively coupled plasma mass spectrometry (ICP-MS). To predict bloodspot mercury concentration, we fit linear regression models with maternal fish consumption. Multiple logistic regression models were fit to assess the association between bloodspot mercury concentration and developmental outcome (autism versus typical development), adjusting for potential confounders, and assessing for effect modification by the inclusion of a product term between bloodspot mercury concentration and GSTM1 genotype.
Results: Maternal third trimester fish consumption significantly predicted bloodspot mercury concentration. With regard to developmental outcome (autism vs. typical development), the OR for a one unit natural log increase in bloodspot mercury concentration was 0.79 (0.50, 1.23). In the GSTM1 active and null strata, ORs for developmental outcome for a natural log increase in blood mercury concentration were 0.94 (0.53, 1.68) and 0.77 (0.45, 1.32), respectively.
Conclusions: We did not find a significant association between bloodspot mercury concentration and autism risk. Mercury concentration did not increase autism risk in GSTM1 active or null subgroups. Investigation into other potentially genetically vulnerable subgroups is warranted.

IMPACT OF CLIMATE CHANGE ON OZONE INDUCED MORTALITY IN EUROPE

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Background and Aims: Ozone is a highly oxidative pollutant, associated with respiratory morbidity and mortality. All else (e.g. ozone precursors) being equal, ground-level ozone will increase as temperatures increase with climate change. As a part of the Climate-TRAP project we used CO_2 emission scenarios, models and epidemiological data to assess ozone-related health impacts under a changing climate.
Methods: European ozone concentrations were modelled at a grid size of 50x50 km using MATCH-RCA_3. Projections from two climate models, $ECHAM_4$ and HADLEY, were used, assuming greenhouse gas emission scenarios A2 and A1B, respectively. With $ECHAM_4$ (A2) two periods were compared: the baseline period as 1961–1990 and future as 2021–2050. With HADLEY (A1B) two additional periods were included: the current situation as 1990–2009 and further future as 2041–2060. The impact on mortality (short-term effect) was calculated for exposures above a daily maximum 8-hour concentrations of 70 μgm^{-3}. We used a European-wide exposure-response function with country-specific baseline mortality.
Results: Comparing the current situation with the baseline period (HADLEY (A1B)), the largest increase in ozone-associated mortality due to climate change (~4%) occurred in Belgium, Ireland, Netherlands and UK. Comparing the baseline period and the future, the increase is projected to be biggest in Belgium, France, Spain and Portugal (10–14%) and the effect will be stronger for the A2 scenario (using $ECHAM_4$). However, in Nordic and Baltic countries the scenarios suggest a decrease in ozone-related mortality of the same magnitude. Furthermore, there were regional differences in climate change projections, depending which of the climate models ($ECHAM_4$ or HADLEY) were implemented. Also interactions between temperature and air pollution may need to be included.
Conclusions: The current study suggests that projected effects of climate change on ozone levels could differentially influence mortality and morbidity across Europe.

MAPPING HUMAN HEALTH VULNERABILITY TO CLIMATE CHANGE IN MEXICO

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Background and Aims: Mexico is particularly vulnerable to climate change and climate variability due to its geographical location topography, hydrology and other factors like urbanization, deforestation and relative growth of poverty. For this reason we are building a human health vulnerability atlas, in order to assisting decision-makers in identifying risk, and planning and mapping a future, which would be more resilient to the changing climatic conditions in México.
Methods: The first stage of the analysis was to obtain baseline data of climatic variables (1970-1999) and epidemiological data from acute diarrheal disease (ADD) and dengue (1998-2005). Secondly we generated a regionalized climate change projections for Mexico, from the downscaling of the results of General Circulation Models (GCMs): HadCM3, GFDL and ECHam4, and the A2 scenario. Finally we projected the incidence of ADD and dengue in 2030, including information of precipitation, temperature and human vulnerability.
Results: Our study predicts that in 2030 the states of Veracruz, Tabasco and Chiapas will have high risk to ADD and almost all costal states will have high risk to dengue. There will be an increase in 2030´s rate ratios from the month of June and September for ADD and dengue, respectively.
Conclusions: The preliminary results indicate that in 2030 there will be an excess for ADD and dengue cases attributable to climate change. Climate change will add to the burdens of those who are already poor and vulnerable.The results of the analysis are thus indicative only. Even so, they are useful for several purposes.

RISK ASSESSMENT OF EXPOSURE BY $PM_{2,5}$ FROM THE BIOMASS BURNING IN CHILDREN OF BRAZILIAN AMAZON: ESTIMATIVE OF POTENTIAL DOSE AND RISK TOXICOLOGY

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Background and Aims: Exposure to fine fractions of particulate matter ($PM_{2,5}$) was associated with increased hospital admissions for respiratory disease and cardiovascular disease in children and elderly (Pope III and Dockery 2006; Gouveia et al 2006). This study aims to estimate the toxicological risk of $PM_{2,5}$ from the burning biomass in children between 6 to 14 years of age in Tangará da Serra, a municipality of Subequatorial Brazilian Amazon.
Methods: Study of Risk Assessment of $PM_{2.5}$ by estimated the potential dose and risk quotient in two scenarios of exposure according to local seasonality. The exposure scenarios were defined using the average of concentrations $PM_{2,5}$ during the dry and rainy season. The potential dose of $PM_{2,5}$ was estimated using Monte Carlo simulation, according age, gender, asthma and Body Mass Index (BMI).
Results: The children incorporated a potential average dose of $PM_{2.5}$ of 2.05 µg/kg.dia (CI 95%: 1.91-2.18) in dry season and 0.32 µg/kg.dia (CI 95%: 0.31-0.34) in the rain scenario. During dry season, children and adolescents showed toxicological risk to $PM_{2.5}$ of 2.41 (CI 95%: 2.25-2.57). In the rain scenario, the exposure to $PM_{2.5}$ not configured toxicological risk (RQ=0.54; CI 95%: 0.52-0.56).
Conclusions: Children and adolescents living in the Subequatorial Brazilian Amazon region were exposed to higher potential average doses of $PM_{2.5}$, resulting in toxicological risk for this pollutant.
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THE ASSOCIATION OF BODY SHAPE, COMPUTER-USING TIME AND PHYSICAL ACTIVITY AMONG COLLEGE STUDENTS IN TAIWAN

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Background and Aims: The utilization of computer and internet has become widespread among college students in Taiwan. Previous articles found that the degree of internet addiction of male college students had a significant negative correlation with the physical activity mass. The purpose of this study was to explore the computer-using time and physical activity of college students, and to determine whether gender and body shape were associated with computer-using time and physical activity among college students in Taiwan.
Methods: A cross sectional survey was conducted and the subjects were chosen from one college in central Taiwan by cluster sampling. The instrument to evaluate the physical activity in this study was Bouchard's 3-day Physical Activity Log. An anonymous closed end self-report questionnaire was designed and the data collected from the questionnaire was analyzed with statistical methods.
Results: 260 male and 830 female students with mean age of 19.29±1.02 years were investigated. The mean BMI was 20.91±3.21 and the mean calorie expenditure was 2334±722 Kcal for weekday and 2315±758 Kcal for weekend. The percentage for overweight was 11.9% of male and 6.7% of female students, and obesity rate was 11.5% of boys and 3.4% of girls, in the meantime the weekday and weekend computer-using time of boys(149 and 197 minutes per day) were higher than girls(113 and 141 minutes per day). The findings indicated that the weekday computer-using time of students with obesity were higher than students with underweight and the weekend computer-using time of students with overweight were higher than students with underweight.
Conclusions: The findings of this research showed that the less time students spent in computer, the more physical active they were. The study may be important in providing health educator with a better understanding of how to promote college students to be more physical active in campus.
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RESULTS FROM THE CHAMACOS STUDY OF CHILDREN'S ENVIRONMENTAL HEALTH

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Background and Aims: Organophosphate (OP) pesticides are acute neurotoxicants. In the US, they are widely used in agriculture. We present the associations of OP exposure during pregnancy and neurodevelopment of children in the CHAMACOS study, a longitudinal birth cohort study of primarily Latino farmworker families living in California.

Methods: We enrolled 601 pregnant women during pregnancy and conducted neurodevelopmental assessments of their children at 1 and 6 months and 1, 2, 3.5, 5, 7, and 9 years. The children are currently undergoing the 10.5 year assessment. OP pesticide exposure in the mother during pregnancy and of the children were assessed by measures of urinary dialkyl phosphate metabolites (DAPs). We also examined the association and effect modification of PON1 genotype and phenotype.

Results: We found that DAP metabolites of the mother during pregnancy are related to abnormal reflexes in the neonate on the Brazelton Scale, lower mental development on the Bayley Scales and pervasive developmental disorder as reported by their mother at age 2, and lower verbal abilities at 3.5 and 5 years. When the children reached school age, we reported an association between maternal DAPs and poorer attention as reported by the mother and as measured on a continuous performance test. In addition, by age 7 years, we found that there is a significant negative relation between all subscales of the WISC IQ and maternal DAP levels but not child levels. We will also present on results with autonomic nervous system reactivity and with PON1 genotype and phenotype.

Conclusions: We have found significant associations between OP exposure as measured by DAPs and child neurobehavioral development in a population living in an agricultural community. Maternal urinary DAP concentrations were higher, but nonetheless within the range of levels measured in the general U.S. population.

TITTLE DEVELOPING MODLES OF RESIDENTIAL AND PARA-OCCUPATIONAL EXPOSURE TO PESTICIDES FOR AGRICULTURAL FAMILIES

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Background and Aims: CAREX Canada is a national occupational and environmental surveillance project estimating the number of Canadian exposed to carcinogens. Agricultural pesticide estimates are being developing to calculate cancer risks across the country. To facilitate these risk assessments, we examined the state of the literature on residential and para-occupational exposure and its implications for pesticide risk assessment.
Methods: A search was undertaken in the published literature for data on exposures in farm homes as well for spouses and children of farmers and farmworkers, including exposure assessments and epidemiologic studies. Papers were limited to research from North America. Environmental and biological sampling and epidemiological data from these studies (n=42) were critically examined and catalogued in a matrix.
Results: Para-occupational and residential pesticide exposures are clearly documented in North America. The studies showed increased exposures for farm children compared to non-farm children. A smaller increase was seen in some studies of farm spouses. Major sources of exposure included workers' boots, clothes and vehicles. Children who were present during spraying showed even higher levels of exposure. Proximity of the home to spraying locations explained some, but not all, of the home exposure reported. Epidemiologic studies showed higher rates and risks of cancer and decreased neurobehavioral performance in children whose parents had occupational exposure to pesticides.

We propose the need for a stratified farm community risk assessment model, with low (farm spouse), medium (children not present for spraying) and high (children present for spraying) exposure categories.
Conclusions: (Arial, 8pt, bold) text (Arial, 8pt) dummy text, dummy text, dummy text, text, dummy text, dummy text, dummy text, dummy text, text, dummy text, dummy text, text, dummy text, dummy text, text, dummy text, dummy text, text, dummy text, dummy text, text, dummy text, dummy text, text, dummy text, dummy text, text, dummy text, dummy text, text, dummy text, dummy text, text.
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THE EFFECTS OF A SEXUAL HEALTH LIFE-SKILL TEACHING PROGRAM ON SEXUAL HEALTH KNOWLEDGE, ATTITUDE AND BEHAVIOR INTENTION OF THE ADOLESCENTS IN TAIWAN

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Background and Aims: The purpose of this study is to investigate the effects of life-skills teaching program in sexual health education on the seventh grade students' sexual health knowledge, attitude, and behavior intension in a high school in Taiwan.
Methods: A quasi-experimental research method was used in this study. In total, 133 students in a junior high school in Central Taiwan were recruited by purposive sampling. The subjects were divided into the experimental group (n=69) and control group (n=64). The students in the experimental group received five units of teaching courses for ten hours while the students in the control group did not. A self-administered structured questionnaire was designed to serve as the pre-test and post-test instrument. The questionnaire consists of scales of knowledge (r = 0.70), attitude (Cronbach's α = 0.84), and behavioral intention (Cronbach's α = 0.87). All the participants took the pretest one week before the intervention and the posttest one week after the intervention, and the post posttest was conducted eight weeks after the intervention.
Results: One week after the intervention, the sexual health knowledge, attitude, and behavior intention of the experimental group showed instantly significant improvement. Eight weeks after the intervention, the sexual health knowledge and attitude of the experimental group continued to make progress, while the sustainability of the sexual health behavior intention was not significant.
Conclusions: The results indicated that the sexual health life-skills teaching program had positive effects on adolescents. The results of this study shall serve as a reference for the school health educators to implement the sexual heath education program.
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AIR POLLUTION IN THE BRAZILIAN AMAZON AND SEX SECONDARY RATIO

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Background and Aim: Air pollution has been related to changes in the sex ratio in industrial areas. The aim of this study is to analyze the correlation between secondary sex ratio, and exposure to fine particulate matter from biomass burning in the Brazilian Amazon.
Methods: Ecological study of the correlation between the indicators: annual hours (AH%) of fine particulate matter ($PM_{2,5}$) and secondary sex ratio (SSR) in the Brazilian Amazon region in 2004 and 2005. The database for the exposure indicator, i.e. the percentage of annual hours of $PM_{2.5}$ above the thresholds of 25• g/m^3, 50• g/m^3 e 80• g/m^3, representative of the air pollution levels of concentration of were produced by the Weather Forecasting and Climatic Study Center of the Brazilian Space Research Institute (CPTEC/INPE). To calculate the indicator of RSS we used the database of the Information System of Birth (SINASC) for all municipalities in the Brazilian Amazon.
Results: The states of Rondonia and Mato Grosso presented the highest levels of particulate matter during the study period. The Spearman correlation of every cut-off points for AH% was not statistical significant with the RSS. The averages of RSS were 1.08 and 1.07 in 2004 and 2005 respectively that represents 8 to 7% more males than females. Conclusion: The secondary sex ratios were not related to the levels of pollutants from biomass burning in the Brazilian Amazon during 2004 and 2005.
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COMPARING DIFFERENT EXPOSURE MEASURES OF TRAFFIC-RELATED POLLUTION: A STUDY OF TERM LOW BIRTH WEIGHT IN LOS ANGELES COUNTY, CALIFORNIA

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Background and Aims: Few birth outcomes studies have examined associations with air toxics in traffic exhaust, such as benzene, toluene, ethyl benzene, and xylene (BTEX). Additionally, land use-based regression (LUR) provides estimates of small area variation in air pollution and contributes to an understanding of the spatial distribution of traffic-related air pollution. We compare effect estimates for term low birth weight (LBW) based on LUR-modeled estimates, and criteria pollutant and air toxics data.

Methods: We included births from 1/1/1995-12/31/2006 to women residing within 5 miles of a California Air Resources Board air toxics monitoring station in Los Angeles County, California. LUR-modeled estimates of NO, NO_2 and NO_x based on >200 field measurements were seasonalized using monitoring station data, and extracted for geocoded residential addresses. We examined associations with term LBW (≤37 weeks completed gestation and <2500g birth weight) using logistic regression adjusted for maternal age, race/ethnicity, education, parity, and infant gestational age and gestational age squared.

Results: We analyzed 8,181 term LBW cases and 370,922 term normal-weight non-cases. For LUR-estimated and air toxics exposures, the strongest associations were seen for the third trimester, the entire pregnancy, and the last pregnancy month averages. Adjusted odds ratios (ORs) for a 10ppb increase in NO, NO_2 and NO_x, respectively, were 1.02 (95%CI=1.01, 1.03), 1.05 (95%CI=1.02, 1.08), and 1.01 (95%CI=1.00, 1.02) for third trimester seasonalized LUR-estimated exposures, and 1.06 (95%CI=1.03, 1.09), 1.12 (95%CI=1.05, 1.19), and 1.04 (95%CI=1.02, 1.07) for unseasonalized LUR estimates. Third trimester BTEX exposures were associated with term LBW when stratifying by closest monitoring station, for women living within 5 miles of north Long Beach, Burbank, and downtown LA stations.

Conclusions: Using spatial contrasts (e.g. unseasonalized LUR estimates) and temporal contrasts (e.g. monitoring station estimates, stratified by station), we provide additional evidence that traffic-related air pollution increases the risk of term LBW.

ESTIMATING THE EFFECT OF RAINFALL AND INDICATOR BACTERIA IN AN EPIDEMIOLOGICAL STUDY

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Background and Aims: Climate change scenarios point to the fact that Sweden will be affected by more extreme temperatures and more extreme precipitation. This may indicate that water treatment plants will face larger risks since more pathogens are expected to enter the raw water system. Göta River, running in the south-west of Sweden, is a fresh water supply to the population of Gothenburg. Turbidity and indicator bacteria are frequently studied to decide if the water is appropriate to produce drinking water. Our first objective is to study the potential associations between rainfall, turbidity and indicator bacteria and assess if effects are delayed in time, in order to subsequently conduct time series analysis on acute gastrointestinal (AGI) illnesses in the population.
Method: We have used a distributed lags non-linear (DLNM) regression model, which describes simultaneously the relationship along the space and the lag dimension of the predictor. We have daily mean values from online turbidity measures which were accessible between 2001 and 2010. 3 various types of indicator bacteria are sampled 2-4 times a week in raw water and available data were accessed between 2004 and 2010. Data of daily precipitation were accessible 30 kilometers upstream (2001-2010).
Results: When controlling for time trends and seasonal patterns, autoregressive Gaussian models shows significant effects of rainfall on both turbidity and indicator bacteria. Turbidity is predicted to increase with factor 1.15 (1.4) at 20mm (50mm) rain and significant effects are visible at lag 1- 4 while peaks at lag 2. Coliform bacteria increase with factor 2.4 (95% CI: 2.0, 2.6) at 20 mm of rain at lag 2.
Conclusion: Results confirm that precipitation is a good predictor to both turbidity and indicator bacteria in Göta River and will be used in the next phase where AGI will be studied.

CONCENTRATIONS OF POLYFLUOROALKYL CHEMICALS DURING GESTATION AND SERUM LIPIDS AT AGE 7 IN GIRLS ENROLLED IN THE AVON LONGITUDINAL STUDY OF PARENTS AND CHILDREN

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Background and aims: Polyfluoroalkyl chemicals (PFCs) are commercially synthesized chemicals used in consumer products. Exposure to PFCs is widespread and some PFCs may disrupt signaling processes involved in the control of lipid metabolism. We explored associations of maternal concentrations of perfluorooctane sulfonate (PFOS), perfluorooctanoate (PFOA), and perfluorohexane sulfonate (PFHxS) during gestation with serum lipid concentrations at age 7 in girls.
Methods: Analyses were conducted on a sample of 227 singleton girls and their mothers participating in the Avon Longitudinal Study of Parents and Children. PFC concentrations were measured in serum samples obtained from the mothers at pregnancy. Cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL) and triglycerides were measured in serum samples obtained from the girls at age 7. Linear regression models were used to estimate the average change in lipids levels for each 1-unit increase in the natural logarithm (Ln) of the PFCs after adjustment for covariates.
Results: PFOS (median 19.8 ng/mL), PFOA (median 3.7 ng/mL), and PFHxS (median 1.6 ng/mL) were detected in 100% of samples. A 1-Ln unit increase in PFOS was associated with a 9 mg/dL (95% confidence interval [CI]: 1,18) increase in cholesterol concentrations and with a similar increase in LDL concentrations (9 mg/dL; 95% CI: 2,16) in girls. A 1-Ln unit increase in PFOA was associated with a 9 mg/dL (CI: 3,16) increase in LDL concentrations. PFOS and PFOA concentrations were not associated with HDL or Triglycerides. PFHXS concentrations were not associated with any of the outcomes.
Conclusions: Gestational exposures to PFOS and PFOA may have a persistent influence in lipid metabolism during childhood.

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TRANSIENT EXPOSURE TO VEHICLE EXHAUST PLUMES INSIDE NEW DELHI AUTO-RICKSHAWS

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Background and Aims: Air pollution exposures in roadway microenvironments are of concern in part because of the large number of people exposed, high concentrations, and close proximity between people and vehicle emissions. Few studies have investigated the characteristics of short-duration exposure to vehicle exhaust on roadways. We use data from New Delhi to explore the nature of transient on-roadway exposures to high pollutant concentrations.
Methods: We measured real-time (1 Hz) exposure to fine particle (PM2.5) and black carbon (BC) mass and ultrafine particle number (PN) concentrations inside auto-rickshaws, a common type of unenclosed vehicle in India. The dataset consists of 180 h of driving during 62 trips along a single route in New Delhi; we investigate here transient (~ 15 – 60 s) concentration variations. To quantify the contribution of these peak exposure events to cumulative on-roadway exposure, we use a moving window function to mathematically separate distinct spikes from the baseline on-roadway concentration.
Results: Peak instantaneous exposures contribute substantially to total on-road exposure. For the median trip, incremental exposure attributable to transient concentration spikes accounted for 16%, 41%, and 50%, respectively, of trip-integrated PM2.5, BC, and PN exposures. After subtracting simultaneously measured urban background concentrations, transient spikes accounted for ~50% of on-roadway PM2.5 exposure and ~60% of on-roadway BC and PN exposure.
Conclusions: For the dataset under consideration, transient exposures to poorly diluted vehicle exhaust plumes constitute an important fraction of the total on-roadway air pollution exposure. The health effects of such short duration (< 1 min) exposures to peak levels of vehicle air pollution are poorly understood. However, the possibility for nonlinearity in dose-response relationships suggests that this aspect of on-roadway exposure may merit further attention.

EFFECTS OF TRAFFIC-RELATED AIR POLLUTION ON THE BRAIN IN THE CARDIOVASCULAR HEALTH STUDY

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Background and Aims: Compelling evidence links air pollution to cardiovascular disease. Although the brain is susceptible to pathways mediating these adverse effects, comparatively little is known about the influence of air pollutant exposure on brain health. We will examine traffic-related air pollution effects on risk of dementia and MRI-detected brain abnormalities in the Cardiovascular Health Study (CHS), a large, longitudinal study of coronary heart disease and stroke in older adults, the age-group at greatest risk for dementia.
Methods: The proposed study will include approximately 3,600 men and women aged 65 years and older, living in 4 geographically-diverse communities who were recruited into the CHS between 1989-93 and who participated in annual clinical exams through 1999. Air pollution exposure will be characterized using 1) already-calculated monthly individual estimates of NO_2, CO, O_3, SO_2, and PM_{10} exposure and 2) residential roadway proximity. Dementia was classified by neurologist/psychologist committee review. Brain infarcts and white matter changes, both of which are associated with elevated risk of cognitive decline and stroke, were measured twice by cerebral MRI. The impact of air pollution on risk of dementia and MRI findings will be evaluated in adjusted Cox proportional hazards and logistic regression models.
Results: 227 participants were classified as having prevalent dementia at study entry, and 480 incident cases were identified during follow-up. Over 30% of subjects had a brain infarct on first scan, and, of the subjects without an infarct at the initial scan who had a second scan, nearly 20% developed an infarct. Approximately 30% of participants who completed both scans experienced worsening white matter grade.
Conclusions: The proposed work is a highly novel, targeted study that takes advantage of an extraordinary resource in the CHS. This study has the potential to provide important knowledge regarding the impact of air pollution on the brain.

RAINFALL AND EMERGENCY DEPARTMENT VISITS FOR ACUTE GASTROINTESTINAL ILLNESS IN NORTH CAROLINA, 2006-2008

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Background & Aims: Climate models suggest the frequency of extreme rainfall events will continue to rise in coming decades. We aim to investigate the temporal relationship between daily variability of rainfall and acute gastrointestinal illness (AGI) in North Carolina (NC).
Methods: County-level rainfall and emergency department (ED) visits data were obtained from the NC Climate Retrieval and Observation Network of the Southeast and NC Disease Event Tracking and Epidemiologic Collection Tool databases, respectively. We examined associations between daily average rainfall (mm) and daily counts of ED visits for AGI at the county-level in NC between Jan. 1, 2006 and Dec. 31, 2008, controlling for time trends, seasonal patterns, and region. Using Poisson models, rates for AGI per unit change in rainfall (mm) were calculated for lags of 0-15 d. Age and water source were examined as potential modifiers.
Results: Statewide, the crude rate of AGI was 511 per 100,000 person-years (pyr) with variability by season (winter: 619/100,000 pyr; summer: 408/100,000 pyr), age (infants ≤1 yr: 2,814/100,000 pyr; children 10-14 yr: 240/100,000 pyr), sex (females: 583/100,000 pyr; males: 436/100,000 pyr), and region (Piedmont: 646/100,000 pyr; Coastal Plain: 385/100,000 pyr). A 25-mm (~1 inch) increase in daily average rainfall at a lag of 5 d was associated with 13.99 additional AGI ED visits per 100,000 pyr (95% CI = 13.95-14.02), with a higher rate among seniors (≥65 yr) (rate = 44.77; 95% CI = 44.68-44.86) and counties with >75% surface water source (rate = 19.16; 95% CI = 19.12, 19.19).
Conclusions: The observed temporal lag (5 d) between daily rainfall and AGI is consistent with waterborne transmission. (This abstract does not necessarily reflect EPA policy. The NC Public Health Data Group and NC DETECT do not take responsibility for the scientific validity or accuracy of methodology, results, statistical analyses, or conclusions presented.)

AIR POLLUTION, MALODOR, AND HEALTH IN A COMMUNITY BORDERING A LANDFILL

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Background and Aims: Municipal solid waste landfills are sources of air pollution that may affect the health and quality of life of neighboring communities. We aim to investigate health and quality of life concerns of neighbors related to landfill air pollution.
Methods: Landfill neighbors were enrolled and kept twice-daily diaries for 14 days about odor intensity, alteration of daily activities, mood states, and irritant and other physical symptoms between Jan–Nov, 2009. Concurrently, hydrogen sulfide (H_2S) air measurements were recorded every 15-min. Relationships between H_2S, odor, and health outcomes were evaluated using conditional fixed effects regression models.
Results: Twenty-three participants enrolled and completed 878 twice-daily diary entries. H_2S measurements were recorded over a period of 80 d and 1-hr average H_2S = 0.22 ppb (SD = 0.27; range = 0–2.30 ppb). Landfill odor increased 0.67 points (on 5-point Likert-type scale) for every 1 ppb increase in hourly average H_2S when the wind was blowing from the landfill towards the community (standard error (SE) = 0.19; t-value = 3.49). Odor was strongly associated with reports of alteration of daily activities (odds ratio (OR) = 9.0; 95% confidence interval (CI) = 3.5, 23.5), negative mood states (OR = 5.2; 95% CI = 2.8, 9.6), mucosal irritation (OR = 3.7; 95% CI = 2.0, 7.1) and upper respiratory symptoms (OR = 3.9; 95% CI = 2.2, 7.0), but not positive mood states (OR = 0.6; 95% CI = 0.2, 1.5) and gastrointestinal (GI) symptoms (OR = 1.0; 95% CI = 0.4, 2.6)).
Conclusions: Results suggest air pollutants from a regional landfill negatively impact the health and quality of life of neighbors.

WHEN POLLUTION GETS PERSONAL: DEVELOPING PROTOCOLS FOR BIOMONITORING RESULTS COMMUNICATION WITH INPUT FROM STUDY PARTICIPANTS

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Background: Advances in biomonitoring methods have enabled environmental health scientists to measure ever-lower concentrations of environmental contaminants in human blood, urine, breast milk, and other tissues. Yet our ability to detect chemicals in humans has rapidly outpaced our capacity to interpret what personal exposure results mean for health effects, sources or toxicity. This situation raises ethical and scientific challenges related to reporting biomonitoring results to individual study participants and their communities. California's Biomonitoring Program is required by law to provide individual chemical exposure results to those participants who want them.
Methods: We developed individual report-back materials that are scalable to a statewide biomonitoring program involving participants from diverse cultural backgrounds and literacy and numeracy levels. We recruited study participants from the Chemicals in Our Bodies Project, a biomonitoring study conducted by UC Berkeley, UCSF and Biomonitoring California, which is testing for chemicals in pregnant mothers and their newborn babies. Upon recruitment, study participants were asked to participate in usability testing of prototype report-back materials that assessed whether and how messages about chemical exposures and scientific uncertainty regarding health effects and sources are understood and interpreted.
Results: Participants valued getting their personal biomonitoring results and were able to identify their exposure levels from the text and graphs provided in the prototype materials. Participants understood the scientific uncertainty regarding the implications of exposures for health effects. Key challenges were distilling results from the large number of chemical analytes tested and communicating the meaning of reference levels.
Conclusion: Although medical ethics have favored reporting only clinically significant biomonitoring results, public policy and community concern regarding the ubiquity of chemical exposures is beginning to broaden the ethical focus toward participants' right-to-know. This shift will necessitate more research on developing effective report-back protocols that are accessible and transparent to linguistically and culturally diverse groups.

WATER AND SANITATION INFRASTRUCTURE FAILURES AND THE MICROBIOLOGICAL AND CHEMICAL SAFETY OF WATER IN A COMMUNITY BORDERING A REGIONAL LANDFILL

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Background and Aims: A historically Black community straddles unincorporated boundaries of two municipalities in Orange County, North Carolina and predates a regional landfill sited along its border. Community members and university partners aimed to investigate long-standing concerns about the microbial and chemical safety of drinking and surface water quality in the community.
Methods: Households in the community were surveyed to collect information about structural signs of well vulnerability (well pump failure; problems with cloudiness, taste, odor; history of well disinfection) and septic system failure (pumping septic tank ≥1 per year; a wet yard due to drain-field during non-rainfall periods), and drinking and surface water samples were collected, geo-coded, and analyzed for parameters of microbial and chemical water quality. Relationships between distance to the landfill and concentrations of water quality parameters were evaluated using conditional fixed effects land-use regression models, adjusted for total rainfall in the previous 24 hours.
Results: Of 73 households identified in the community, 27 responded to the survey, and 20 provided drinking water samples. Households reported pervasive signs of well vulnerability (100%) and septic system failure (68%). The microbiological safety of well water was poor compared to public drinking water supplies. Wells exceeded microbiological standards protecting health, whereas public water supplies did not. The presence of volatile organic compounds and heavy metals was also detected in well water supplies. Each 100-meter unit increase in distance from the landfill was associated with a 334 MPN/100 ml decrease in average enterococci concentrations in surface water (95% confidence interval (CI) = -710, 41).
Conclusions: Pervasive private household water and sanitation infrastructure failures were identified, suggesting a need for improved water and sanitation services in this predominantly Black community bordering a regional landfill.

RESIDENTIAL EXPOSURE TO PARTICULATE MATTER AND MONOCLONAL GAMMOPATHY OF UNDETERMINED SIGNIFICANCE

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on behalf of the Heinz Nixdorf Recall Investigative Group.

Background and Aims: Monoclonal gammopathy of undetermined significance (MGUS) is a precursor condition leading to hematological malignancies. An association of MGUS with inflammatory disorders was reported. As particulate matter (PM) can induce chronic inflammation, we asked whether there is an association of PM exposure and MGUS.
Methods: We screened baseline and 5-year follow-up serum samples of the Heinz Nixdorf Recall Study, an ongoing cohort study of 4,814 participants aged 45-75 years in Germany. Serum electrophoresis and immunofixation (Hydragel 12 IF, Penta-Kit, Sebia, Fulda, Germany) was used to detect MGUS. The individual one-year average $PM_{2.5}$ and PM_{10} exposure prior to baseline was assessed using a dispersion and chemistry transport model (EURAD). We calculated distance from participants' home addresses to highly trafficked roads. PM values were categorized in quartiles. Poisson regression was used to model incident MGUS adjusting for sex and age. Logistic regression was used to calculate odds ratios (OR) for prevalent MGUS at follow-up adjusted for distance, age, sex, BMI, education, smoking status, and physical activity.
Results: At baseline 165 MGUS cases were identified among 4,702 screened participants (prevalence 3.5%, 95%-CI 3.0-4.1). Among 3,862 participants free of disease at baseline, 50 (1.3%) new MGUS were identified. Median one-year $PM_{2.5}$ and PM_{10} concentrations were 16.6µg/m³ (IQR 2.4) and 20.7µg/m³ (IQR 4.0), respectively. Age- and sex-adjusted relative risk of incident MGUS in increasing quartiles of $PM_{2.5}$ exposure was 2.78 (95%-CI 1.09-7.11), 1.58 (0.56-4.44), and 3.33 (1.33-8.34), respectively. Fully adjusted ORs for prevalence of MGUS at follow-up in increasing quartiles of $PM_{2.5}$ were 1.02 (0.65-1.62), 0.98 (0.62-1.56), and 1.54 (1.02-2.34). Effect estimates for PM_{10} showed a positive trend.
Conclusions:
We provide first data suggesting that residential exposure to particulate matter may increase risk of MGUS and thus linking chronic particle exposure with cells of the adaptive immune system.

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LONG-TERM EXPOSURE TO TRAFFIC NOISE AND TRAFFIC-RELATED AIR POLLUTION AND CORONARY HEART DISEASE MORTALITY

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Background and Aims: In metropolitan areas, road traffic is a major contributor to ambient air pollution, and also the dominant source of environmental noise. Therefore, observed associations between air pollution and adverse cardiovascular outcomes may be confounded by coexistent traffic noise or vice versa. This population-based cohort study investigated the independent and joint effects of traffic noise and traffic-related air pollution on coronary heart disease (CHD) mortality.
Methods: This study included a 5-year exposure period and a 4-year follow-up period. All residents aged 45-85 years who resided in Metropolitan Vancouver during the exposure period and without known CHD at baseline were included (n = 445,795). Individual exposures to traffic noise and traffic-related air pollutants including black carbon, $PM_{2.5}$, NO_2, and NO were estimated at subjects' residences using a noise prediction model (Cadna A) and land use regression models, respectively. CHD deaths during the follow-up period were identified from the provincial death registration database.
Results: Traffic noise level was moderately correlated with black carbon (0.44), but weakly correlated with $PM_{2.5}$ (0.14), NO_2 (0.33), and NO (0.39). After adjusting for baseline age, sex, preexisting comorbidity, neighborhood socioeconomic status, $PM_{2.5}$, NO_2, and black carbon, a 10 dBA elevation in residential noise was associated with a 9% (95% CI: 1-17%) increase in CHD mortality; subjects in the highest noise decile (>70 dBA) had a 19% (95% CI: 2-40%) increase in CHD mortality compared with those in the lowest decile (≤57 dBA). After similar adjustments including noise, an interquartile range (0.97×10^{-5}/m) elevation in black carbon concentration was associated with a 4% (95% CI: 1-8%) increase in CHD mortality. We did not find any interaction between traffic noise and black carbon on CHD mortality.
Conclusions: Traffic noise and black carbon may both be independently responsible for observed associations between exposure to road traffic and adverse cardiovascular outcomes.

EPIDEMIOLOGIC AND MICROBIOLOGIC ASSOCIATIONS BETWEEN FLIES AND DIARRHEA

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Background and Aims: Diarrhea is the cause of death in almost 23% of Indian children under 5. Flies carry enteric pathogens and may mediate food-borne enteric infections. This study aims to characterize fly densities as a determinant of infectious diarrhea.
Methods: We recorded number and duration of diarrheal episodes for families of Vellore, India in an ongoing year-long cohort of 160 urban and 80 rural households with 1274 individuals (27% - under 5y.o.) accumulating 198795 person-days. Household questionnaires on living conditions were completed. ELISA, light microscopy, bacterial culture, and multiplex PCR were performed on stools. Fly abundance was measured in 2 seasons using fly ribbons placed in kitchens. PCR for enteric bacteria, viruses, and protozoan were performed on flies. Multivariate log-linear models were used to explore the relationships between diarrhea and fly densities, demographics, hygiene, and human/animal interactions.
Results: 91 (89% - in under 5s) episodes of diarrhea occurred from 8/6/2010 to 1/31/ 2011. Stool pathogens isolated in 24 of 77 (31%) of samples included *E.coli*, *Shigella* spp., *Vibrio* spp., *Giardia*, *Cryptosporidium spp.*, and Rotavirus. 43 of 60 (72%) fly samples were positive for pathogens including *E.coli*, *Salmonella* spp., Norovirus, and Rotavirus. Fly abundance was 2.56 times higher during the dry season compared to monsoon ($p<0.0001$). Trash disposal close to homes and rural living were significant risk factors for high fly densities. The adjusted relative risk (RR) of diarrhea associated with 75th percentile of fly density was 1.10[95%CI:1.03,1.19]. An increase in fly density to 75th percentile was associated with longer duration of diarrhea, RR 1.11[95%CI:1.05,1.18]. Indoor latrines were protective against high fly densities and diarrhea.
Conclusions: Flies harbored enteric pathogens including Norovirus, a poorly documented pathogen on flies. Fly densities were significant predictors for diarrhea. Both diarrhea and fly densities may exhibit seasonality to be confirmed with study completion.

ENVIRONMENTAL INDICATORS OF INFECTIOUS DIARRHEA IN VELLORE, INDIA

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Background and Aims: Diarrhea is an important source of morbidity and mortality in resource poor settings. Transmission of enteric pathogens is only partially understood. This study aims to characterize environmental drivers in transmission of enteric infections in 80 rural and 160 urban households in Vellore, India.
Methods: Diarrheal episodes were investigated with microbiologic analysis of stool collected weekly in an ongoing 1-year open cohort study from August 6-January 31, 2010.Information on demographics, hygiene, human/animal interactions, and water sources was collected by questionnaires. Household water was examined for fecal contamination using fecal coliform counts. Fly densities were measured using sticky ribbons placed in kitchens. Log linear multivariate analyses were performed to examine the role of these indicators on the incidence and duration of diarrhea.
Results: There were 91 episodes of diarrhea over 198795 total person days (PD). There were substantial fluctuations in monthly diarrheal incidence from 0.15 to 0.92 per 1000PD. Fecal contamination was found in the majority (81%) of public water samples in rural areas. Water samples collected from household storage containers had fecal coliforms present in 67% and 74.6% of samples from rural and urban areas respectively. The use of private wells, house-taps, and increased fly densities were associated with diarrheal episodes. Risk factors for increased duration of diarrhea included animals in living quarters, family size, private well or house-tap use, nails not trimmed, and increased fly densities, while rural living, indoor latrine use and better education were protective. The adjusted relative risk associated with house-tap use was 3.07[95%CI:2.01,4.67] for increased diarrheal episodes and 2.69[95%CI:1.14,5.14] for a longer episode duration.
Conclusions: Several environmental risk factors for increased diarrhea were identified including water sources, living conditions, hygiene, and fly densities. The seasonality of diarrhea should be confirmed by completion of the study.

RISK OF DEATH FOR RESPIRATORY AND CARDIOVASCULAR DISEASES ASSOCIATED WITH AIR POLLUTION IN VOLTA REDONDA CITY, RIO DE JANEIRO STATE, BRAZIL

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Background and Objective: For many years we have observed that fast technological advancement has brought an increase in the quantity and variety of pollutants in the atmosphere, which are affecting the quality of life on our planet. By virtue of the many roles that it plays, the respiratory system is particularly exposed to aggressive environments and is often the organ most affected by exposure to air pollutants. After him the cardiovascular system is the most affected. This study aimed to evaluate the effects of PM_{10}, SO_2 and O_3 on deaths from respiratory and cardiovascular diseases among the elderly in Volta Redonda city, Rio de Janeiro State, Brazil.
Methods: This ecological time-series study used data on daily deaths from respiratory and cardiovascular diseases (ICD-10: J00-J99 and I00-I99) of people. These data were organized, average concentrations of PM_{10}, SO_2 and O_3, minimum temperature and relative humidity for the period from January, 2002 to December, 2006. The data were analyzed using generalized additive Poisson regression, with constrained distributed lag models adjusted for long time trend, weekdays and holidays. The quality of fit for the final model was estimated using residual deviance analysis and the Akaike criteria.
Results: An increase of 10μg/m^3 in PM_{10} and SO_2 concentrations were associated with an increased risk of death from respiratory and cardiovascular diseases around 5.23%. For O_3, did not have an association with risk of death in Volta Redonda city.
Conclusion: The results showed an association between ambient PM_{10} and SO_2 concentrations and an increased risk of death for respiratory and cardiovascular diseases. Additionally, the greatest increased risk was in elderly people.

AIR NICOTINE CONCENTRATIONS AND RESPIRATORY AND SENSORY SYMPTOMS AMONG BAR AND RESTAURANT WORKERS IN SANTIAGO, CHILE

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Bakground and Aim: The current smoking ban legislation in Chile does not protect workers in pubs, bars and restaurants. The aim of this study was to assess the relation between exposure to secondhand smoke, as measured by air nicotine concentrations, with self-reported respiratory and sensory symptoms in workers of these venues.

Method: A total of 206 workers recruited from 59 bars and restaurants (24 smoking allowed, 25 mixed and 10 smoke-free) were recruited between September 2010 and January 2011. An interviewer-administered questionnaire collected demographic and smoking data as well as self-reported information on respiratory and sensory symptoms in the last 4 weeks (irritated eyes, runny nose, sore throat, wheezing, shortness of breath, morning cough, daytime cough, phlegm). In addition to individual symptoms, a composite variable by adding the eight symptoms was generated. Vapor-phase nicotine concentrations were measured over a 1-h sampling period at a time of peak activity. The association of air nicotine with the presence of symptoms was estimated using Poisson regression models.

Results: Workers median age was 30 years. 60.7% were men and 56.8% were waiters. 52.4% were current smokers and the median number of years at work was 1 (interquartile range 0.33 to 4) year. Overall, 86.6% of participants reported having experienced at least one symptom in the past 4 weeks. After adjustment for age, sex, smoking status, home exposure and number of years working in the venue, a change in 1 $\mu g/m^3$ in air nicotine concentrations were associated with the prevalence of respiratory or sensory symptoms (Prevalence ratio 1.12; 95% 1.04 – 1.20).

Conclusion: These findings support that exposure to secondhand smoke in bars and restaurants impact sensory symptoms and respiratory health of workers. Laws that ensure smoke-free workplaces in hospitality venues should be implemented promptly in Chile.

THE EFFECTS OF INDOOR MOLDS AND GENETIC POLYMORPHISMS ON WHEEZING ILLNESS IN CHILDREN

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Background and Aims: Evidence has shown that climate may contribute to different prevalence of asthma in different geographic areas. In subtropical area, indoor dampness is a risk factor for respiratory symptoms and constitutes a significant public health problem. However, little is known about the effects of dampness and genetic polymorphisms on asthma. In this study, we evaluated the effects of home dampness and β2-adrenergic receptor (ADRB2) genetic polymorphisms on asthma and wheeze.
Methods: We investigated 6078 schoolchildren by a standard questionnaire for respiratory symptoms and environmental exposures. Multiple logistic regressions were performed to assess the association between ADRB2 polymorphisms and home dampness frequency and degree (visible mold on the wall, mildewy odor, water stamp on the wall, and water damage) on asthma phenotypes, after adjusting for potential confounders.
Results: The frequency mildewy odor, the number of walls with water stamp, and the duration of water damage were associated with increased risk of awakened at night due to wheeze (p<0.05). ADRB2 Arg16Gly showed significant interactive effect with home dampness on current wheeze (p for interaction=0.04) and awakened at night due to wheeze (p for interaction=0.007). The frequency and degree of home dampness was associated with increased risk of current asthma, current wheeze, medication use, and awakened at night in an exposure-response manner among children with ADRB2 Arg/Arg genotype (p<0.05).
Conclusion: ADRB2 genetic polymorphisms may be responsible for differences in susceptibility to childhood asthma and wheeze with regard to household dampness.

Keyword: asthma, ADRB2, home dampness, gene-environmental interaction

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HEAVY METALS IN BLOOD OF PRE- AND PERI-PUBERTAL GIRLS IN CALIFORNIA, BY DEMOGRAPHIC CHARACTERISTICS

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Background and Aims: The Breast Cancer and the Environment Research Centers are investigating whether exposures to potential hormonally active chemicals affect the onset of puberty, which influences later health, including risk of breast cancer. Higher lead levels have been associated with delayed puberty, but other metals have not been examined. The aim of this analysis was to determine the distribution of blood metals, such as cadmium, lead, and mercury, in young girls, and their variation by key variables.

Methods: In California, girls were recruited at ages 6-8 for the longitudinal study that includes annual anthropometry, tanner staging, questionnaire completion and bio-sampling. Nearly 350 baseline blood samples were assayed for a metal panel using high through-put ICP-MS with low detection limits. The distributions were examined and geometric means compared for lead and mercury across categories of race/ethnicity, age (at time of blood draw), BMI, care-giver education, care-giver income and home ownership, in adjusted models. Cadmium was examined as detected or not in logistic regression models.

Results: Lead and mercury were detected in over 98%; lead levels were similar to children in NHANES 2005-06 (median 0.92 vs. 0.97 ug/dL), but mercury levels were higher (median 0.56 vs. 0.41 ug/L, respectively). Blood lead levels were higher among Black and Hispanic girls and those living in rented homes, still significant after adjustment. Blood mercury levels were much higher among Asians than Whites and lower among Hispanics and the youngest girls. Cadmium was detected in 51%; the detection frequency varied by age, race and parental education. The adjusted OR for Asians was 5.2 (95% CI 2.1-13.2) and among 9 versus 6 year olds was 0.33 (95% CI 0.12-0.93).

Conclusions: Metals were detected with a high frequency among young girls and levels varied by characteristics that may be related to puberty, which will be examined further.

WHO IS WHO IN BRAZILIAN ENVIRONMENTAL HEALTH? IDENTIFICATION AND CHARACTERIZATION OF ACADEMIC GROUPS AND CIVIL SOCIETY ORGANIZATIONS

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Background and Aims: In this paper we present the results of the first phase of the project Who is Who in Brazilian Environmental Health. The aim of this project is to identify and characterize the Academic Groups and Civil Society Organizations acting on the field of environmental health that are able to contribute both to the strengthening of its technical and scientific basis, and to the dialogue with organized civil society.
Methods: The identification took place through the data source available at CNPq (Research Groups Directory), ABONG (Brazilian Association of Non-Governmental Organizations), FBOMS (Brazilian Forum of NGOs and Social Movements for Environment and Sustainable Development) and RBJA (Brazilian Network for Environmental Justice).
Results: The results were presented and discussed based on time evolution, geographic distribution and areas of research and action.
Conclusions: Final considerations point to the great potential for dialogue between experts and non experts, governmental and non-governmental, in order to create the foundation for a extended peer community capable of combining policies, knowledge, technologies and actions, seeking the comprehension and search of solutions to the establishment of health as a prerequisite and X a result of well being and full life.

EFFECTS OF LONG-TERM AMBIENT HYDROGEN SULFIDE EXPOSURE ON ASTHMA AND LUNG FUNCTION

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Background and Aims: The health effects of long-term, low-level H_2S exposures are unknown. This study took place in Rotorua, New Zealand, the world's largest city built on a geothermal field (population >55,000). Geothermal gas, including H_2S, emission sources are distributed throughout the city.
Methods: Participants were adult Rotorua residents, each of whom performed spirometry. H_2S exposure was estimated from networks of passive samplers distributed throughout the city in the summer and winter. The monitoring results were used to generate concentration surfaces across the city, from which H_2S concentrations at participants' current residential addresses were estimated.
Results: A total of 739 participants was used in this analysis, of whom 169 (23%) reported a doctor's diagnosis of asthma. H_2S exposure was divided into quartiles based on estimated residential concentrations averaged over winter and summer. The asthma diagnosis rate was lower in the highest exposure group (16.6%) than in the other three groups combined (24.8%) (p=0.07). Logistic regression analysis for asthma, adjusted for smoking, age, BMI and ethnicity showed the 3 highest H_2S exposure quartiles to have odds ratios of 1.21 (95% CI:0.75-1.95), 0.94 (0.58-1.53), and 0.70 (0.41-1.88), in order of increasing residential H_2S exposure. Participants with asthma had higher adjusted FEV_1 measures associated with higher residential H_2S exposures on a continuous scale (p=0.02), whereas there was no association with H_2S for those without an asthma diagnosis (p=0.79).
Conclusions: This study presents evidence of reduced asthma risk and higher FEV_1 in asthmatics living in higher H_2S exposure areas. This might be a direct effect on the airways of asthmatic subjects, as recent animal studies have shown inhaled H_2S can reduce inflammation (Faller et al 2010), or it could be a healthy survivor bias.
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Traffic of Vehicles and urban noise in Itajuba, Brazil: annoyance evaluation

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Background and aims: In the urban-oriented track delimited by the BR-459 highway, in urban area of Itajuba, Brazil, there is an important traffic of vehicles. This scenario makes noise and may be a annoyance source for the neighbourhood .
Methods: This work makes a survey and analysis of noise levels in this region. Through measurements and calculations, along with questionnaires aimed to conduct a comparative analysis regarding the annoyance effect between two different regions given the importance of traffic noise from vehicles.
Results: The average values of L10, L50, L90 and LAeq were 67, 58, 51 and 63 dB (A), respectively, was observed an average flow of 99 light vehicles and 14 heavy over a period of 10 minutes. These values exceed the limits set by the NBR and the State Law 10.151/2000 10.100/1990. A questionnaire based on ISO / TS 15.666/2003 was applied in a random sample of 40 residents on the highway (exhibition area) and 40 neighboring background (non-exposure area). There was a 92.5% return of questionnaires distributed to 67.5% for exposed and unexposed, and found that 55.7% of respondents say they are bothered by traffic noise when they are home with the windows and doors; when open, the percentage of troubled reaches 68.3%.
Conclusions: Factors such as age, gender and place of residence (highway or side streets) had no significant association with the level of disturbance in the interviews.

Renin-Angiotensin System Polymorphism modulates outdoor temperature related variation in blood pressure

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Background and Aims: Outdoor temperature related variation in blood pressure has been considered to play a role in excess cardiovascular mortality in extreme weather. The aim of this study is to evaluate the role of Renin-Angiotensin System gene polymorphisms (the Angiotensin converting enzyme (ACE) insertion/deletion (I/D), angiotensinogen (AGT) M235T, and angiotensin II type 1 receptor (AT1R) A1166C polymorphism) in modulating outdoor temperature dependent blood pressure (BP) responses.

Methods: Data including meteorological information, RAS gene polymorphisms, and BP were collected for 4,903 subjects from February 2003 to August 2004 in a university hospital. The generalized additive and linear models were used to examine the influence of genetic variants of RAS on the association between outdoor temperature and blood pressure

Results: Outdoor temperature (°C) was inversely associated with systolic BP (SBP) and diastolic BP (DBP) (SBP; β=-0.099, p=0.07, DBP; β=-0.100, p=0.006). These inverse relationship were found to be stronger in the subjects with ACE DD, AGT TT and AT1R AA genotype (SBP; β=-0.416, p=0.003, DBP; β=-0.320, p<0.001 for ACE DD, SBP; β=-0.204, p=0.003, DBP; β=-0.154, p<0.001 for AGT TT, , SBP; β=-0.133, p=0.024, DBP; β=-0.121, p=0.002 for AT1R AA polymorphism). In the subjects with ATR1 AC/CC polymorphism, significantly positive temperature-dependent BP responses were found in the temperature above 21.4 °C (SBP; β=2.208, DBP; β=1.250, each p<0.05), but the associations disappeared in the temperature range below 21.4 °C (SBP; β=-0.044 DBP; β=-0.020, each p>0.05).

Conclusions: This study suggests that RAS gene polymorphism modulates the relationship between outdoor temperature and BP. Genetic status of ACE DD, AGT TT and AT1R AA was associated with higher risk of blood pressure elevation when exposed to cold temperature, whereas AT1R genotype was found to be susceptible genotype for blood pressure elevation in hot temperature.

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TRAFFIC-RELATED AIR POLLUTION INCREASES THE RISK OF EMERGENCY DEPARTMENT PRESENTATION WITH ASTHMA AMONG YOUNG CHILDREN IN WESTERN AUSTRALIA

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Background and Aims: Previous studies have reported associations between air pollution and exacerbation of respiratory disease but very few have examined the influence on emergency department presentations (ED). The aim of this study was to determine whether changes in city-wide levels of traffic-related air pollution increases the risk of hospital ED presentations for asthma among children

Methods: The study group were 603 children and young adults aged less than 19 years who had presented at any public ED within Perth, Western Australia between 2002 and 2006. A time-stratified case-crossover design was applied using city-wide estimates of background air pollution from a local air monitoring network.

Results: Previous day exposure to nitrogen dioxide and carbon monoxide resulted in the most significant risk of ED presentation for asthma among children aged less than 5 years. An interquartile range increase in nitrogen dioxide resulted in an odds ratio of 1.70 (1.08, 2.69). For carbon monoxide, an interquartile range increase in this pollutant resulted in an odds ratio of 1.40 (1.06, 1.84).

Conclusions: These results help quantify the extent to which very young children are vulnerable to the effects of air pollution, which are notably higher than those reported by previous studies.

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FACTORS AFFECTING PRENATAL ENVIRONMENTAL MANCOZEB EXPOSURE AMONG INFANTS IN THE INFANTS' ENVIRONMENTAL HEALTH (ISA) STUDY

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Introduction: At banana plantations, weekly aerial applications of mancozeb, a ethylene bisdithiocarbamate (EBDC) fungicide, are performed to protect bananas from Sigatoka disease. This study aims to identify environmental factors that determine prenatal mancozeb exposure in infants living nearby banana plantations.
Methods: The study population consists of 450 mother-child pairs from the Infants' Environmental Health Study (ISA, for its acronym in Spanish), living in 40 villages with intensive large-scale banana farming from the Matina County, Limón. Using GIS, maps were elaborated for the communities, including house-locations of the study participants. Distances from banana plantations to houses were calculated, and meteorological stations were used to obtain data on wind direction and other climatologic factors. In addition, information on socio-economical and occupational factors was obtained by administering structured interviews during the first, second and third trimesters of pregnancy. During pregnancy, repeated urine samples were obtained for 450 women and subsequently ethylenethiourea (ETU) levels were determined. ETU is a specific metabolite of EDBC fungicides.
Results: Maps showed that 10 out 40 villages are immersed in banana plantations, and located less than 100 meters from the fields. We observed frequent aerial spraying above public roads, playing areas and houses: a disobedience of the current legislation of a minimum distance of 30 meters when a natural barrier is present, or 100 meters in case a natural barrier is absent. We will present the results of environmental factors affecting prenatal mancozeb exposure in approximately 250 infants, using ETU as a biomarker for exposure.
Conclusions: GIS form a powerful tool to unravel pesticide exposure determinants. To achieve compliance of current legislation of pesticide applications with light aircrafts or helicopters, governmental supervision mechanisms of aerial pesticide applications should be revised.

TRAFFIC-RELATED AIR POLLUTION INCREASES THE RISK OF FETAL GROWTH RESTRICTION IN PERTH, WESTERN AUSTRALIA

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Background and Aims: The aim of this study was to investigate the risk of fetal growth restriction in relation to exposure to motor vehicle traffic emissions about the residential address. While most past studies have relied on monitoring station measurements very few have used more accurate methods such as land-use regression.
Methods: Records were obtained for singleton births in the period 2000-2006 in Perth, Western Australia (N=23,452). Small for gestational age and sex (SGA) was investigated in relation to nitrogen dioxide as a marker for motor vehicle traffic emissions using multivariate logistic regression. Ambient nitrogen dioxide was estimated using land-use regression. Adjustment was made for maternal and pregnancy risk factors and for ambient temperature stress. The sub-populations investigated were: women who spent the most time at home, women who did not move house, women with respiratory or circulatory morbidity, and women living in low, medium and high socioeconomic areas.
Results: An IQR increase in second trimester nitrogen dioxide (16.97ppb) was associated with an adjusted OR 1.17 (0.98, 1.39) for SGA. This effect increased to OR 1.35 (1.08, 1.69) for women who did not move during pregnancy and hence had minimal exposure misclassification. Major roads (>40k veh/day) and semi-major roads (>20k veh/day) within 50m were highly predictive of nitrogen dioxide levels at home.
Conclusions: Exposure to motor vehicle traffic emissions in mid-pregnancy was associated with constrained fetal growth among a population in Perth, Western Australia.
References:

TEMPERATURE, AIR POLLUTION AND PEDIATRIC HOSPITALIZATIONS IN MEXICO CITY

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Background and Aims: Studies have documented associations between temperature and mortality or hospital admissions. Impacts may be exacerbated in cities with high levels of air pollution, like Mexico City (MC). Thus, the objective of this study is to evaluate the association between increased temperature and pediatric hospital admissions in MC due to all causes and respiratory diseases during: dry-cold, dry-warm, and wet season adjusting for air pollution.
Methods: An ecological study was conducted using a retrospective time series analysis of daily admissions records from 11 pediatric hospitals, temperature, humidity, ozone (O_3) and particulate matter less than 10 microns (PM_{10}) in MC from 2000 to 2002. The accumulated risk of hospital admissions due to temperature was evaluated using generalized additive models (GAM) with Poisson regression, adjusting for seasonal trends, holidays, humidity, 8-hr maximum moving average of O_3 and average PM_{10} with natural spline functions and different degrees of freedom per year.
Results: A total of 37,018 hospital admissions were evaluated for all causes of illness, of which 9,067 corresponded to respiratory illnesses. During the study period, the maximum average temperature was 23.7°C, 27.5°C and 24.8°C during the dry-cold, dry-warm and the wet period, respectively. The O_3 concentration was 165.25 ppb during the dry-warm period. During this same period, for every 1°C increase in temperature a percentage increase risk of hospital admissions for children under 5 years old was 2.49% (95% CI: 1.56, 3.43) for all causes of illness and of 6.39% (95% CI: 4.38, 8.45) for respiratory causes, with a lag of 4 days.
Conclusions: There is an increased risk of respiratory disease associated with the increase in the maximum daily temperature during the warm period in the population of children in MC, controlling for O_3 and PM_{10}, pollutants associated with the increase in morbidity in this city.

SWEDISH ENVIRONMENTAL HEALTH QUESTIONNAIRE SURVEYS

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Background and Aims: Environmental conditions, the general population's experience of these, and the level of knowledge throughout the community concerning the effect of environmental factors on public health are changing at an ever increasing rate. It is therefore important to regularly update the foundation of knowledge upon which decision making processes concerning environmental measures and priorities are dependent. The periodically published environmental health reports contribute significantly to such updates.
Methods: In Sweden, these reports are to a large extent based upon the National Environmental Health Surveys (MHE). The surveys have been conducted every 4th year since 1999, alternating between adults and children. The response rate has been between 60-73%. Bias in the sampling and the proportion of respondents in different groups has been adjusted for by calibration and hence, the responses are representative of the target population. The 4th is currently in progress and the invitation to respond has been sent to parents of about 80 000 children aged 6-10 months, 4, 8,12 and 16 years. The survey includes questions regarding children's health and annoyance in relation to various environmental factors.
Results: The results give an up to date describe of how the general population is exposed to risks caused by various environmental factors. Moreover, the results show differences between various sub-groups within the population, such as age, sex, and social class. Geographic differences both between but also within the different regions can be studied. Finally, time trends regarding exposures and annoyance related to various environmental factors can be followed. The surveys are also used for research purposes, and to evaluate the Swedish environmental quality objectives.
Conclusions: The periodical Environmental Health survey is an extremely important source of information in decision making processes that aim to promote awareness among citizens about the risks associated with environmental factors and to reduce the risk they pose to public health.

SHORT-TERM EFFECTS OF AIR POLLUTION IN A COHORT OF PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Backgrounds and aims: It has been postulated that patients with chronic obstructive pulmonary disease (COPD) have a higher risk of emergency medical care and death after exposure to air pollution in comparison to the general population. Few observations are available where subjects with COPD have been compared with people without the disease. We designed a study to evaluate the daily air pollution effects in COPD and non-COPD sub-groups in Rome, Italy.
Methods: We identified a dynamic cohort of COPD patients resident in the city of Rome, Italy, using hospital admission data (1998-2009) and drug prescriptions data (2005-2009); subjects without COPD from the general population of the city were also defined. The follow-up for emergency hospitalisations and mortality lasted from 1st February 2005 to 31st December 2009. We carried-out a case-crossover analysis to estimate short-term effects of airborne pollutants (PM_{10}, $PM_{2.5}$, NO_2 and ozone) in the COPD cohort (analysis for the comparison cohort is on-going) .
Results: There were 49755 emergency hospitalisations and 16,683 deaths (18% out-of-hospital) in the cohort of 147,067 suffers from COPD as identified from hospital diagnoses (23%) or drugs prescriptions of respiratory drugs (77%). An increased risk of hospitalisation for respiratory diseases (3.88%; 95% Confidence Intervals, CI, 0.98-6.87) was observed for a 10• g/m^3 increase NO_2 (lag 0-5). The strongest effect was observed on respiratory mortality for $PM_{2.5}$ and NO_2 (10.66%; CI 1.86-20.23 and 7.17%; CI 0.89-13.85, respectively at lag 0-5). The effect on mortality was lower, but with similar pattern, for PM_{10}.
Conclusions: We confirmed a high risk of health effects due to air pollution in COPD patients. The strongest effect was for respiratory mortality in relation to $PM_{2.5}$ and NO_2. The estimates doubled respect those previously observed in Rome in the general population; however a more formal comparison will be done with the non-COPD population.

CAUSE SPECIFIC MORTALITY IN A COHORT OF PEOPLE LIVING CLOSE TO SIX MUNICIPAL SOLID WASTE LANDFILLS

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Background and Aims: the risk perception at population level of possible adverse health effects of waste treatment and landfilling is strong, especially in Italy, although the scientific evidence is still limited We evaluated whether living close to a landfill is associated with an increased risk of cause specific mortality in Lazio, Italy.
Methods: we defined a cohort of residents within 5 km from six landfills during the period 1996-2008. Follow-up for vital status was done with the municipality of residence and mortality data were retrieved from a regional data base. Each participant's address was geocoded and assigned to a distance from each landfill on the basis of a GIS. Cause-specific mortality relative risks (RR, CI 95%), adjusted for age and socioeconomic status (area-based index) were calculated in 3 bands of increasing radius from landfills:0-2, 2-3, and 3-5 Km (reference group), using a Poisson regression model.
Results: the cohort consisted of 197.285 people, 2.7% of whom lived close (0-2 km) to the landfills; 43.6% of the residents at 0-2 km was of low socioeconomic status versus 28.2% observed in the reference group. No excess risk in mortality was observed when comparing people residents at 0-2 km with the reference group (3-5 km) (RR 1.03 CI 95% 0.93-1.14 men; RR 1.03, CI 95% 0.92-1.16 women). No distance related gradient was observed for cancer mortality (RR 0.92, CI 95% 0.77-1.10 and RR 0.95, CI 95% 0.76-1.20, men and women, respectively) or for several other causes analyzed.
Conclusions: subjects living close to landfills tend to be of lower socioeconomic status. In agreement with the available literature, our results indicate that after adjusting for socioeconomic status, there is no association between residence in areas with landfills and mortality.

HUMAN BIOMONITORING OF RESIDENTS LIVING IN THE VICINITY OF A MODERN SOLID WASTE INCINERATOR (SWI): A PILOT STUDY IN NORTHERN ITALY

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Background and Aims: As part of IPPC related to the solid waste incinerator in Modena (Emilia-Romagna region, Italy), a human biomonitoring cross-sectional pilot study was carried out to investigate possible biomarkers of exposure related to incinerator emissions.
Methods: Between May and June 2010, 65 subjects living and working within 4 km from the incinerator for at least 3 years (exposed) and 103 referents living and working outside this area, within a 15 km distance from the incinerator for at least 3 years (not exposed) were recruited. Blood and urinary metals (Cd, Cu, Hg, Mn, Ni, Zn) and urinary polycyclic aromatic hydrocarbons (PAHs) were analysed. Information about lifestyle, anthropometric characteristics, residential history, and health status were collected by a self-administered questionnaire. A multivariate regression analysis was performed to investigate the different concentration of biomarkers in the two groups and the possible relationship between biomarkers and the distance of residence from the plant.
Results: Metals showed no difference between groups; their levels were within the Italian population reference values, with the exception of blood Zn and urinary Ni (possible sampling contamination). Metals showed association with age, gender, BMI, smoking habit, education, traffic, and diet, as expected.
As regard PAHs, 5 of them presented more than 50% of their values below the limit of quantification. The mean level of the remaining PAHs was: naphthalene 53.05±25.86ng/L, phenanthrene 9.27±5.52ng/L, fluorene 2.84±4.31ng/L, pyrene 1.56±0.71ng/L, and anthracene 0.73±0.62ng/L. The comparison between the two groups showed higher levels in the exposed subjects only for phenanthrene and anthracene ($p<0.01$).
Results of the multiple regression analysis showed that urinary phenanthrene, anthracene and Mn were inversely correlated to the distance of residence from the plant.
Conclusions: This study suggests that specific urinary PAHs and Mn may provide information about the exposure arising from SWI. Further analyses will investigate incinerator fallout maps.

COMPARATIVE ENVIRONMENTAL HEALTH RISK ASSESSMENT FOR USE IN POLICY-MAKING: THE VEGAS PROJECT

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Background and Aims:
Environmental stressors in Germany need to be examined regarding their health impact to develop suitable policies. The environmental burden of disease (EBD) concept combines aspects of morbidity and mortality of environmental stressors in the form of DALYs (disability-adjusted life years), which is useful for comparative risk assessment (CRA). The VegAS project [distribution-based analysis of health effects from environmental stressors] aims at providing a basis for policy-making.

Methods:
Seven environmental stressors – benzene, cadmium, noise, ozone, particulate matter, perfluorinated surfactants, and second-hand smoke – were considered because of their relevance to public health. Evidence levels of health effects were defined referring to international guidelines, reviews, meta-analyses, and epidemiological and toxicological studies. Exposure-response functions (ERFs) and population-based exposure data were evaluated to calculate the EBD. Parts of the DALY approach are discussed extensively and critically. Uncertainties are described and evaluated.

Results:
Up to ten health effects attributable to a single environmental stressor were identified with strong or moderate scientific evidence. Exemplary, cadmium causes different kinds of cancer, acute myeloid leukemia is attributable to benzene, and environmental noise induces myocardial infarction and sleep disturbance. Evidence differs strongly depending on the state of research of stressor and health outcome. Differences were also observed regarding availability (e.g., population-based registries, surveys), quality of ERFs and transferability to the general German population. Detailed uncertainty and sensitivity analyses are part of the project to enable reliable CRA results.

Conclusions:
Through high quality standards, the VegAS project will contribute to a realistic CRA by making use of the strengths of EBD analyses while carefully considering its limitations. A transparent application of the VegAS approach will substantially augment the options of policy-making. Final results are available in early 2012.

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DECREASING INFANT EXPOSURE TO PCDD/FS AND PCBS THROUGH BREAST MILK IN FINLAND

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Background and Aims: PCDD/Fs and PCBs are environmental pollutants that are extremely persistent in the environment and accumulate in the human body. Because of their high lipophilicity, they are enriched in the fatty tissue. For women, lactation is the main route of elimination from the body. On a body weight basis, infants may be exposed to many orders of magnitude higher concentrations of these chemicals than adults. The main human health effects at current exposure levels are considered to be developmental effects in the foetus and children. In addition, these compounds are suspected to disturb the thyroid hormone system even at low exposure levels. The Finnish National Institute for Health and Welfare (THL) has monitored the levels of PCDD/Fs and PCBs in Finnish breast milk since 1987, and in 2000, PBDEs and DDT metabolites were added in the monitoring programme.
Methods: Sampling was conducted in 1987-88, 1993-94, 2000, and 2005. Another sampling round is currently on the way, and expected to yield results in 2011. The number of samples in each round was around 300, and samples were collected initially from two areas in southern Finland representing rural and urban areas. Later, northern areas were included in the studies. The samples were analysed for PCDD/Fs and PCBs, and from 2000 on also for PBDEs and DDTs. The samples have been stored for future needs.
Results: Between 1987 and 2005, the concentrations of PCDD/Fs and PCBs decreased significantly from 26.3 to 6.80 pg TEQ_{1998} g^{-1} fat (74.1%) and from 25.5 to 4.10 (83.9%), respectively. Based on the slope of the decrease, a further 10–15% decrease is expected between 2005–2011.
Conclusions: The study has shown a significant decrease in infant exposure to PCDD/Fs and PCBs. In 2011, information on current exposure will be obtained.

References: -

GREEN NEIGHBORHOOD QUALITY IS ASSOCIATED WITH PHYSICAL ACTIVITY BEHAVIOR AND SELF-RATED HEALTH STATUS IN SCANIA, SOUTHERN SWEDEN

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Background and aims: Various studies have shown positive associations between green environments and health or health-related behavior (de Vries et al, 2003, Groenewegen et al, 2006, Maas et al, 2006, Björk et al 2008, Sugiyama et al, 2008). However, neighborhood quality may not be equally important for each population subgroup (de Vries et al, 2003, Cummins et al, 2006). Our aim was to assess how quality of the green neighborhood environment is related to weekly level of physical activity, BMI and self-rated physical and mental health status and whether associations are modified by socio-demographic status.
Methods: We used self-assessments (N = 24,847) of five green qualities (culture, lush, serene, spacious and wild) and health status from a cross-sectional public health survey (2008). Area proportions of positive self-assessments for each quality were obtained from a multilevel model and used to create the area-aggregated Scania Green Score (SGS) (de Jong et al, 2011). Associations of the SGS and individual qualities with physical activity level, BMI and self-rated physical and mental health status were assessed in ordinal regression models, all adjusted for sex, age, educational level, economic status, country of origin, type of residence and as a sensitivity analysis for objectively assessed quality (GIS-based). We used the likelihood ratio test to investigate effect modification.
Results: Green neighborhood quality and health status were associated with socio-demographic status. SGS was associated with health status (OR 1.07: 1.03-1.21) and physical activity level (OR 1.16: 1.12-1.21), the latter association was modified by age (p=0.01) and educational level (p<0.001). SGS was not associated with BMI. The quality culture was clearly associated with all outcomes but for BMI only among tenants (OR 1.89: 1.19-3.01). Odds ratio's were 1.54 (1.19-1.99) and OR 1.43 (1.11-1.84) for physical activity and health status respectively. Effects for other qualities were ambiguous.
Conclusions: This study shows that green neighborhood quality can benefit health and health-related behavior, especially among specific subgroups, i.e. those most exposed to their neighborhood environment Notably these groups live in neighborhoods with least favorable green quality in Scania.

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Anogenital distance as a marker of in-utero hormonal exposures, and breast and prostate cancer risk. A pilot study.

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Background and aims. Several lines of evidence indicate that foetal exposures may be related with adult breast and prostate cancer. Anogenital distance is a sexually dimorphic phenotype that has been shown in animals to be related to foetal androgen action and that tracks through life. Anogenital distance has been scarcely used in human studies. A single study in adults found that shorter anogenital distance was a predictor of low sperm concentration. We evaluated the association of anogenital distance with breast and prostate cancer risk in a pilot study within a large population based case-control study in Spain (MCC-Sp).

Methods: Cases were identified at the Hospital del Mar, Barcelona and population controls were residents in the catchment area of the hospital. Anoclitoral (ACD: anus to clitoris) and anofourchetal distance (AFD: anus to fourchette) were measured in 46 breast cancers cases and 19 population controls. Anogenital distance (AGD: anus to upper penis), anoscrotal distance (ASD: anus to scrotum) were measured in 58 prostate cancer cases and 5 population controls. Odds ratios were adjusted for age, examiner, BMI (or weight and height) and parity (women).

Results: Anogenital distances were wider in males (mean AGD=120.7mm, SD=13.0; mean ASD = 35.8mm, SD=12.4) than females (mean ACD=102.5, SD=12.8; mean AFD=28.7, SD=6.6). No differences were observed for breast cancer (Odds Ratio (OR) for AGD=0.99, 95%CI 0.93-1.05; OR for AFD=1.09, 0.97-1.23). Shorter AGD (OR=0.85, 0.74-0.98) and ASD (OR=0.92, 0.84-1.01) were associated with a lower prostate cancer risk, although based on very small numbers.

Conclusions: This is the first study reporting anogenital measurements in adults in relation to cancer risk. Results are preliminary and, if confirmed, may indicate that prostate cancer is associated with lower levels of androgens in utero. The study is ongoing and results for a larger population sample will be presented.

Review on farm environment, genes and development of asthma and allergies

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Background and Aims
Children growing up on farms are protected from asthma and atopy when compared to rural peers, yet the mechanisms underlying these effects are not exactly known. The review will summarize new findings mainly from two studies of the farming environment, i.e. PASTURE, a birth cohort and GABRIEL, a cross sectional study.
Methods
PASTURE has followed a birth cohort of 1063 children (half from farm families) from pregnancy up to age 6 yrs with extensive questionnaires, biological and environmental sampling and, immunological measurements. GABRIEL is a cross-sectional study of 9668 school-aged children, including 7606 with IgE measurements and 1708 with extensive genotyping data. Extensive environmental sampling was performed in about 800 children in one GABRIEL study area.
Results
Genome-wide interaction analysis for asthma and atopy and farm-related exposures in the GABRIEL study showed that the strong protective effect of a farm environment could not be attributed to the genetic make-up of the farming population nor to common genetic polymorphisms interacting with particular exposures. Exposure to a greater variety of environmental micro-organisms, however, was associated with a reduced risk of asthma (OR 0.86 (95%CI 0.75-0.99). Consumption of raw milk was inversely associated with asthma (aOR 0.59, 95% CI 0.46-0.74), atopy (0.77, 0.61-0.90) and hay fever (0.51, 0.37-0.69) independent of farming.
The longitudinal analyses of the PASTURE birth cohort showed that prenatal exposures modified atopic sensitization and cytokine patterns in cord blood and could influence the development of atopic dermatitis within the 2 first year of life. Gene expression of innate immunity receptors (TLR's) were decreased in children with atopic dermatitis.
Conclusions
The ongoing analyses of the cohort study will greatly enhance the understanding of the mechanisms underlying the protective effect of farm related exposures and hopefully open new avenues for prevention.

LUNG CANCER AND EXPOSURE TO MINERAL WOOLS: THE ICARE STUDY

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Background and aims: In France, between 13 and 29% of lung cancers in men are estimated to be attributable to occupational factors. The aim of this work is to assess the risk of lung cancer associated with mineral wools (MW) currently used as a substitute for asbestos. They are suspected of increasing the risk of lung cancer because of their structure close to asbestos. Exposure to MW concerned around 15% of men in France.

Methods: ICARE is a large multicentre population-based case-control study conducted between 2001 and 2006 in 10 French *départements* with a general cancer registry. ICARE includes 2926 incident lung cancer cases and 3555 controls with 78% of men. A detailed description of lifetime occupational history was collected. The subjects' exposure to MW was first determined using a Job-Exposure Matrix (JEM) specific for MW. Then, individual exposure was assessed with an algorithm using specific questions on exposing tasks. We estimated odds ratios and 95% confidence intervals with unconditional logistic regression adjusted for age, department, number of job periods, lifelong cigarette smoking and exposure to asbestos (also assessed by a JEM and an algorithm).

Results: Analyses were conducted among men (2301 cases, 2780 controls) and concerned 27191 jobs. In the first analyses, we find significant associations between the risk of lung cancer and exposure to MW assessed with the JEM. They became nonsignificant and close to 1 when adjusting for exposure to asbestos. In contrast, a significant dose-response relation was found between exposure to asbestos and the risk of lung cancer, even when adjusted for exposure to MW.

Conclusions: These results need to be completed with the exposure assessment from the algorithm. This algorithm would help us disentangle individual levels of MW and asbestos exposure, which are closely related because of similar exposing jobs. Both results will be presented.

TRAFFIC DENSITY IN AREA OF RESIDENCE IS ASSOCIATED WITH PHYSICAL HEALTH-RELATED QUALITY OF LIFE IN WOMEN: THE COMMUNITY-BASED HORDALAND HEALTH STUDY

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Background and Aims: Vehicle traffic is increasing worldwide, and this is a major concern since traffic-related air pollution and noise may influence health. The aim of this study was to evaluate whether reduced health-related quality of life (HRQoL) among men and women is associated with increased vehicle traffic density in participants' area of residence.
Methods: A total of 16,410 individuals between the ages of 40 and 45 years from three municipalities in Hordaland County were asked to participate. The response rate was 55% for men and 66% for women. Vehicle traffic density in participants' area of residence was defined as low, moderate or high, with a maximum of 50,000 vehicles a day on the busiest roads. Using the SF-12 questionnaire, both physical and mental HRQoL were investigated in relation to vehicle traffic density.
Results: Linear regression analyses showed that women living in areas with high traffic density had significantly poorer physical HRQoL than women living in areas with moderate or low vehicle traffic density. There were no similar findings among men. Mental HRQoL was not associated with vehicle traffic density in the area of residence, neither for women nor for men.
Conclusion: There is an association between high vehicle traffic density in residential area and reduced HRQoL in women, but not in men.

AIRCRAFT NOISE EXPOSURE AND COGNITIVE PERFORMANCE IN CHILDREN LIVING NEAR THE CIAMPINO AIRPORT IN ROME

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Background and Aims: chronic aircraft noise exposure has been associated with impairment of reading comprehension and long-term memory in the RANCH study. We evaluated the association between aircraft noise exposure and cognitive performance in children living around the Ciampino airport in Rome, Italy.
Methods: we investigated 555 children, aged 9-11 years, attending 13 schools located in the airport area. Aircraft noise Leq levels were measured for each school from 9.00 am to 1.00 pm. To estimate aircraft noise exposure at home, we defined three contours (Laeq,24h <60, 60-65, and >65-75 dB) using the Integrated Noise Model linked to each participant's address (a GIS system was employed). Children completed classroom-based tests on cognition, reading comprehension, recognition and clued recall, working memory, sustained attention, and auditory discrimination. Questionnaires were completed by parents to provide information about children's health status and socioeconomic context. The effects of airport noise on specific cognitive performance were analysed through adjusted logistic regression models (outcome variables: lowest decile of the distribution for each test) considering school clustering.
Results: in our sample, 40% of children was exposed at school at >65-75 dB, while 4.3% lived in homes exposed at >65-75dB. We found an association between aircraft noise levels at school and auditory discrimination ability (OR 1.7, 95% CI 0.9-3.1 when comparing >65-75 vs <60 dB), this impairment became statistically significant when children cognition was taken into account (OR 1.9, 95%CI 1.1-3.5). When we considered exposure at home, we found a borderline excess risk for impairment in cognition (OR 2.97, 95%CI 0.95-9.28) and a strong effect for auditory discrimination ability (OR 3.4, 95%CI 1.1-10.7). No association was found between exposure to aircraft noise and the other tests performed.
Conclusions: our findings indicate that chronic aircraft noise exposure plays a role in the cognitive development of children.

CLINICAL AND EPIDEMIOLOGICAL SURVEILLANCE OF A POPULATION CONTAMINATED BY BETA-HEXACHLOROCYCLOEXANE FROM AN ILLEGAL CHEMICAL DUMPING SITE

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Background and Aims: The health effects associated to Beta-hexachlorocycloexane (Beta-HCH), an organochlorine isomer of lindane, are still unclear. Potential effects on hormonal function, diabetes, cardiovascular, neurological, liver, renal, and reproductive disorders have been hypothesized. A population living close to the Sacco River Valley in central Italy has been exposed via food contamination from an illegal dumping site of a chemical industry producing pesticides. A programme of clinical and epidemiological surveillance has been going on since 2009. The objective of the study was to analyze the relationship between blood levels of Beta-HCH and some biochemical parameters.
Methods: A total of 495 people (48% of females), living within 1 km from the Sacco River, underwent an interview and a blood sampling for the detection of Beta-HCH and biochemical analyses (TSH, FT3, FT4, Cortisol, Transaminase, GammaGT, HDL-Cholesterol, Creatinine, Azotemia, Glycemia, Glycosylated Hemoglobin, Fibrinogen, FSH, LH, Prolactin, Testosterone). The association between Beta-HCH levels and each parameter was investigated using logistic regression (cut-off the 10^{th} or 90^{th} centile of the distribution) considering clustering within families. The analyses were done separately for gender, adjusting for age, educational level, breast-feeding (for women) and thyroid therapy (for TSH, FT3, FT4).
Results: The population had an average high level of Beta-HCH (geometric mean=80, GSD=1.2 ng/g lipids). In females, there was a clear association of Beta-HCH (per 100 ng/g lipids) with high TSH (OR: 1.38, 95%CI: 1.12-1.69), FT3 (OR: 1.25, 95%CI: 0.99-1.57), LH (OR: 1.31, 95%CI: 0.99-1.73), and low HDL (OR: 1.31, 95%CI: 1.08-1.58). In males, a no clear inverse association was found for FT3 (OR: 0.73, 95%CI: 0.54-0.99) and GammaGT (OR: 0.77, 95%CI: 0.59-0.99).
Conclusions: A clear effect of Beta-HCH on the thyroid regulation and function was suggested in females. The surveillance of the population is on-going and additional data will be available to confirm these results.

THE EFFECT OF PREVIOUS BREASTFEEDING ON THE BIRTH WEIGHT OF SUBSEQUENT CHILDREN

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Background and Aims: Studies have shown that birth weight increases with parity, while breastfeeding lowers the maternal body burden of persistent environmental toxicants. We hypothesized that women with longer history of previous breastfeeding have a reduced risk of adverse birth outcomes in subsequent pregnancies due to the decreased exposure of the fetus to such toxicants.

Methods: We restricted our analysis to second gravida women with singleton births from the "Norwegian Human Milk Study" (HUMIS, n=806 mother-newborn pairs), the Spanish multi-center "INMA" study (n=737), and the Greek "Rhea" cohort (n=404). Breastfeeding duration in previous pregnancy (in months) was assessed by a questionnaire, and data on birth outcomes; birth weight, small for gestational age, large for gestation age, difference in birth weight between index and previous pregnancy, were obtained from the women's clinical records and questionnaires. Multivariable log-binomial and linear regression models were used, adjusting for several potential confounders.

Results: Breastfeeding duration in previous pregnancy is associated with a slightly reduced risk for small for gestational age neonates in index pregnancy, consistently in the three cohorts, though not statistically significant in any cohort. A per month increase in breastfeeding duration in Rhea cohort increased the birth weight in index pregnancy by 9.3 gr (b coefficient: 9.3; 95% CI: 2.5, 16.1), while smaller increases were observed in the INMA and HUMIS cohorts. Results will be presented on additional birth outcomes including large for gestational age, birth weight and the difference in birth weight between index and previous pregnancy.

Conclusions: This is the first time that this research hypothesis is being investigated. Results indicate that long duration of breastfeeding may slightly reduce the risk of adverse birth outcomes in subsequent pregnancies, although residual confounding of breastfeeding habits by socioeconomic-status is a challenge and cannot be fully eliminated.

IMPACT OF URBAN AIR POLLUTION ON INCIDENCE AND PROGNOSIS OF STROKE

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Background and aims: Few studies have evaluated the association between long-term exposure to air pollution and incidence or prognosis of stroke. We investigated the association between nitrogen dioxide (NO_2) exposure at residence and incidence of stroke (total and by subtype) and its prognosis within a large cohort study.
Methods: The Rome Longitudinal Study (RoLS) is a fixed cohort enrolled at the 2001 census. We selected subjects aged 45-80 years at the baseline who had not changed their address nor had a hospital admission for stroke in the previous five years (n=677,909). Incident cases of stroke occurred between October 2001 and December 2004 were selected from administrative databases. NO_2 exposure was estimated for residence's coordinates through a land use regression model (R^2=0.66). Subjects were followed till December 31st, 2006. We used Cox regression models to evaluate the association between NO_2 exposure and incidence of stroke and survival taking account of education, occupation, place of birth, and area-based socioeconomic position (SEP).
Results: During the period 2001-2004 there were 4455 new cases of stroke (76% ischemic) in the cohort . Average exposure of NO_2 was 44 (sd 8) µg/m^3. There was no evidence of association between NO_2 at residence and incidence of stroke in the study population, both for ischemic and hemorrhagic forms. Stroke incident cases in the highest quintile of exposure (>50.2µg/m^3) had 23% (95%CI:3%-47%) risk of dying for natural causes than those living in the lowest quintile (<35.7µg/m^3). After first stroke there was a 9% (95%CI:3%-17%) higher risk of dying for 10µg/m^3 increase of NO_2 at residence.
Conclusions: Although there was no evident association between air pollution exposure at residence and incidence of stroke, we found a strong evidence of association between NO_2 exposure and survival after first stroke.

INTEGRATED HEALTH IMPACT ASSESSMENT OF WASTE MANAGEMENT IN LAZIO (ITALY)

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Background and Aims: the management of municipal solid waste (MSW) may entail health effects difficult to be quantified. We evaluated potential health impacts arising from MSW management under a 2008 baseline scenario (BS) and an alternative 2016 green scenario (GS) which includes decrease in waste production, increase in recycling, clean transportation, and no landfilling without pre-treatment.
Methods: we evaluated the population of the Lazio region in Italy (5.5 million inhabitants). Pollutants concentrations from transport, incineration, and combustion of landfills biogas were modelled using the ADMS-Urban model. Population-weighted exposure levels were calculated. Concentration-response functions were derived from systematic reviews of the literature. Cancer incidence (CI), low-birth weight (LBW) newborns, congenital anomalies (CA), respiratory symptoms (RS) and odour annoyance (OD), Years of Life Lost (YLL), and Disability Adjusted Life Years (DALYs) were estimated for the period 2016-2050.
Results: at the BS, 36,191 people lived nearby MSW facilities, while 14.606 were estimated under the GS. Waste transport health impact was estimated in 561 YLL at BS, 29 under the GS. For incinerators, CI was 7.5 (BS) and 2.5 (GS) cases. 10 YLLs were estimated at BS whereas 9.6 for GS. For landfills, LBW cumulative incidence was 8.3 cases (BS) and 2.8 (GS), respectively. The cumulative incidence of CA was 0.3 (BS) and 0.1 (GS) cases. The health impact as YLL was 17.9 (NO_2) at BS and 12.4 with GS. At the BS the prevalence of severe OD and RS were the same, 54 and 424, respectively while a decrease to 19 and 147 were predicted with the GS. About 3000 and 1600 DALYs were estimated under the two scenarios. The largest contribution to DALYs was from RS (about 90%) and OD.
Conclusions: although MSW management impact on health is moderate, a substantial improvement can be realized with a green waste policy.

ASSESSMENT OF HEALTH EFFECTS OF TRANSPORT POLICIES IN ROME: IMPACT ON SOCIO-ECONOMIC INEQUALITIES

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Objectives and aims: To reduce traffic-related air pollution local councils usually introduce transportation policies, including congestion charges, environmental zoning, monetary subsidies to decrease the number of older cars on the road, and measures to promote public transport and cycling. Few studies have assessed the effects of these traffic policies. Our aim was to evaluate the impact, in terms of air quality and health effects, of the two low emission zones (Limited Traffic Zone and Railway Ring) implemented in Rome in the period 2001-2005, and to examine whether the impact was different according to socioeconomic position (SEP).
Methods: We evaluated the effects of the policy intervention on various stages in the full chain model, that is: pressures (number and age distribution of cars), emissions, PM10 and NO2 concentrations, population exposure, and years of life gained (YLG). The impact was evaluated according to a small-area indicator of SEP of the residents.
Results: In the period 2001-2005 there was a decrease in the total number of cars (-3.8%), of NO2 and PM10 emissions, of traffic-related concentrations (from 22.9 to 17.4 ug/m3 for NO2 and from 7.8 to 6.2 ug/m3 for PM10), and in the overall population exposure. The specific policy had an impact on concentrations in the two low emission zones (NO2: -4.13 and -2.99 ug/m3; PM10: -0.70 and -0.47 ug/m3). Overall, residents living along busy roads (264,522 subjects) gained 3.4 days per person (921 YLG per 100,000) for NO2 reduction; the gain was larger for people in the highest SEP group (1387 YLG per 100,000) than for residents in the lowest SEP group (340 YLG per 100,000).
Conclusions: The traffic policy in Rome was effective in reducing traffic-related air pollution, but because of the spatial distribution of SEP in the city, most of the health gains were found in well-off residents.

Indoor exposure of expecting mothers by VOC at home induce wheezing in young children

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Aims: To assess the effects of domestic exposure to volatile organic compounds during pregnancy and in the first year of life on respiratory diseases in young children.

Methods: A prospective cohort study was conducted in Leipzig, Germany, in expecting mothers and their children during the first year of life. Concentrations of volatile organic compounds were measured during these periods. Specific redecoration-associated VOCs have been identified. The health effects of these VOC were assessed for the exposure periods.

Results: We found VOC that were specifically associated to floor covering, floor covering with adhesives, and painting. Among respiratory health effects, wheezing that needed medical treatment was found to be most significantly associated to redecoration-related VOC exposures. Floor covering at home resulted in increased exposure levels of six specifically flooring-related VOC which induced significantly increased risks for treated wheezing. Among the specifically redecoration-associated VOCs, elevated styrene concentrations during pregnancy and during the first year of life, and methyl isobutyl ketone concentrations during the first year of life were identified to induce treated wheezing. For adhesive-related VOC we found significant adverse effects for ethylbenzene octane, 1-butanol, and o-xylene at elevated concentration levels during pregnancy. For painting-related VOC, we did not find significant risk increases.

Conclusions: VOC exposures during pregnancy have been identified to induce adverse effects of on children's respiratory health in the year after birth. We found these effects of exposure because of redecoration that recently mostly have been only accused to cause immediately respiratory effects in children.

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MORTALITY AND EMERGENCY ROOM VISITS AMONG PEOPLE LIVING CLOSE TO GEOTHERMAL SOURCES OF AIR POLLUTION

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Background and Aims: Subjects living in buildings located in volcanic areas may be exposed to H_2S and CO_2 emitted from the soil. Few studies have shown that geothermal emissions can cause fatalities from asphyxiation and increases in respiratory diseases. We studied the association between residence in a geothermal area and mortality and emergency room visits (ERVs) in Marino (Rome).
Methods: We enrolled the cohort of residents in Marino from 01/01/1996 to 31/12/2008. Each participant's address was geocoded and the mortality and ERVs follow-up was done using health databases. The cohort was divided in three zones, according to residence at baseline: the area close to the gas emission site (zone A), the surrounding area (zone B), and the rest of Marino (reference). We measured peaks of indoor CO_2 and H_2S up to 28% and >500 ppm in zone A and 11% and 54 ppm in zone B. We evaluated the risk of mortality and ERVs in zone A and B using a Poisson regression model adjusting for age and socio-economic status.
Results: 53.609 people were enrolled, 2.1% living in zone A and 5.4% in zone B. When we compared zone A with the reference, we found an increased risk of myocardial infarction mortality (RR 2.12, 95%CI 0.92-4.87) among men and increased number of ERVs both in men (RR 1.09, 95%CI 1.03-1.16) and in women (RR 1.15, 95% CI 1,08-1,22), in particular for intoxication (RR 2.70 95%CI 1.14-6.39) among men. In zone B, increased risks of ERV for dyspnoea (RR 1.50 95%CI 1.19-1.88 men; RR 1.41 95%CI 1.07-1.86 women) and chest pain (RR 1.42 95%CI 1.07-1.87 women) were found.
Conclusions: We found elevated mortality and ERVs rates consistent with high exposures to H_2S and CO_2. There is a need of epidemiological surveillance of populations living in high risk areas.

A CROSS SECTIONAL INVESTIGATION ON THE HEALTH STATUS IN A POPULATION EXPOSED TO 50Hz MAGNETIC FIELDS IN A DISTRICT OF ROME: HEMATOLOGICAL AND IMMUNOLOGICAL PARAMETERS

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Background and Aims: Extremely Low Frequency Magnetic fields are possible carcinogens and the question whether they cause biological effects is of special interests.
Aim of the study is to evaluate hematological and immunological parameters in the resident population of a district of Rome built in part under a 60 kV electric distribution line. In the same area two mortality and morbidity studies were previously performed.
Methods: Residential magnetic field levels based on current load, line characteristics and distance of the dwellings from the power line were estimated, and the study area was divided into sub-areas with differing magnetic field levels. Subjects living close to the line were contrasted with those resident in the more distant dwellings.
252 subjects had blood sample taken to investigate hematological parameters, including lymphocyte subsets. Lymphoproliferative response to mitogens and cytolytic activity of natural killer (NK) cells were tested.
A detailed questionnaire collected information on possible confounders.
Results: Preliminary results showed in "exposed" vs "unexposed" subjects:
a) increased platelet count and plateletocrit, and reduced basophilic granulocytes
b) reduced percentage of total CD3± T lymphocytes
c) reduced percentage of CD4± (helper inducer) T lymphocytes
d) reduction of CD4/CD8 ratio
e) increased percentage of NK cells
f) increased percentage of CD19 lymphocytes
Conclusions: Preliminary results showed some abnormalities in the hematological and immunological parameters of the exposed group which deserve further investigation.

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HEMOGLOBIN ADDUCTS IN CORD BLOOD FROM ACRYLAMIDE, ITS METABOLITE GLYCIDAMIDE AND BIRTH OUTCOMES

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Background and Aims: Acrylamide is a potential human carcinogen and neurotoxicant that crosses the human placenta. Some reproductive and developmental toxicity of acrylamide have been observed in rodents, yet evidence is limited and no human data exist. We examined the effects of hemoglobin adducts from acrylamide in cord blood, as well as its mutagenic and genotoxic metabolite glycidamide, on birth outcomes in the NewGeneris (Newborns and Genotoxic exposure risks) study population.
Methods: Included in this study were infants born to women with singleton pregnancies (N=1096) from Greece, Norway, Spain, Denmark and the United Kingdom. Cord blood adducts were simultaneously determined by the "adduct FIRE procedure" using liquid chromatography–tandem mass spectrometry (LC–MS/MS).
Results: Acrylamide exposure was associated with a significant decrease in birth weight. In linear regression models adjusted for gestational age and country of birth, the difference in mean birth weight for infants in the highest quartile of acrylamide adduct concentrations compared with that of infants in the lowest quartile was -127 gram (SE: -41; p=0.006, n=1096); this difference was similar in infants born to self-reported non-smokers (β: -115 gram; SE: -42; p=0.006, n=941) and for glycidamide adducts. No major changes in these associations were observed when self-reported maternal smoking, exposure to ETS, maternal age, pre-pregnancy BMI, and gender were included as additional covariates. High acrylamide exposure were also associated with increased odds ratios for small size for gestational age (birth weight <10th population centile taking into account week of gestation) and reduced head circumference.
Conclusions: This study is the first to evaluate the relationships between cord blood hemoglobin adducts from acrylamide and birth outcomes. As the associations between biomarkers of acrylamide exposure and reduced birth weight appeared in infants born to non-smokers, these results are likely to be associated to intake of less healthy food.

INCREASED PREVALENCE OF RESPIRATORY SYMPTOMS AMONG CHILDREN EXPOSED TO DAMPNESS AND MOULD AT SCHOOL

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Background and Aims: Studies on respiratory health effects of dampness and mould among school-aged children have mainly focused on home environments. We studied the relationships between dampness and mould in school buildings and respiratory symptoms in children.
Methods: Primary schools in Finland, The Netherlands and Spain were selected according to the presence (n=29) or absence (n=28) of reported moisture damage (dampness and/or mould) that was confirmed by standardised building inspections. Parent-administered questionnaires among 9425 children aged 6-12 years included lower and upper respiratory tract symptoms in the last year (ISAAC) and potential determinants. Country-specific associations between building dampness problems and the prevalence of respiratory symptoms were assessed using logistic regression analyses adjusted for potential confounders including sex, age, educational level, and mould in the home, and were combined using random-effects meta-analyses.
Results: The prevalence of respiratory symptoms was higher in Finland than in the other two countries. Finnish children from exposed schools more often had respiratory symptoms in the last year including wheeze (Odds Ratio (OR) 1.35; 95% Confidence Interval (CI) 1.11-1.65), dry cough at night (OR 1.36; CI 1.13-1.64) and nasal symptoms (OR 1.33; CI 1.16-1.53). Associations for The Netherlands and Spain were not apparent. A significant interaction by country was found for wheeze (P for heterogeneity 0.003) and nasal symptoms (P=0.02). Controlling the analyses for mould or dampness at home did not change the results.
Conclusions: These preliminary analyses suggest that moisture damage in schools may have adverse respiratory health effects on the pupils. Finnish schoolchildren seem to be at higher risk, perhaps due to quantitative and/or qualitative differences in exposure characteristics. More complex analyses taking into account these differences as well as other spatial and temporal determinants of exposure related to climate and building use will be considered.

EFFECTS OF PRENATAL EXPOSURE TO AMBIENT AIR POLLUTION ON RESPIRATORY HEALTH IN EARLY LIFE – SOME METHODOLOGICAL CONSIDERATIONS BASED ON 'EDEN MOTHER-CHILD' COHORT

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Background and Aims: The increasing availability of air pollution (e.g., dispersion) models with a fine spatial resolution in large areas offers opportunities to try better characterize the effects of prenatal exposure to air pollution on respiratory health in early-life. We aimed at evaluating this association and at illustrating some issues related to confounding and choice of study area that may impact on effect estimates.
Methods: We included 1082 mother-child pairs from EDEN cohort, living in rural and urban areas around Poitiers and Nancy, France. NO_2 and PM_{10} levels in the ambient air at the home addresses were estimated using ADMS dispersion model. Information on health outcomes until 1 year of age was obtained from questionnaires.
Results: Mean (sd) pregnancy exposure to NO_2 and PM_{10} were 20.9 (8.1) and 20.1 (4.3) $\mu g/m^3$, respectively. The adjusted odds-ratio (AOR) associated with a 10 $\mu g/m^3$ increase in NO_2 was 0.78 (95% confidence interval, 0.52-1.15) for doctor-diagnosed asthma, 0.81 (0.62-1.05) for wheeze and 0.95 (0.75-1.21) for bronchitis/bronchiolitis in the entire population. The AOR for doctor-diagnosed asthma was 1.15 (0.55-2.43) in Poitiers and 0.63 (0.38-1.04) in Nancy. Similar patterns, with no significant associations, were observed for PM_{10}. Maternal smoking habits, mode of transport, breastfeeding, daycare attendance differed significantly between both cities, urban and rural areas, and according to exposure levels..
Conclusions: Prenatal exposure to air pollutants was not significantly related to respiratory health in the first year of life; this may partly be explained by the low exposure levels and the early age of assessment of respiratory health. Additionally, exposure was strongly associated with area of residence and with many factors known to be associated with respiratory health. Given that these factors could not always be accurately assessed, there is potential for residual confounding. The potential for confounding may differ between urban and rural areas.

HEAVY METALS AND COUPLE FECUNDITY, THE LIFE STUDY

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Background and Aims: Exposure to high concentrations of heavy metals has been associated with a spectrum of adverse reproductive outcomes in men and women. However, limited prospective study has focused on the relation between environmentally relevant concentrations and human fecundity serving as the impetus for the study.
Methods: Using population based sampling frameworks, we recruited 501 couples discontinuing contraception for the purpose of becoming pregnant in two geographic regions with reported exposure to persistent environmental pollutants including metals. Upon enrollment into the cohort, couples completed baseline interviews and anthropometric assessments and provided blood specimens for the quantification three metals (i.e., cadmium (ng/ml), mercury (ng/ml), lead (ug/dl)) using inductively coupled plasma mass spectrometry. Couples completed daily journals on intercourse and lifestyle behaviors along with menstruation and pregnancy test results for women. Couples were followed until an hCG pregnancy or 12 cycles without pregnancy. Fecundability odds ratios (FORs) and 95% confidence intervals (CIs) were estimated adjusting for maternal age, body mass index, cotinine, and serum lipids in relation to female then male exposures. FORs <1 reflect reduced fecundity or a longer time-to-pregnancy. Final models included both partners' metals concentrations along with relevant covariates.
Results: In adjusted models, cadmium was associated with reduced FORs for both female (0.82; 95% CI 0.69-0.99) and male (0.84; 95% CI 0.71-0.99) exposure. Lead was associated with a significant reduction in the FOR (0.86; 95% CI 0.75-0.98), but only for male exposure. In the joint analysis, male lead concentration significantly reduced the FOR (0.86; 95% CI 0.76-0.99). No association was observed for mercury and couple fecundity.
Conclusions: This prospective couple based cohort with longitudinal capture of time-to-pregnancy affirms the reproductive toxicity of cadmium and lead concentrations for environmentally relevant concentrations underscoring the importance of measuring both partner's exposures for coupled based reproductive outcomes.

PERFLUORINATED CHEMICALS AND SEMEN QUALITY, THE LIFE Study

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Background and Aims: The relation between persistent environmental chemicals and semen quality is still evolving, given that much of the available evidence relies upon couples seeking infertility treatment. We assessed the relation between perfluorinated chemicals (PFCs) and semen quality in the context of lifestyle among male partners participating in a cohort of couples attempting to become pregnant without an infertility history.
Methods: We utilized population-based sampling strategies to recruit 501 couples discontinuing contraception for purposes of becoming pregnant from two geographic regions with reported environmental exposures to persistent pollutants. Upon enrollment into the cohort, couples completed baseline interviews and anthropometric assessments and provided blood for the quantification of 8 serum PFCs (perfluorosulfonates, perfluorocarboxylates and perfluorosulfonamides) using tandem mass spectrometry, 2005-2009. Men collected semen samples at home following two days of abstinence, and returned them by overnight mail to a central andrology laboratory. Linear regression analysis adjusting for age, urinary cotinine, serum lipids, and research site was used to estimate the effect of PFCs (ng/ml as categorized into quartiles) in relation to a spectrum of conventional semen quality measurements along with CASA and flow cytometry measures.
Results: Four PFCs (perfluorodecanoate [PFDeA], perfluorooctane sulfonamide [PFOSA], perfluorooctane sulfonate [PFOS], and perfluorooctanoate [PFOA]) were adversely associated with select semen quality endpoints, with effects seemingly concentrated with sperm head size. Men in the highest quartile of PFOA had significantly smaller sperm head length (-0.08; p=0.03), area (-0.26; p=0.03) and perimeter (-0.15; p=0.04) compared to men in the lowest quartile.
Conclusions: Select PFCs were associated with decrements in sperm head endpoints and may be indicative about possible modes of action, particularly in the absence of other adverse effects on other aspects of semen quality.

PERSISTENT ORGANIC POLLUTANTS AND ENDOMETRIOSIS: IMPORTANCE OF BIOLOGIC MEDIA FOR DEFINING EXPOSURE - THE ENDO STUDY

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Background and Aims: Persistent organic pollutants (POPs) have been associated with endometriosis, though with equivocal results possibly reflecting choice of biospecimen. We sought to assess this relation using omental fat as a measure of internal dose then compared findings with serum concentrations to assess the consistency.
Methods: We used a population-based matched exposure cohort design to establish an operative cohort of women aged 18-44 years undergoing laparoscopy from 14 clinical centers (n=495) for capture of incident endometriosis, and a similarly aged population cohort residing within 40 miles of the clinical centers who underwent pelvic magnetic resonance imaging (MRI) for the identification of incident endometriosis (n=131). All women completed baseline interviews, anthropometric assessment and provided blood and urine specimens, 2007-2009. Surgeons obtained visceral fat and completed standardized operative reports for gynecologic pathology and endometriosis staging. Two radiologists completed all standardized MRI. Using high-resolution mass spectometry, fat and serum concentrations were quantified for organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs) in fat and serum. All chemical concentrations were log transformed prior to inclusion in logistic regression models when estimating odds ratios (OR) and 95% confidence intervals (CIs) for visually-diagnosed endometriosis adjusting for age, cotinine, body mass index, and a conditional parity-breastfeeding variable.
Results: Fat concentrations were higher than serum POP concentrations. In unadjusted models, significantly increased ORs for endometriosis were observed for hexachlorobenzene (HCB; OR=3.04), PBDE #183 (OR=1.3), PCB #28 (OR=1.64), PCB #151 (OR=15.01), and PCB #201 (OR=4.37), but only when using fat. HCB remained significant in adjusted models (OR=2.49; 95% CI 1.07-5.79). Further model exploration is underway, given the reduction conferred by cotinine (OR=0.88; 95% CI 0.79-0.99).
Conclusions: POPs were associated with endometriosis when using both the gold standard for internal dose (fat) and diagnosis (laparoscopy). Reliance on other biospecimen proxies may mask relations between lipophilic chemicals and endometriosis.

MORTALITY IMPACTS OF SULPHUR CONCENTRATIONS IN AIR IN 20 EUROPEAN CITIES IN THE APHEKOM PROJECT: A CASE-CROSSOVER DISTRIBUTED LAG APPROACH

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Background and Aims: The implementation of three EU directives to reduce sulphur content in fuel was assessed for mortality impacts in 20 European cities, between 1990 and 2007 in the APHEKOM project. This specific study aimed to examine whether different lag structures apply to the relationships between cardiovascular and respiratory events and SO_2 concentrations, which will therefore result in differences in mortality impacts from regulation implementation. Prior evidence has shown that cardiovascular mortality is more likely to be affected by SO_2 concentrations on the same or the previous day of the event, while respiratory mortality more likely to show a delayed effect of exposure to the same pollutant.
Methods: City-specific data on SO_2 concentrations and all-cause and cause-specific mortality were obtained for 20 European cities. A city-specific distributed lag case-crossover design was implemented with two simultaneous lags in the model: average SO_2 concentration for lag 0 to 1 days (L01); and lag 2 to 5 days prior to the mortality event (L25). Pooled estimates of the city specific results were calculated using a random effects meta-analysis model.
Results: Pooled results showed a 1.17% (95% CI: 0.53%-1.80%) increase in all-cause mortality for every 10µg/m^3 change in SO_2 concentrations for L01, and no effect for L25. Respiratory mortality increased by 1.31% (95% CI: 0.04%-2.59%) with L25, and showed no effect with L01. Cardiovascular deaths showed a 0.94% (95% CI: 0.32%-1.57%) increase with L01 but not with L25. These associations were greater than those observed in no-lag models for both mortality causes.
Conclusion: The application of different lags in the association between cause-specific mortality and SO_2 concentrations showed stronger and more precise effect estimates than the no-lag approach. Considering the important decline in SO_2 concentration levels following regulation implementation, these lagged effects imply greater reductions in mortality than those suggested by no-lag models.

EXPOSURE VARIABILITY AND BEHAVIOUR OF INDOOR AND OUTDOOR AIR POLLUTANTS IN PRIMARY SCHOOLS IN THE UNITED KINGDOM

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Background and Aims: Current evidence suggests that exposure to common indoor air pollutants is associated with adverse health effects in children. This study was conducted to examine air quality in four primary schools in southern England, in order to establish daily, weekly and seasonal variability of pollutant concentrations within and between the schools, and to understand the behaviour of common indoor and outdoor air pollutants.
Methods: Four primary schools were selected for the study, in urban, suburban and rural environments with diverse size and socioeconomic backgrounds. Air quality monitoring was conducted in three rounds (autumn, winter, summer) during the academic year 2009-2010. Each round involved monitoring continuously for one week in four locations of typical children's exposure: generally three indoors and one outdoors. Measurements were carried out for particulate matter count for size range 0.5-5.0μm ($PM_{0.5-5.0}$), carbon dioxide (CO_2), carbon monoxide (CO), and nitrogen dioxide (NO_2).
Results: Findings revealed great variability in $PM_{0.5-5.0}$ concentrations during the week and between rounds of measurements within each school, and between schools. CO concentrations were greatly variable for the suburban and rural schools. Little variability was seen for NO_2 concentrations. CO_2 levels differed during the day and between days and rounds in each school, and between schools, depending on the daily activity patterns of children and practice of ventilation. Linear regression models predicted indoor levels for $PM_{0.5-5.0}$, CO and NO_2, based on contribution of outdoor concentrations to the same pollutant, ventilation measured by CO_2 concentrations and weather variables.
Conclusions: Study findings showed variability in pollutant exposure levels between locations, days and seasons in each school, and between all four schools. These differences related to school building design and location, ventilation practices and children's daily activities. These findings support the need for developing methodology for personal exposure assessment to air pollutants among school children.

BRINGING THE GERMAN HUMAN BIOMONITORING SYSTEM INTO LINE WITH REACH - ARE GERMAN ENVIRONMENTAL SURVEY (GERES) AND ENVIRONMENTAL SPECIMEN BANK (ESB) APPROPRIATE TOOLS?

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Background and Aims
The German population is still substantially exposed to chemicals. This can be demonstrated for chemicals some of which have already been banned, restricted or cannot be further regulated because of their geogenic origin. Exposure levels, their sources and development over time are well documented by the German human biomonitoring (HBM) system consisting of the German Environmental Survey (GerES) and the Environmental Specimen Bank (ESB). While in the past outdoor air and drinking water were particularly important, today's exposure of the German population is mainly due to nutrition, indoor air, the broad variety of consumer products, body-care products, and cosmetics. Thus, not only the importance of the exposure pathways changed, but also the chemicals of concern. However, even if being banned decades ago, exposure levels of persistent chemicals like DDT or PCB as well as carcinogenic substances difficult to prevent emphasise the necessity of continuously monitoring persistent, accumulating or carcinogenic substances in humans and the environment.
Methods: Germany started a joint activity on enhancing HBM aiming at identifying and measuring current substances of possible concern regarding health impacts or potentially frequent occurrence in the population. Background, motivation, and status of this project will be presented.
Results: Three out of six chemicals to be banned from 2014 due to REACh regulations were identified as relevant chemicals by the German HBM system: As demonstrated by GerES data exposure to the phthalates DEHP, BBP and DBP exceeded tolerable daily intakes in a considerable fraction of children living in Germany. Musk fragrances, diaminodiphenylmethane (MDA), and flame retardant HBCDD are heading the project's elaborated priority-list for HBM methods to be developed.
Conclusions: The new HBM methods will help a) prioritizing substances of concern with regard to their occurrence in humans and the environment, b) following up efficiency of REACh as well as c) optimizing assessment requirements.

PRENATAL EXPOSURE TO RESIDENTIAL OUTDOOR AIR POLLUTION AND INFANT MENTAL DEVELOPMENT: MODULATION BY ANTIOXIDANTS AND DETOXIFICATION FACTORS

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Background and Aims: Effects of air pollution on children's neurodevelopment have recently been suggested. We aimed to assess whether prenatal exposure to residential outdoor air pollution impaired infant's mental development, and whether antioxidant/detoxification factors modulate this association.
Methods: In the Spanish INMA (Environment and Childhood) Project, 2,644 pregnant women were recruited at 1st trimester. Nitrogen dioxide (NO_2) and benzene were measured with passive samplers covering the study areas. Land-use regression models were developed for each pollutant and applied to predict outdoor air pollution levels at each women address during the whole pregnancy. Information on parental socio-demographic, life-style, and child characteristics was obtained by questionnaire. Maternal diet was obtained in the 1st trimester through a validated food frequency questionnaire. Maternal circulating vitamin D in pregnancy were determined by radioimmunoadsorbant assay. Around 14 months, infant mental development was assessed using the Bayley Scales of Infant Development.
Results: Median exposure was 28.1µg/m^3 for NO_2 and 1.2µg/m^3 for benzene. Exposure to NO_2 and benzene showed a negative association with mental development, though not statistically significant, after adjusting for a large array of potential confounders (• (95%Confidence Interval) = -0.74 (-3,73;2,26) and -1.40 (-3,71;0,91), for a doubling in each compound, respectively). Stratifying by antioxidant/detoxification variables, a significant negative relation of both compounds in infants with low maternal intakes of fruits and vegetables during pregnancy was observed (-3.62 (-6,57;-0,68) and -3.56 (-6,12;-1,00), respectively) although interaction terms were only borderline significant ($p<0.10$). A negative non-significant association in non-breastfed infants and in infants with low maternal levels of vitamin D was also found.
Conclusions: This study supports the hypothesis that prenatal exposure to residential air pollutants may adversely affect infant mental development, and that these effects may be limited to infants whose mothers have low levels of antioxidant intakes and/or detoxification factors.

Evaluation of Statistical Weighting Approaches for a Meta-analysis of Occupational Acrylonitrile Exposure and Lung Cancer Mortality

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Background and Aims: Meta-analysis provides a useful quantitative summary for occupational mortality studies. We conduct a meta-analysis for lung cancer mortality and occupational acrylonitrile exposure comprising all available published studies through the end of the year 2010. In addition, we evaluate weighting methods typically applied by standard meta-analytic approaches for estimating summary standardized mortality ratios (SSMR).

Methods: Results were abstracted from mortality studies for eleven occupational cohorts. National comparisons were reported for eight cohorts while regional comparisons were reported for seven cohorts. The SSMR was calculated by pooled analysis, and by fixed and random effects models following heterogeneity assessment. The relative change in proportional weight for each study-specific SMR was evaluated.

Results: Pooled SSMRs were 0.93 (95%CI: 0.84, 1.02) and 0.84 (95%CI: 0.74, 0.94) for results from the national and regional comparisons, respectively. Due to significant evidence of heterogeneity in the results for both national comparisons (p=0.01) and regional comparisons (p=0.05), random effects SSMRs were estimated as 1.02 (95%CI: 0.85, 1.22) and 0.96 (95%CI: 0.77, 1.19), respectively. Standard statistical weighting approaches to meta-analysis increased the relative proportional weights assigned to studies reporting SMRs greater than 1.0 while those studies reporting SMRs less than 1.0 had decreased proportional weights.

Conclusions: Consistent with published qualitative reviews, occupational acrylonitrile exposure is not significantly associated with lung cancer mortality. The current meta-analysis weighting approach may introduce bias relative to summary estimates from pooled analyses. This is due to increased proportional weights assigned to studies reporting SMR greater than 1.0 without regard to cohort size or number of observed mortality outcomes.

TOOLS FOR ASSESSING HEALTH IMPACTS OF CLIMATE CHANGE: LESSONS LEARNT FROM MALTA AND TURKEY

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Background and Aims: Within the framework of the CIRCE project, training in assessing health effects of climate change was provided and assessments of past and future impacts on health were done in Turkey and Malta.
Methods: The training package and the pilot training were targeted for national public health experts appointed to co-ordinate the development of a climate change and health strategy. Various CIRCE partners contributed to the development and delivery of the training. The objective of the training was in particular to enable participants to assess health impacts and to develop a climate change and health strategy, emphasizing the health sector role in adaptation and mitigation. Assessments were done in Malta and Turkey so far.
Results: In Turkey, the assessment of health risks of climate change has an emphasis on infectious diseases. Risks of vector-borne, water- and food borne diseases are growing. Crimean-Congo Hemorrhagic Fever, Hantaviruses and phleboviruses infections were recently detected in Turkey, and all were described to be associated with climate changes.
In Malta, an increase in summer temperatures is of concern to human health, especially in the elderly. Also air pollution (particulate matter, ozone), thunderstorms and flash floods and infectious diseases (food- and vector-borne diseases) put health at risk . In the Maltese assessment risk perception was considered, finding that 84 % of the Maltese population is aware of climate change but that Maltese public perceives climate change “only somewhat” as a threat to human health.
Conclusions: Adaptation actions in the area of Public Health include to strengthen health, social and environmental systems and services to improve their capacity to prevent, prepare for, and cope with climate change. At the same time, any mitigation and adaptation measures should integrate health issues at all levels; raise awareness to encourage healthy mitigation and adaptation policies in all sectors; increase the health and environment sectors’ contribution to reducing greenhouse gas emissions; share best practices, research, data, information, technology and tools at all levels on climate change, environment and health and to identify research gaps.

INTEGRATED ASSESSMENT MODEL FOR ESTIMATING HEAT RELATED MORTALITY DUE TO GLOBAL CLIMATE CHANGE: RESULTS FROM THE INTARESE PROJECT

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Background and Aim: The INTARESE project developed a framework for integrated environmental assessment. We report findings from WP 3.7 "Climate" that developed a method to quantify heat-related mortality in Helsinki (population=570 thousand), London (population= 7.5 million) and Rome (population= 2.7 million), under current and future climates.
Methods: Published European pooled temperature-mortality functions were used to estimate age-specific heat-related summer mortality. Future populations were derived from national estimates scaled to age specific projections for the study area. Climate scenario data from regional climate models were used to estimate heat-related deaths in 2030 and 2050. Age-specific death rates were assumed constant and a policy scenario (introduction of heat prevention plan), was included in the model (reduction in mortality of 46% derived from an Italian multi-city study).
Results: Under the current climate, heat-related deaths during an "average" summer: were 58 (95%CI 15,106) in Rome, 180 (95%CI 15, 369) in London and 8 (95%CI 1,16) in Helsinki; while during a "hot" summer estimates rose to 477 (95%CI 123,865), 1320 (95%CI 110,2649) and 79 (95%CI 6,163) respectively. By 2030, "average" summer heat-related deaths are projected to rise to 120 (95%CI 33,214) in Rome, 259 (95%CI 20, 510) in London and 14 (95%CI 1,28) in Helsinki. With the introduction of policy (heat prevention plans) by summer 2030, deaths will be reduced to 65 in Rome, 141 in London and 8 in Helsinki.
Conclusions: Integrated models of climate change impacts are able to consider both climate and population scenarios (growth and ageing). There is limited information on effect modifiers which may reduce future impacts due to acclimatization (autonomous adaptation) or policy measures (planned adaptation). Using available evidence, we found that intervention measures may contribute in reducing the impacts of climate change on health.

THE IMPACT OF HEAT AND HEAT-WAVE EPISODES IN EUROPEAN CITIES

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Background and aims: In recent years several EU projects (PHEWE, EuroHeat, CIRCE) investigated the impact of high temperatures and heat-waves producing a broad description of health effects in European cities. Since these projects used two different approaches, time-series and episode analyses, results are not easily comparable.
The EuroHeat project evaluated the impact of heat-waves on mortality during the 1990-2004 years in 9 European cities, comparing estimates with a standardized definition of heat-wave and results showed large heterogeneity of the effect among cities.
In this analysis an integrated approach is used to evaluate the increase in risk due to both the effect of daily temperatures and heat-waves in the EuroHeat cities.

Methods: The impact of high temperatures on mortality is investigated using distributed lag nonlinear functions of temperature (DLNM models) including an indicator term for heat-wave (defined as 2 or more consecutive days with maximum apparent and minimum temperature above the 90th monthly percentile). The effect is estimated as percent increase in daily mortality in the elderly (65+ years) and for different duration of heat-waves.

Results: Results of the EuroHeat study showed great geographical heterogeneity of the effect of heat-waves among cities. The increase in mortality was up to 3-times greater during heat-waves of long duration and high intensity. Results showed a greater impact in Mediterranean (+21.8% total mortality) than in North-Continental (+12.4%) cities, whereas the heat-wave impact was stronger in North-Continental cities in 2003. These results are compared with estimates decomposed in the two components of risk due to the effect of daily temperatures and heat-waves.

Conclusions: This additional analysis provides a more complete and comparable evaluation of the heat effect on mortality in European cities, jointly estimating the effect of daily temperatures and heat-waves. Furthermore, results allow comparisons for nonlinear delayed effects of temperatures and harvesting.

SHORT TERM EFFECT OF HIGH TEMPERATURES ON MORTALITY IN MEDITERRANEAN CITIES: RESULTS FROM THE EU-FUNDED CIRCE PROJECT (CLIMATE CHANGE AND IMPACT RESEARCH: THE MEDITERRANEAN ENVIRONMENT)

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Background and aims: Current scenarios indicate that the Mediterranean area will be especially vulnerable to future climate change. The effect of heat has been widely studied in Europe while to a less extent in North Africa and the Middle East. In the CIRCE project, we estimated the short-term effect of Maximum apparent temperature (Tappmax) on total and cause-specific mortality, (by gender and age groups) during summer (April-September) in 10 Mediterranean cities (Athens, Bari, Barcelona, Istanbul, Lisbon, Palermo, Rome, Telaviv, Tunis and Valencia). The presence of harvesting effect was also evaluated.
Methods: Two time series approaches were performed: a linear threshold model (GEE) and a distributed lag nonlinear model (DLNM) to overcome the assumption of linearity. The first model estimated the overall effect of Tappmax (lag0–3) above a city-specific threshold, while the second estimated the effect of 1°C step increases considering different time windows (up to 30 days).
Results: For most cities, J-shaped curves, with differences in the threshold and the impact of high temperatures were observed. The relationship was weak in the hottest cities (Telaviv, Tunis and Valencia). The greatest effect on total mortality was found in the 65+ age group. The second analysis shows a difference in the effect of Tappmax for 1°C step increases along the temperature and lag distribution. The harvesting effect was observed only in few cities.
Conclusions: The results show that the effect of heat and its temporal structure differs between cities. The weaker effect in North-African cities can be explained by the lower proportion of elderly and local population adaptation to heat. On the contrary, the progressive aging in European people will increase the fraction of susceptible population. Differences in local demographic characteristics may explain the heterogeneity of the harvesting effect.

CHARACTERIZATION OF GLOBAL DNA METHYLATION AT LINE-1 IN A COHORT OF URBAN ASTHMATIC CHILDREN WITH A GRADIENT OF EXPOSURE TO HIGHWAYS

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Background and Aims: Asthma is a complex chronic disease with heterogeneous clinical expression and waxing and waning activity over the life cycle. Epigenetic modifications may be a mechanism to explain clinical variability. However, the relationship between environmental exposures, epigenetic changes, and health outcomes is unclear, particularly in young vulnerable populations.

Methods: This study builds on an investigation of the impact of near-highway residence on the health of asthmatic children, "The Community Action Against Asthma (CAAA) Diesel Study." In this pilot study, we measured global DNA methylation in cells from saliva in a cohort of urban asthmatic children. Children aged 6-14 with asthma were recruited based on the proximity of their residence to highways. DNA was extracted from saliva samples from 79 children and assessed for degree of DNA methylation at four loci within LINE-1. We assessed the association between methylation and gender, age, and exposure to highways.

Results: Methylation of LINE-1 loci was heterogeneous and ranged from a mean of 66% at site 3, to 74% at site 2, with an overall mean of 70% across the four sites. Girls were hypomethylated at site 3 (65.64%) compared to boys (67.11%, p=0.048) and this difference remained significant after adjustment for gender, race, asthma severity, exposure to tobacco smoke, and highway exposure. Neither current highway exposure status nor asthma severity were significant independent predictors of methylation. However, changes in methylation pattern with age differed across exposure groups, showing a steeper declining gradient in the high diesel exposure group.

Conclusions: Differences in global methylation measured at LINE-1 are site-specific, present relatively early in life and may vary by exposure to roadway-associated air pollution. There may be important gender-specific differences in methylation. Expanded studies of the epigenome in exposed populations will help clarify the role of epigenetic modifications in asthma phenotype.

EXPOSURE ASSESMENT: PAST AND PRESENT

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Background and Aims: Biomonitoring of exposure to short-lived chemicals is inherently complex. Furthermore, the multiple biomarkers that can be used for biomonitoring complicate the interpretation, compromise the specificity of the measurement and hinder our ability to link exposure to disease.
Methods: We have explored multiple markers of exposure to organophosphorus (OP) insecticides, their longitudinal variability, matrix stability and measurement error. Our evaluations have employed state- of- the- art mass spectrometry-based methods to understand the distribution of OP pesticide biomarkers in multiple matrices, their long term stability in various matrices, the contributions from non-toxic preformed environmental degradates, and their overall relation and measurement error.
Results: While serum/plasma measurements of the intact pesticide are more selective biomarkers of exposure, blood levels of these chemicals tend to be in the low pg/mL range, typically about 3 orders of magnitude lower than urinary metabolite levels. While urinary metabolite levels are typically significantly correlated ($r>0.5$, $p<0.001$), mass balance between exposures and metabolite levels can rarely be achieved. Significant contributions to urinary metabolite levels from preformed metabolites can occur. In fact, in many common food matrices, up to 30% of the pesticide residue can be converted to its preformed metabolite under normal storage conditions. Protein adduct measurements of OP pesticides allow retrospective and time-integrated exposure assessments but the measurements are cumbersome and costly. Although OP pesticides are not believed to appreciably bioaccumulate, certain OP pesticides can be deposited in adipose tissue.
Conclusions: While measuring the intact pesticide in biological matrices is the most selective measurement of OP pesticide exposures, this measurement can be hindered by analytical limitations. Creative, holistic approaches to assess OP pesticide exposure must be undertaken in order to fully understand their relation to disease.

OZONE AND CHILDREN'S HEALTH: TOWARD IMPROVING CONSIDERATION IN AIR QUALITY DECISIONS

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Background and Aims: Ozone, regulated by the U.S. Environmental Protection Agency (EPA) under the National Ambient Air Quality Standards, has been shown to have detrimental effects on human respiratory health, with some of the greatest effects seen in children and asthmatics. EPA must rely on the epidemiologic data to understand how ozone impacts susceptible populations, such as children. This work aimed to understand the current state of the science, identify data gaps and other important considerations, and propose ideas for filling the data gaps, in an effort to improve comparison across studies of the effects of ozone on children's respiratory health.
Methods: A literature search was conducted to identify peer-reviewed epidemiology studies with child subjects and ozone air pollution exposure; results were restricted to respiratory-related effects. A review of the studies was completed, comparing/contrasting methods including: exposures, outcomes, lags, co-pollutants, confounders and effect modifiers, and other variables. Data gaps were qualitatively analyzed, and the relative strengths and weaknesses of the studies were assessed.
Results: Over forty studies were identified, with varying subject ages, ozone exposure classification and measurement, co-pollutants, model types, confounders, and outcomes (ranging from expiratory measures to school absences). Data gaps were identified, including the need for data concerning the consequences of long-term ozone exposure and the lack of understanding of ozone effect(s) during gestation and early development.
Conclusions: There are inconsistencies in the methods and results of the ozone epidemiology literature focusing on children's health, which may hinder the ability of science decision-makers to incorporate all of the available research into policy recommendations. It is hoped that this analysis will enable key data gaps on the effects of ozone on children's respiratory health to be filled, and will aid the consideration of this research in future decisions regarding air quality improvement.

HAIR NICOTINE CONCENTRATION IN NON-SMOKING WORKERS EXPOSED TO SECONDHAND TOBACCO SMOKE

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Background and Aim: Exposure to secondhand tobacco smoke (SHS) is a public health problem of high concern worldwide. Restaurants and nightclubs are the work environments with higher levels of exposure to SHS. Our aim was to assess personal exposure to SHS, measured by hair nicotine concentrations, and to identify its main determinants in non-smoking workers of bars and restaurants in Santiago, Chile.

Methods: A total of 79 non-smoking workers from 25 bars and restaurants were recruited in 2008 and completed a questionnaire, provided a hair sample to measure nicotine concentrations and used two passive personal samplers to measure airborne nicotine concentrations for 24 hours. One sampler was used during working hours and one sampler was used outside the workplace. Hair and passive sampler filters were analized at the Johns Hopkins Bloomberg School of Public Health. Multiple linear regression models were used to evaluate determinants related to hair nicotine concentrations.

Results: The median age was 30 years (interquartile range (IQR) 24-40). The proportion of men was 66%. The median number of days of work was 6 (IQR 5-6) and median number of hours worked per day was 9 (IQR 8-11). Comparing the hair nicotine concentrations by type of location, we found that workers in smoking venues had higher concentration (13.7 ± 5.5 ng/mg) than workers of non-smoking venue (3.5 ± 5.5 ng/mg) and mixed venue (3.7 ± 6.2 ng/mg). A change in 1 $\mu g/m^3$ in air nicotine concentrations in the workplace was associated with 0.42 ng/mg higher hair nicotine concentrations (95% CI 0.19, 0.65; R^2=0.13). Women had 0.64 ng/mg lower hair nicotine concentrations compared to men (95%CI -0.92, -0.36; R^2=0.20).

Conclusions: Results show that workers of bars and restaurants are unprotected against SHS exposure. Due to health risks associated with SHS exposure, a comprehensive smoke-free legislation is urgently needed in Chile.

PROFESSIONAL PESTICIDE EXPOSURE AND DEPRESSION

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Background and Aims: Limited evidence suggests a possible association between pesticide exposure and risk of depression. We explored this association within a Parkinson's disease (PD) case-control study among agricultural workers in France (1998-2000) characterized by a high prevalence of exposure.
Methods: Pesticide exposure was assessed among 177 PD cases and 567 controls all of whom were farmers or farm workers participating in Mutualité Sociale Agricole (France). Self-reported treatment or hospitalization for depression and year of first instance were reported. Exposure classification was based on occupational history, and detailed in-person and on-farm interviews by occupational physicians. Time-dependent exposures were determined on a year-by-year basis from year of first agricultural work to date of interview or year of first depression report, whichever occurred first. Hazard ratios (HR) for depression were estimated using Cox proportional hazards models, stratified by region, adjusted for PD status, age, sex, smoking, education, and history of head trauma. Multiple imputation was used to impute missing values of pesticide families. Analyses based on complete-data and imputed datasets were performed.
Results: Depression was reported by 83 subjects with a mean age of onset of 49 years (standard deviation=14; range=15-77). Ever exposure to herbicides was strongly associated with depression (HR: 2.83; 95% confidence interval [CI]: 1.15-6.97), but exposure to insecticides or fungicides were not. Results were similar when restricted to PD controls or men only. Compared to those never exposed to herbicides, the HR among those exposed for <137 hours (median) was 2.0 (95% CI: 0.8-5.2), and among those exposed ≥137 hours was 3.5 (95% CI: 1.3-9.9). Among specific herbicide families, only dinitrophenol herbicides were significantly associated with depression in both complete-data (HR: 3.35; 95% CI: 1.47-7.65) and imputed (HR: 2.36; 95% CI: 1.04-5.36) datasets.
Conclusions: Our results support an association between depression and professional pesticide exposure, in particular to herbicides.

THE INFANTS' ENVIRONMENTAL HEALTH (ISA) STUDY: A BIRTH-COHORT STUDY WITH AN ECOSYSTEM HEALTH APPROACH IN LIMÓN, COSTA RICA

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Background and Aims: In Costa Rica, pesticide use at large-scale banana plantations includes permanent use of chlorpyrifos-impregnated bags and weekly aerial spraying of mancozeb, an ethylene bisdithiocarbamate (EBDC) fungicide (Barraza et al., 2011). The ISA study aims to evaluate and reduce pesticide-related health risks in infants living in banana growing areas.
Methods: The study population includes 450 mother-child pairs from the Matina County, with intensive large-scale banana farming. To assess prenatal pesticide exposure, women's urine samples were collected during the first, second and third trimester of pregnancy. Also, environmental samples such as dust and soil samples were collected. To obtain information on sociodemographic characteristics, lifestyle habits, occupational history, and pesticide exposure, structured questionnaires have been administered to the women during pregnancy and postpartum. Infants' birth outcomes have been abstracted from the newborns' Official Cards of Health. The association between prenatal pesticide exposure and fetal growth will be examined using multiple linear regression models.
Results: To date, we have enrolled 370 mother-child pairs of whom about 100 women have delivered.
About 25% of the participants live less than 100 meters away from the banana plantations. To assess prenatal mancozeb, chlorpyrifos, and pyrethroid exposures, urine samples (n=468) of 257 pregnant women are being analyzed for the pesticide metabolites ethylenethiourea (ETU), 3,5,6-trichloro-2-pyridinol (TCPy) and phenoxybenzoic acid (PBA), respectively.
In 12 of the 40 villages, environmental exposure was measured on four different times using passive and active air sampling and recollecting dust and water samples and are being analyzed for ETU, chlorpyrifos, and pyrethroid concentrations.
Conclusion: We will compare environmental exposure and personal exposure estimates. We will present variability in infants' prenatal exposure levels over time. The results of the relationship between prenatal pesticide exposure to chlorpyrifos, mancozeb and pyrethroids in relation to birthweight, and length of gestation will be presented for approximately 250 children.

References: Barraza D, Jansen K, van Wendel de Joode B, Wesseling C. Barraza D, Jansen K, van Wendel de Joode B, Wesseling C. Environ Res. 2011 Mar 9. [Epub ahead of print]

RELATION OF CHRONIC ENVIRONMENTAL LEAD EXPOSURE TO DEPRESSION AND ANXIETY SYMPTOMS IN OLDER WOMEN

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Background and Aims: Environmental lead exposure has been associated with adverse cardiovascular and cognitive outcomes, which are themselves correlated with psychological symptoms. Yet few studies have examined links between lead exposure and psychological symptoms. We explored the association between bone lead—a biomarker of cumulative lead exposure—and depression and anxiety symptoms among older women.
Methods: We measured patella and tibia bone lead by K-X-Ray-Fluorescence, and obtained repeated measures of depression and anxiety symptoms using the Mental Health Index 5-item subscale (MHI-5) and Crown-Crisp Index phobic anxiety scale (CCI) in 615 women in the Nurses Health Study. We analyzed MHI scores as a continuous variable using linear regression and estimated the odds of a CCI score ≥4 using generalized estimating equations, in both cases accounting for correlation between repeated outcomes (MHI: 3; CCI: 2) and adjusting for potential confounders.
Results: The average age of participants was 61 (sd=6) years at the time of bone lead measurement. While tibia lead was associated with moderately worse MHI-5 and CCI scores among all women, results were much stronger among women who, at bone lead measurement, were premenopausal or had been consistently on hormone replacement therapy (HRT) since menopause. In these analyses, women in the highest tibia lead tertile scored 8.16 points worse (95% CI: -11.60, -4.72; p-trend<0.0001) on the MHI-5 than women in the lowest tertile, and had increased odds of high phobic anxiety (CCI ≥4; OR=2.41; 95% CI: 1.06-5.50; p-trend=0.04). We found no relation of patella lead to depression and anxiety symptoms.
Conclusions: Our results support an association of cumulative environmental lead exposure with increased risk of depression and anxiety symptoms among older women. Weaker results when including women not consistently on HRT after menopause may be an artifact of increased error in estimating cumulative exposure with bone lead among these women.

CAN HEALTH IMPACT ASSESSMENT (HIA) BE A PLATFORM FOR SYNERGY BETWEEN ENVIRONMENT AND HEALTH? A CROSS-COUNTRY COMPARISON

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Background and aims: Natural and manmade physical environments are influential determinants of health. Sound public policy requires consideration of health, and working across diverse institutions; however, institutional fragmentation and inter-disciplinary specialization are potent barriers to this end. HIA practice is promoted internationally as a means of assessing health impacts of policies, plans and projects. We examine whether using HIA in decision-making has led to changes in inter-sectoral collaboration.

Methods: We utilize a case study approach, describing the evolution and outcomes of HIA initiatives in three countries. We examine whether HIA has led to procedural and substantive outcomes changes, including working relationships between environmental and health disciplines; inclusion of health in assessment and design practices; public and political understanding of the health-environment nexus; and policy, legislation, and regulations. We identify obstacles to inter-sectoral cooperation that HIA may trigger or expose.

Results: The country cases demonstrate diverse relationships, coalitions and disputes between environment and health professionals. In the USA, HIA has demonstrated the need for and feasibility of greater inclusion of health effects in the existing EIA process. It has been a catalyst for advancing health objectives with participation of economic development, transportation, and land-use planning institutions. In Israel, HIA exposed tensions between environment and health professionals, partially overcome in joint work to legislate HIA within EIA, stemming from realization of mutual interests. In the UK, HIA has often been undertaken in cases in which EIA is not conducted, such as policies and urban regeneration, developed and conducted by health practitioners independently of environmental practitioners.

Conclusions: The coalitions of health and environment experts recently formed around promoting HIA demonstrate it is a common ground for advancing mutual interests. While these interdisciplinary coalitions are complex and differences are hard to mitigate, they enable overcoming antagonism, and can serve as a platform for synergy.

ENHANCING THE MEDICATION SAFETY OF INFANTS AND CHILDREN

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Background and Purposes: The medication safety knowledge of main caregivers of infants and children directly or indirectly affect the infants/children's health. This study purpose was aimed to enhance the medication safety knowledge and ability of the main caretakers of infants/children, and help them to clearly describe the physical conditions of infants/children, understand the explanation of the usage of medicine bag, exactitude takes medicine, as well as to discuss with pharmacist when have medication problem or questions.
Methods: The subjects chosen from the main caregivers for infants and children while they take baby to received vaccination at a local health center in July 2010. Based on the medication safety need assessment found that the subjects lack of medication safety knowledge. Therefore, the researcher designed medication safety materials for medication safety education, including:(1) clearly describe the physical conditions of infants/children when go to medical clinic;(2) understand the explanation of the usage of medicine bag; (3) understand the medication usage and exactitude takes medicine; (4) to discuss with pharmacist or doctor when have medication problem or questions. To promote the main caregiver medication safety while the take care infants and children. After medication safety education, the closed end questionnaire was used to evaluate the effects of the medication safety educational program by telephone.
Results: After medication safety education for the main caregivers, the score of the medication safety knowledge of the main caregivers was increased from 79.22 to 98.15, show that the medication safety education was effective.
Conclusions: This study may be of impotence in Enhancing the Medication Safety of Infants and Children. As well as providing the community health workers with a better understanding of how to promote and enhance the medication safety of Infants and Children.

THE COMPLEXITY OF STAKEHOLDER PARTICIPATION IN HEALTH IMPACT ASSESSMENT (HIA)

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Background and aims: Participation of stakeholders, both public members and professionals, is an integral part of HIA. Nevertheless, participatory HIA practices barely recognize or address the complexity which characterizes participation of diverse stakeholders. Our aim was to study participatory practices within HIA using a concrete case-study of multi-ethnic and multi-disciplinary HIA of a large metropolitan plan.

Methods: This research took place within the framework of an HIA regarding a metropolitan plan in the south of Israel that includes among other components a large industrial park and unrecognized Bedouin villages. The research included participant observation of the process, as well as in-depth interviews with the stakeholders and focus groups. The data was analyzed in qualitative methods.

Results: During the scoping stage of the HIA, the stakeholders scoped the environmental limitations zoning surrounding a hazardous industry and hazardous waste site. Process analysis revealed that stakeholders possess multiple types of knowledge, data and interests, often contradictory. These lead in turn to stakeholders speaking different languages and possessing different approaches to health, which may not be possible to mitigate within the framework of an HIA process. For example, the views of stakeholders regarding the required zoning surrounding the hazardous site ranged from 0 to 32km, based on diverse sets of data such as epidemiological studies, monitored emissions, modeling and local knowledge. Interests included employment, real estate, environmental quality and reputation alongside health.

Conclusions: Stakeholders in HIA are situated in different and often conflicting positions. The current frameworks of participation in HIA, and more widely the current culture of participation in decision-making, do not address this complexity. The presentation will include suggestions for modifying the current methods, taken from work on issues such as complexity and multiculturalism, in order to advance HIA towards meeting its goal to maximize health gain and minimize health inequality.

INDIGENOUS CHILDREN'S CHLORPYRIFOS EXPOSURE IN BANANA AND PLANTAIN COMMUNITIES IN TALAMANCA, COSTA RICA

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Background and Aims: In Costa Rica, chlorpyrifos-treated plastic bags are used to protect the banana and plantain fruits from insects and to fulfil product standards. The aim of this study was to evaluate children's exposure to chlorpyrifos in communities situated nearby banana and plantain farms in Costa Rica.
Methods: The study was performed in three communities: in two, chlorpyrifos-treated bags were used in surrounding banana and plantain plantations whereas in the third community mostly not. In total, 140 children donated a urine sample of which forty on more than one occasion (n=207). TCPy levels were measured as a biomarker for chlorpyrifos exposure. Also environmental samples were taken.
Results: Children from the banana and plantain community had higher TCPy levels in urine than children from the organic community, GM=2.6; 2.2 and 1.3, respectively. In the plantain community boys had higher levels than girls, GM=2.9 versus 1.5 µg/g creatinine, p=0.01, whereas in the other communities levels were similar for both sexes. Children from the banana community were more homogenous exposed that children from the plantain community. In the banana and plantain community, chlorpyrifos was detected in several environmental media, including children's (n=12) hand and footwash samples. Median estimated values of the Absorbed Daily Dose of children from the banana and plantain community was five times the chronic US-EPA established reference doses (RfD).
Conclusions: Children living in the vicinity of plantations that use chlorpyrifos-treated bags are being exposed and at risk for overexposure. Measures are required to reduce this exposure.

HEALTH IMPACTS OF THE BUILT ENVIRONMENT: PHYSICAL INACTIVITY, EXPOSURE TO AIR POLLUTION, AND ISCHEMIC HEART DISEASE

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Background: Physical inactivity and exposure to air pollution are important risks globally. Urban planning and the built environment may influence exposures to these risk factors in different ways and thus differentially impact the health of urban populations.
Aims: To investigate the built environment's influence on air pollution exposure and physical inactivity and subsequent health impacts.
Methods: We use a regional travel survey to estimate within-urban variability in physical inactivity and air pollution exposure ($PM_{2.5}$, NO_x, O_3) for ~30,000 individuals in Los Angeles. We then estimate the resulting risk for ischemic heart disease (IHD) using literature-derived dose-response values for the general public and for a sensitive subpopulation. We compare estimated IHD mortality risks between neighborhoods based on "walkability" scores, and conduct sensitivity analyses to explore robustness of our results.
Results: The proportion of non-sedentary individuals is ~2× larger in high- vs. low-walkability neighborhoods (24.9% vs. 12.5%); however, since a small share of the total population is physically active, between-neighborhood variability in estimated IHD mortality attributable to physical inactivity is modest (7 fewer IHD deaths per 100,000 in low- vs. high-walkability neighborhoods). Since spatial patterns differ for air pollutants, risks from air pollution exposure are similar between neighborhoods (9 fewer [13 more] IHD deaths per 100,000 for $PM_{2.5}$ [O_3] in low- vs. high-walkability neighborhoods). This suggests health benefits from increased physical activity may be realized in high-walkability neighborhoods only because of tradeoffs in air pollution exposure. Comparisons to data from other cities suggest our core conclusions are not unique to Los Angeles.
Conclusions: Accounting for exposure to air pollution is a critical aspect of planning for more clean and health-promoting cities.

THE EFFECTS OF HIGH IODINE INTAKE ON PERCHLORATE-RELATED DECREASES IN THYROID HORMONE, NHANES 2001-2

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Background: Perchlorate is an oxidizing agent used to manufacture rocket fuel, munitions, and other products, and exposure in the U.S. is ubiquitous. Perchlorate inhibits iodide uptake into the thyroid and can decrease thyroid hormone production. Thyroid hormone is critical for proper neurodevelopment, and even small decreases in thyroid hormone during pregnancy have been linked with significant developmental effects in children. Recent evidence suggests that common environmental perchlorate exposures could decrease thyroid hormones in people with low iodine intake. This has led to the suggestion that all pregnant women should receive iodine supplementation. However, some data suggest that high iodine intake might also cause thyroid suppression.
Methods: Data from the 2001-2 National Health and Nutrition Examination Survey on serum thyroid hormones and urine perchlorate and iodine, and linear regression analyses, were used to assess whether previously observed perchlorate-related decreases in thyroid hormone might be greater in people with high iodine intakes.
Results: In women with urinary iodine <100 µg/L, a 10-fold increase in urinary perchlorate (about the 10^{th} to the 90^{th} percentile) was associated with an 11.4% decrease in serum thyroid hormone levels ($p<0.01$; $n=383$). In women with high urinary iodine (>95^{th} percentile of 600 µg/L) the effect was 3-times greater. That is, a 10-fold increase in urinary perchlorate was associated with a 34.7% decrease in serum thyroid hormone levels ($p=0.02$; $n=53$). No clear effect was seen in women with moderate urinary iodine levels (100-600 µg/L).
Conclusions: These data provide some indication that high iodine intake might worsen the thyroid effects of perchlorate. Although the sample size was small, the finding in the high iodine group is consistent with other studies in high iodine populations. These findings highlight the need to consider further research on the potential adverse effects of high iodine before new widespread iodine supplementation programs are begun.

ENVIRONMENT-FRIENDLY HABITS – WHO IS WILLING TO ADAPT?

A SURVEY IN A HEALTH CARE SETTING

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Background and Aims

The health care setting is not a priori related to environment concerns. Even so, we assumed that while in a doctor's office, people may be willing to reflect about aspects of quality of life other than their health problems, such as environment issues. Effectively complying with the needs of the environment will require the cooperation of a large part of the population. Knowing the views of an unselected population, as encountered in a doctor's office, can be a first step in order to engage people to adapt to environment-conforming behavior. We inquired about awareness and interest in environment issues with visitors to a doctor's practice.

Methods

People visiting the practice were asked in consecutive order to fill out a 29 question survey, while they were sitting in the waiting room, before being seen by the physician.

The questions asked involved: the degree to which the environment was seen as endangered today and in the future, people's behavior relating to consumption and waste production, impact on the state of health as a result of environment influences, and willingness to make changes towards environment-friendly habits.

Results

129 questionnaires were filled out; the rate of participation was 59.7% of all visitors.

21 questions inquired about concern for environment issues; 73.8% of answers expressed concern. In 8 questions dealing with cooperation in favor of environment issues, 79.1% of answers expressed willingness to change environment behavior.

Conclusions

Participants in this survey showed significant interest in environment issues and willingness to contribute to their improvement, even though they were faced with the subject unexpectedly and with minimal preparation. It is clear that expression of concern is not equivalent to action. The results of the survey could serve as a stimulus to arouse discussion and facilitate changes in

behavior. It could be made more representative by applying it to additional settings, whether health institutions or other public settings.

GENETIC MODIFICATION OF THE ASSOCIATION BETWEEN DIOXIN EXPOSURE AND PUBERTAL ONSET IN A COHORT OF RUSSIAN BOYS

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Background and Aims: Dioxins are environmental pollutants with various reproductive toxicities, possibly including delayed pubertal onset. Dioxin susceptibility varies widely between animal species, but it is unknown whether genetic polymorphisms affecsusceptibility in humans. In this prospective cohort of Russian boys, we assessed whether the observed associations betweenserum dioxin concentrations and pubertal onset differed by genotype.
Methods: 337 tagging single-nucleotide polymorphisms (SNPs) were selected from genes related either to dioxin metabolism or to pubertal development. Gene-environment interactions were assessed using two different statistical methods, considering both peripubertal and maternal serum dioxin concentrations, and pubertal onset defined both by testicular volume (TV) or genitalia staging (G2).
Results: The 408 boys were 8-9 years old at study entry, with a median serum TEQ of 21 pg/g lipid for boys and 25 pg/g lipid for their mothers. Using the first statistical method, in which SNPs are first screened for a significant marginal association with each outcome, two SNPs showed significant interactions with the sons' peripubertal serum dioxin concentration, after adjustment for multiple comparisons. One of the interactions was seen for TV pubertal onset, in the gene for estrogen receptor-α (ESR1). The other was for G2 pubertal onset in the SRC gene. Using the second method (i.e. including all SNPs regardless of marginal associations), significant interactions were seen for two SNPs in the glucocorticoid receptor (GR) after adjustment for multiple comparisons (both of them for G2 pubertal onset, with the sons' peripubertal serum dioxin concentration). No significant interactions were identified for maternal dioxin concentrations.
Conclusions: This is one of the first large studies to assess genetic susceptibility to dioxins. The findings suggest several genes which may modify the associations between dioxin and pubertal onset, although the results are sensitive to the choice of statistical method, and the method of assessment of pubertal onset.

ARSENIC AND T CELL FUNCTION IN AN ENVIRONMENT-MATERNAL INTERACTION STUDY (ARTEMIS)

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Background and Aims: Arsenic (As) is a common environmental toxicant to which millions of people are exposed via contaminated drinking water. Arsenic is linked to increased risk of infectious diseases and cancer, but its mechanism of action is uncertain. The immune system, especially T cell function (and specifically T regulatory cells (Treg), which play a critical role in suppressing inflammation), may be an important mediator of As toxicity.
Methods: The study will use prospectively collected data from a New Hampshire cohort of pregnant women and their infants to assess whether *in utero* As exposure (maternal pregnancy urine As) is associated with: 1) impaired T cell and Treg function in infant cord blood, and 2) decreased immune indicators of placental tolerance. We will 3) conduct exploratory analyses of cord blood T cell and Treg function as predictors of enhanced risk of childhood infections and atopic disorders, and 4) test the feasibility of assessing the relation of As with vaccine response, Treg numbers, and atopy (including IgE levels) in 1 year olds.
Preliminary Results: To date we have 213 cord blood and 162 placenta samples, with the goal of collecting at least 250 of each. The mean pregnancy urinary As concentration (excluding arsenobetaine) is 6.7 (range 0.4 – 288) ug/L. In preliminary analyses of cryopreserved cord blood lymphocytes from 16 newborns, the correlation between log(urine As) and T cell proliferation is 0.63 ($p=0.01$) and for Treg function is -0.33 ($p=0.21$).
Conclusions: Our preliminary findings support a potential role of *in utero* As exposure in altering newborn T cell, including Treg, function. With complete data, we will more fully address the impact of As on immune markers in cord blood and placenta to help inform whether As-related changes in these immune markers affect the risk of childhood infectious and allergic diseases.

AMBIENT AIR POLLUTION AND REGULATORY T-CELL FUNCTION IN ASTHMATIC CHILDREN

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Background: Exposure to ambient air pollution (AAP) is associated with increased severity and incidence of asthma, a disease characterized by increased inflammation. Regulatory T-cells (Treg) are newly discovered suppressors of immune response which are involved in asthma pathogenesis, and whose development and activity is regulated by the Foxp3 locus. We hypothesized that exposure to nitrogen dioxide (NO_2), ozone (O_3), and fine particulate matter ($PM_{2.5}$) would negatively affect function of Tregs.
Methods: Immune function was assessed in blood collected in early 2009 from 71 asthmatic children enrolled in a prospective cohort study in Fresno, CA. Treg cells ($CD4^+CD25^{hi}CD127^{lo}$) were purified by flow cytometry, then used in standard ^3H thymidine proliferation assays, flow cytometry, quantitative PCR, and chemotaxis assays. Daily AAP exposure for each child was estimated using a microenvironment model integrating data from multiple air monitoring sites. For this preliminary analysis, midway through participant recruitment, we assessed the associations of Jan. – Oct. 2008 daily average NO_2, O_3, and $PM_{2.5}$ concentrations with Treg function.
Results: Median age at blood draw was 14 years. Distribution of GINA asthma severity scores at baseline: 1 = 32%, 2 = 51%, 3 = 13%, 4 = 4%. Median AAP concentrations were 6.8 ppb for $N0_2$, 18 ppb for O_3, and 11 $\mu g/m^3$ for $PM_{2.5}$. No significant correlations were seen between any measures of immune function and exposure to NO_2, O_3, or $PM_{2.5}$. However, Foxp3 methylation was marginally-significantly inversely correlated with both O_3 ($r = -0.22$, $p = 0.06$) and NO_2 ($r = -0.18$, $p = 0.13$).
Conclusions: No significant associations were seen between AAP exposure and Treg function, possibly due to the small sample size of this preliminary analysis. Once recruitment is complete, this analysis will be re-done in the full population, with additional immune parameters.

MERCURY USE IN ARTISANAL SMALL-SCALE GOLD MINING IN ZIMBABWE: DISABILTY-ADJUSTED LIFE YEARS (DALYS) OF CHRONIC MERCURY INTOXICATION

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Background and Aims: Artisanal small-scale gold mining (ASGM) is a poverty-driven activity in Zimbabwe and other developing countries. Mercury is used for extracting gold because it is readily available and effective. The environmental burden of disease method developed by the World Health Organization was used to estimate the impact of mercury use in ASGM on the health status of the Zimbabwean population.

Methods: Epidemiological and demographic information was collected on the Zimbabwean population (total, practicing ASGM, living in ASGM areas, chronic mercury intoxicated) through two field studies, international literature and official databases. Missing data were modeled using the software tool DisMod II. Disability-adjusted life years (DALYs) were calculated for 2004. Overestimation was avoided by estimating the lowest assumable DALY-scenario. The estimates were compared with disease burdens published in the recent *Global Burden of Disease* study.

Results: Chronic mercury intoxication attributable to the use of mercury in ASGM caused 4.24 DALYs per 1,000 inhabitants in Zimbabwe in 2004 (preliminary results), most of it attributable to male miners (65% of total DALYs). The total estimated burden of 52,932 DALYs calculated was comparable with the burden due to asthma in Zimbabwe. In Europe, the burden of road traffic accidents and hearing loss each also caused over 4 DALYs/1,000 inhabitants. Likewise comparable were cancer (except lung) in Hungary (highest country rate in the world, 4.1 DALYs), and cardiovascular diseases in Germany (3.9 DALYs), both attributable to indoors and outdoors air pollution, water, sanitation and hygiene.

Conclusions: The use of mercury in ASGM was identified as a serious public health issue. It is comparable with well-recognised international public health problems, although the lowest scenario was estimated. Interventions to reduce the burden are urgently needed. The analysis is limited by the data-scarcity. Refined analyses are currently in progress to improve the quality of the first estimates.

INDOOR AIR POLLUTION AND BLOOD PRESSURE IN ADULT WOMEN LIVING IN RURAL CHINA

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Background and Aims: Almost half the world's population is exposed to indoor air pollution (IAP) from use of coal and biomass fuels for domestic energy[1]. We investigated the association of IAP exposure with elevated blood pressure, which is an important risk factor for renal and cardiovascular disease.

Methods: We measured 24-hr personal integrated gravimetric exposure to particles less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$) and systolic (SBP) and diastolic blood pressure (DBP) in the summer and winter among 280 women ≥25 years old living in rural households using biomass fuels in Yunnan, China. We investigated the association between $PM_{2.5}$ exposure and SBP/DBP using mixed-effects models with random intercepts to account for correlation among repeated measures.

Results: Personal 24-hr exposure to $PM_{2.5}$ ranged from 22 to 634 $\mu g/m^3$ in winter and 9 to 492 $\mu g/m^3$ in summer. A one log-$\mu g/m^3$ increase in $PM_{2.5}$ exposure was associated with 2.2 mmHg (95% CI: 0.8, 3.7; p=0.003) higher SBP and 0.5 mmHg (95% CI: -0.4, 1.3; p=0.31) higher DBP among all women, but the effect was dependent on age. Among women >50 years old, a one log-$\mu g/m^3$ increase in $PM_{2.5}$ exposure was associated with 4.1 mmHg (95% CI: 1.5, 6.6; p=0.002) higher SBP and 1.8 mmHg (95% CI: 0.4, 3.2; p=0.01) higher DBP. $PM_{2.5}$ exposure was positively associated with SBP among younger women, but the association was not statistically significant.

Conclusion: Our results suggest that $PM_{2.5}$ exposure from biomass combustion may be a risk factor for elevated blood pressure, and hence for cardiovascular diseases. Issues of energy and IAP should therefore be considered in the formulation of policies and interventions aimed at reducing the burden of cardiovascular disease in China and other countries where domestic biomass fuel use is common. Our findings should be confirmed in longitudinal studies.

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Work stress and burnout among high tech shift workers in southern Taiwan

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Objective: Work stress, which might lead to the acculmulation of stress and in turn lead to various physical and mental illnesses, has become an important issue among workers in the high-tech industry. In recent years, there were many reports on the chronic fatigue associated with work stress, but few were from Taiwan. Therefore, we conducted a study to evaluate the associations between work stress and burnout among high tech workers.
Materials and Methods: We recruited workers working in a scientific park in southern Taiwan between October 1 and December 31, 2010. Information on demographic characteristics was collected through a self-administrated questionnaire. Participants also completed a job content questionnaire and reported habits of smoking and drinking.
Results: There were 774 workers participated in this study. We observed positive associations between work stress and age, marriage status, shift work, work position, perceived stress, economic stress, insomnia, depression, burnout for personal reasons, work-related burnout, over-commitment, and client-related burnout (all with $p < 0.05$). After adjusting for other factors, we found male gender (adjusted odds ratio [AOR] =2.09, 95% confidence interval [CI]: 1.26-3.49), shift work (AOR =1.93, 95% CI: 1.24-3.03), mild depression (AOR =1.69, 95% CI: 1.03-2.75), severe depression (AOR =5.35, 95% CI: 1.59-18.04), work related burnout (AOR =5.76, 95% CI: 2.00-16.59), and over-commitment (AOR =2.12, 95% CI: 1.07-4.18),were independent risk factors of work stress.
Conclusion: Among the high tech shift workers, work stress is associated with male gender, shift work, depression, work-related burnout and over-commitment. Therefore, intervention strategies for work stress should take into consideration these factors.

Key words: shift work, work stress, job content questionnaire and work fatigue.

RELATION BETWEEN COMMUTER AND EXPOSURE TO POLLUTION RELATED TO TRAFFIC IN BARCELONA.

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Background and Aim: Travel microenvironments contribute to the highest non-occupational exposure levels encountered for many city-dwellers, due to proximity to the traffic source. Most travel exposure studies have been conducted in northern Europe. Barcelona, a city with amongst the highest car density in Europe, many street canyons, and bike lanes situated predominately on high traffic roads, presents an interesting field for assessing exposures across modes. We present results from a measurement campaign comparing travel by car, bus, bike, and on foot in Barcelona.
Methods: 86 trips were monitored between May and June of 2009 to measure five pollutants related to traffic: Black Carbon (BC) using a micro-aethalometer (Magee), Ultra Fines (UF) using CPC 3007 and P-TRAK, Carbon Monoxide (CO) and Carbon Dioxide (CO_2) using a Q-TRAK, Particular Mater of 2.5 • m ($PM_{2.5}$) using a Dust-Trak. At each of these trips there were different combinations of commuting (combining walking, bike, bus and car); route (two routes with two directions each one); and day period (four periods along the day).
Results: Car trips showed the highest exposure concentration for most pollutants (all except CO where bus riders showed the highest values), followed by bus riders, cyclist and pedestrians. Walking trips showed the lowest values of CO_2 (474 ppm) and UF (43986 • g/cm^3) and bike trips showed lowest values of CO (0.6 ppm). No differences were found between the routes followed, while differences by period of the day were found, except for CO. Using adjusted models to investigate the factors that could affect the levels of air pollution, we observed that temperature was associated to CO_2, and Wind Speed to UF measured by CPC.
Conclusions: In Barcelona, people using the car were the most exposed to traffic related air pollutants, while those walking were the least exposed.

SHORT-TERM IMPACT OF AMBIENT AIR POLLUTION ON BLOOD PRESSURE AMONG PREGNANT WOMEN: A LONGITUDINAL STUDY

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Background and Aims. Epidemiological studies have reported inconsistent findings for the association between air pollution levels and blood pressure (BP), which has mainly been studied in elderly participants. Sort-term air pollution effects on BP have never been investigated in pregnant women, who may constitute a vulnerable population.
Methods. Between 2002 and 2006, 1,500 pregnant women from a mother-child cohort conducted in Nancy and Poitiers, France, underwent 11,220 repeated BP measurements (average, 7.5 measurements/woman). Nitrogen dioxide (NO_2), particulate matter with an aerodynamic diameter below 10µm (PM_{10}), and meteorological variables were measured on an hourly basis at permanent monitoring sites. Changes of BP in relation to short-term variations of air pollution were studied with mixed models adjusted for meteorology and personal characteristics.
Results. Elevated NO_2-levels 1 and 5 days and averaged over 7 days before the BP measurement were associated with reduced SBP. The strongest decrease was observed for the 7-day NO_2 average (percent change for a 10.7 µg/m³ increase in NO_2: -0.38%; 95%-confidence intervals: [0.62;-0.02%]). PM_{10} effects on SBP differed according to pregnancy trimester: 7-day averages of PM_{10} were associated with SBP increases during the first trimester (0.60% [0.09;1.11%]) and SBP decreases in the second (-0.55% [-0.91;-0.19%]) and third trimester (-0.35% [-0.69;-0.02%]) of pregnancy.
Conclusions. We observed NO_2 and PM_{10} effects on BP in pregnant women. Whether such changes in BP may have clinical implications remains to be investigated.

OZONE EFFECTS ON HEART RATE AND REPOLARIZATION PARAMETERS IN POTENTIALLY SUSCEPTIBLE INDIVIDUALS

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Background and Aims. There is evidence for an association between elevated ozone levels and cardiovascular morbidity and mortality. However, knowledge about ozone effects on electrocardiogram (ECG) parameters is very limited. We investigated the effects of ozone on heart rate (HR) and repolarization parameters in potentially susceptible populations.
Methods. Between March 2007 and December 2008, 363 ECG recordings comprising more than 2000 1h-intervals were measured in 64 individuals with type 2 diabetes mellitus or impaired glucose tolerance and in 46 healthy individuals with a potential genetic predisposition on the detoxification pathways from Augsburg, Germany. Ambient ozone and meteorological data were acquired from a fixed monitoring site on an hourly basis. Associations between 1h-averages of ambient ozone and HR, Bazett-corrected QT-interval (QTc), T-wave amplitude (Tamp) and T-wave complexity (Tcomp) were analyzed using additive mixed models adjusted for long-term time-trend and meteorological variables. A variable indicating both the season and whereabouts of the participants during the 1h-ECG recordings (summer and outdoors vs. winter or indoors) was used to assess potential modification of the ozone effect.
Results. Increases in ozone by 20µg/m³ (≙10ppb) led to concurrent and 1h–4h delayed increases in HR by 0.5-0.7% in all participants. These effects were stronger (1.0-1.2%) when the participants were outdoors during summer. Furthermore, we detected in all participants a concurrent and 1h-lagged T-wave flattening of -1.31% [95%-confidence interval:-2.19;-0.42%] and -1.32% [-2.19;-0.45%], respectively. Correspondingly, 1h- and 2h-lagged increases in Tcomp by 2.12% [0.81;3.52] and 1.89% [0.55;3.26%] were associated with elevated ozone levels, respectively. However, no effects could be observed for QTc. In general, ozone effects were more pronounced in individuals with metabolic disorders.
Conclusion. Our observed findings might be a mechanistic link between elevated ozone levels and reported adverse cardiovascular outcomes.

SWIMMING POOL ATTENDANCE AND RESPIRATORY SYMPTOMS AT 1 YEAR: RESULTS FROM THE INMA BIRTH COHORT IN SPAIN

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Background and Aims: Infant swimming pool attendance has been associated with increased respiratory diseases, but results are inconsistent. The aim was to assess the relationship between swimming pool attendance and several respiratory, atopic symptoms and infections during the first year of life.
Methods: Four birth cohorts from different regions in Spain taking part of the INMA project were used. Data was collected by standard questionnaire at 12-14 months of age on frequency of swimming (indoor and outdoor swimming pools in winter and summer) and having had the following symptoms: bronchiolitis, bronchitis, low respiratory track infection (LRTI), cough, wheezing, atopic eczema, otitis. Birth season, small for gestational age, breastfeeding, day care attendance, maternal age, education, social class and atopy were considered as potential confounders. Odds ratios and 95% confidence interval (OR 95%CI) were calculated by logistic regression.
Results: 2,644 children were included (855 from Valencia, 494 from Asturias, 638 from Guipuzcoa and 657 from Sabadell). Swimming pool attendance during the 1st year of age occurred among 42% of children, with a median cumulated duration of 720 minutes (Interquartile range = 210-1800). Swimming was more common among children in higher social classes with mid-aged mothers, day care attendants and those who breastfed or were born in autumn and winter. Prevalences of symptoms were 16% bronchiolitis, 14% bronchitis, 12% cough, 19% eczema, 33% LRTI, 32% wheezing and 31% otitis. Preliminary results showed no association between swimming pool attendance and symptoms. Compared to non-swimming pool attendants, children who attended swimming pools had the following adjusted OR (95%CI): bronchiolitis=1.04 (0.81-1.34), bronchitis=1.17 (0.91-1.51), wheezing=1.04 (0.86-1.25), respiratory infection=1.09 (0.91-1.32), cough=1.01 (0.78-1.31), eczema=1.03 (0.82-1.28), otitis=1.00 (0.83-1.21).
Conclusions: Results showed lack of association between swimming pool attendance and respiratory symptoms during the first year of life in Spain. Further analyses considering the type of swimming pool are planned.

A PILOT STUDY ON ELEMENTARY SCHOOL STUDENTS' PHYSICAL ACTIVITIES: FAMILY INVOLVEMENT BASE RESEARCH

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Background and Aims: The study purpose was to establish a family involvement base intervention program to promote parents and children's physical activities.
Method: The study subject was recruited from an elementary school at Taichung city in Taiwan the participants include elementary school children and their parents a total 66 people. Researcher applied SMART strategies (Specific; measurable; Acceptable; Realistic; Theoretical) and the "Physical Activity Pyramid" concepts suggests by ACSM to plan health education program, the study period from January, 2009 to December, 2009. A closed end questionnaires and physical fitness measurement was conduct to collect data for evaluate.
Result: The family participants can remind children to do physical activities, encourage children do exercise, and felt doing exercise with children was enjoyable and fun. Overall, children sat less and moved more. The light physical activity increased 40 minutes per week (from 170 min/week up to 210min/week), the moderate exercise increased 78 minutes per week (from 96 min/week up to 174min/week) and the vigorous physical exercise increased 41min per week (from 45 min/week up to 86min/week). total energy expenditure increased 252 calorie/day during weekdays, 339 calorie/day on Saturdays, After the family involvement base intervention program, about 70% of families expressed that they would like to keep participating in the parents'-children's physical activity project.
Conclusion: According to the results, this study may be of impotence in explaining by the family involvement base physical activity intervention program, As well as providing health educator t with a better understanding of how to promote school-children to be physical active.
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RESULTS OF AN INTERVENTION STRATEGY TO REDUCE LEAD EXPOSURE IN SUSCEPTIBLE POPULATION GROUPS IN COPSA MICA AREA, ROMANIA

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Background and Aims: High levels of lead have entered the environment through human activities such as mining, industrial processes and burning fuels.
Studies conducted between 1991 and 2002 focused on lead exposure in children in Copsa Mica area where a primary smelter was processing zinc and lead from mining ores. The results showed an important exposure of the children to lead, impacting somatic development, heme synthesis and neuropsychological development. An intervention program was elaborated and implemented in 2002 in Copsa Mica and blood lead levels (BLL) in children aged 4-15 years were monitored over time to measure the progress along with the intervention.
Methods: Data on lead sources, risk factors (playing with soil, putting dirty toys in the mouth, hand washing, cleaning practices etc.), and socio-economic factors were collected using a questionnaire. BLL in children were measured by atomic absorption graphite furnace spectometry. A social marketing program have been implemented in the investigated area.
Results: The mean measured BLL decreased between 2002-2009 from 46 μg/dL in 2002 to 22 μg/dL in 2007 and to 16 μg/dL in 2009. Statistically significant correlations were found betwen blood lead levels in children and some behaviours/practices/ attitudes: dirty hands/toys to mouth behaviour, and the use of the vacuum cleaner to clean the house in 2009.
Conclusions: In spite of such a major decrease in BLL (three fold) during a relatively short period of time (2002-2009) and taking into account the huge amount of resources which have been allocated to the intervention program, there is still a great need for work to be done on formulating, elaborating and implementing additional measures along with specific indicators to measure the process and progress of intervention at individual level.

4-YEAR-OLD NEURODEVELOPMENT AND EARLY LIFE DETERMINANTS ARE LONGITUDINALLY ASSOCIATED TO 11-YEAR-OLD ATTENTION FUNCTION

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Background and Aims: Previous studies have found association between cognitive development at 4 years old and several early life determinants such as maternal social class, maternal smoking during pregnancy, being first born, breastfeeding, cord blood DDT levels, indoor levels of NO2, and atopy. This study aimed to assess the association between child neurodevelopment at age 4 and the development of attention function at 11 years. We also aimed to assess the early life determinants related to attention functioning at age 11.
Methods: this study was based on a birth-cohort from Menorca, one of the Balearic Islands of the north-east coast of Spain. At 11 years old, 393 children were assessed with the Conners' Continuous Performance Test – Second Edition (CPT-II). This is a 14-minute computerized measure of inhibitory control, sustained attention, vigilance, reaction time, and response variability. The three outcomes analyzed of CPT-II were Omissions, Comissions and Hit Reaction Time. At 4 years old were assessed the child cognitive development (McCarthy Scales of Infant Development), social competence (California Preschool Social Competence Scale), and Attention Deficit and Hyperactivity Disorder (Diagnostic Criteria of DSM-IV).
Results: all the neurodevelopment outcomes at age 4 were significantly associated to Omissions and Comissions at 11 years. Omissions were associated to paternal education, being first born, atopy at age 4, and child's age, and male children. Paternal social class, child sex, breastfeeding, and DDT levels at age 4 were related with Comissions at 11 years. Finally, maternal social class, child's sex, breastfeeding and DDT levels at age 4 were related with Hit Reaction Time at 11 years.

Conclussions: neurodevelopment measurement during childhood is a good predictor of attention function in preadolescence period. Most of the early life determinants related with general cognition at age 4 were also related with the different components of attention at age 11.

INFLUENCE OF THE PRENATAL PCDD/F AND PCB EXPOSURE ON ADRENARCHE AND GENDER SPECIFIC ROLE BEHAVIOUR - RESULTS FROM THE DUISBURG BIRTH COHORT STUDY

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Background and aims: PCDD/F and PCBs have been described to interfere with the endocrine system. We examine if the prenatal exposure to these chemicals will influence the development of children during their childhood. The Duisburg Birth Cohort Study (Wilhelm et al., 2008, Mutat. Res. 659, 83-92) was initiated 2000-2002. Here we present data from examinations at 6-8 and 8-10 yrs after birth of the children.
Methods: PCDD/F and PCB concentrations in blood samples from mothers during pregnancy and in milk samples were measured using GC/HRMS. Blood serum samples were collected from 111/96 children aged 6-8 and 8-10 yrs, respectively, and were assayed for testosterone, estradiol and dihydroxyepiandrosterone sulphate (DHEA-S). Gender specific role behavior was measured using the Pre-School Activities Inventory (PSAI) at 6-8 yrs by scoring gender specific activities. Data analyses were performed by linear regression analysis using GEE to account for repeated measurements of the hormones.
Results: The average age of children was 6.6 and 8.5 yrs, respectively. PCDD/F and PCB levels were in the range of 4.3–97.3 (blood) and 3.0-78.7 (breast milk) pg WHO TEq/$g_{\text{lipid base}}$, respectively. Serum levels (geometric means) of DHEA-S at first examination were 144 and at second 282 ng/ml. Linear regression analysis showed a positive association between DHEA-S and breast milk WHO TEq (increase of 1.36, 95% CI 1.12-1.65 per doubling of WHO TEq). The total gender specific activity score ranged from -30 to +36. Means of activity scores were 20.4 (boys) and -9.5 (girls). The total activity scores significantly increased only in girls per doubling the prenatal exposure to ∑6 PCB and mono-ortho PCB (increase of: ∑6 PCB: 1.46, 95%-CI 1.04-1.88; mono-ortho PCB: 1.52, 95%-CI: 1.05-1.98).
Conclusion: Prenatal exposure to PCDD/F and PCB increases the levels of DHEA-S and also alters the gender specific role behaviour in girls.

Seafood consumption during pregnancy and child neurodevelopment in a population-based longitudinal study: the INMA cohorts

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Background and Aims: Maternal seafood consumption during pregnancy has been associated with higher neurodevelopment scores in children. However, seafood is also an important source of contaminants associated with lower scores. As most studies to date have been conducted in populations with limited intakes, few have been able to examine how different seafood subtypes, which vary in content of both potentially beneficial fatty acids and neurotoxic contaminants, are associated with child development. This study, conducted in a sample with high seafood intakes, aims to address this gap.

Methods: The analysis included 1,895 women recruited during the first trimester of pregnancy as part of the multicenter Spanish INMA Childhood and Environment cohort in Asturias, Gipuzkoa, Sabadell, and Valencia. Trained psychologists assessed child neurodevelopment at approximately 14 months using the Bayley Scales of Infant Development, standardized for standardized for age in days at test administration. Multivariate linear regression was used to assess associations between test scores and maternal seafood intakes, classified as small fatty fish, large fatty fish, lean fish, and shellfish. Models adjusted for confounders including breastfeeding and parity; the effect of additionally adjustments and cord blood mercury and polychlorinated biphenyls and dichloro-diphenyldichloroethylene in 1st trimester maternal serum was examined.

Results: Mean seafood intakes were 4.5 times per week. First trimester intakes of small fatty fish ≥1 time/week, lean fish up to 3 times/week, and shellfish up to twice a week were positively and significantly associated with cognitive scores. Large fatty fish ≥1/week was associated with lower scores overall, though associations were heterogeneous across cohorts. Additionally adjusting for contaminants had no meaningful effect.

Conclusions: Results suggest maternal consumption of most types of seafood is largely beneficial for child neurodevelopment, but support current recommendations to limit intakes of large fatty fish species which may accumulate high levels of both mercury and lipophilic contaminants.

Limitations of Environmental Epidemiology for Guiding Environmental Policy

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Background and Aims: Environmental epidemiologists aspire to generate research findings that provide an objective basis for the formulation of environmental policy. The ideal scenario in which epidemiologic research and policy are perfectly aligned is rarely realized, and efforts to force the epidemiologic evidence to fit sound policy can be detrimental to both.
Methods: I will examine illustrative current debates in environmental health policy in which the incremental, future contributions of epidemiology to their resolution appears to be limited: environmental tobacco smoke, drinking water treatment by-products, and electromagnetic fields. The past contributions and limits of further epidemiologic studies in these areas for guiding policy will be summarized.
Results: Sound policy decisions benefit from general guidance from epidemiology but also draw heavily on findings from toxicology and other contributory sciences, consideration of social and financial costs of alternative courses of action, and extrapolation of epidemiologic evidence. Epidemiologic research should be undertaken to inform policy in these areas when the capabilities of epidemiology match the needs of policy makers. In these examples, the inherent limitations in available epidemiologic methods (which could change with fundamental advances) suggest that additional studies offer little promise of contributing meaningfully to regulatory policy.
Conclusions: Recognizing that sound policy cannot and need not rely on definitive epidemiologic evidence would reduce the pressure to overstate certainty of epidemiologic findings, focus attention on identifying important policy questions that epidemiology is capable of addressing, and free policy makers of needing to invoke direct epidemiologic support for their decisions. Acknowledgment of the important but imperfect connection between environmental epidemiology and environmental policy would promote a more even-handed appraisal of the epidemiologic evidence and more strategically conceived epidemiologic studies, and potentially improve the quality of environmental policy.

AIR POLLUTION AND HEMATOTOXICITY – A POPULATION-BASED STUDY IN TAIWAN

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Background and Aims: Kaohsiung City is one of the worst air quality cities in Taiwan because of many industries. Sequels of peripheral blood cells influenced by air pollutants exposure have been suggested in literature, yet the association is not clear and the evidence is not sufficient.
Methods: This population-based study recruited subjects from 4 out of 11 districts in Kaohsiung City between the year 2003 and 2004. Demographic data including habitual behaviours as well as blood counts were administered. Real-time measurements and hourly data of environmental pollutants included PM10, SO2, CO, NO2, O3, and PSI were collected from air quality monitoring stations. Air quality reports and blood exam data were merged for statistic analysis. Single-pollutant models and multiple-pollutants models were analyzed to realize the effects of pollutants exposure on white count series..
Results: Ten thousand one hundred and forty subjects (4,378 male) between the ages of 33–87 years were recruited. Carbon monoxide would increase white counts as well as neutrophils (regression coefficients 833.4), monocytes, and lymphocytes; whereas sulfur dioxide would decrease white counts as well as neutrophils and monocytes after short expose (within one week) toward air pollution. Gender, body mass index, and cigarette smoking would also contribute to white count elevation other than air pollution, though their effects are less than air pollutants.
Conclusions: Short exposure (within 7 days) toward air pollutants, carbon monoxide and sulfur dioxide in particular, has been supposed to be closely related with white counts alterations which would mediate to systemic inflammatory status.

Single nucleotide polymorphisms (5p15.33, 15q25.1, 6p22.1, 6q27 and 7p15.3) and lung cancer survival in European Prospective Investigation into Cancer and Nutrition (EPIC)

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Background and Aims: The single nucleotide polymorphisms (SNPs) rs402710 (5p15.33), rs16969968 and rs8034191 (15q25.1) have been identified by genome-wide association studies (GWAS) as significant predictors of lung cancer risk (McKay, J.D et. al, 2008; Hung, R.J et al, 2008), while rs4324798 (6p22.1) was previously found to influence survival time in small cell lung cancer (SCLC) patients (Yang et al, 2010).
Methods: Using the same population of one of the original GWAS, we investigated whether the selected SNPs and 31 others (also identified in GWAS) influence survival time in EPIC, assuming an additive model. The effect of each polymorphism on all cause survival was estimated in 1094 lung cancer patients, and lung cancer specific survival in 763 patients, using Cox regression adjusted for *a priori* confounders and competing causes of death where appropriate.
Results: After 1558 person-years of post-diagnostic follow-up, 874 deaths occurred from all causes, including 690 from lung cancer. In the lung cancer-specific survival analysis (1102 person-years), only rs7452888 (6q27) and rs2710994 (7p15.3) modified survival, with adjusted hazard ratios of 1.19 (P=0.009) and 1.32 (P=0.011) respectively, taking competing risks into account. Weak associations were identified in subgroup analysis for rs16969968 and rs8034191 (15q25.1) and rs4324798 (6p22.1) and survival in never-smokers, as well as for rs402710 in current smokers and SCLC patients.
Conclusions: rs402710 (5p15.33), rs16969968 and rs8034191 (both 15q25.1), and rs4324798 (6p22.1) were found to be unrelated to survival times in this large cohort of lung cancer patients, regardless of whether the cause of death was from lung cancer or not. However, rs7452888 (6q27) was identified as a possible candidate SNP to influence lung cancer survival, while stratified analysis had hinted at the possible roles of rs8034191, rs16969968 (15q25.1), and rs4324798 (6p22.1) in determining survival in lung cancer patients who were never-smokers, based on a small sample.
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THE ASSOCIATION OF MATERNAL DIET DURING PREGNANCY AND ANOGENITAL DISTANCE IN CHILDREN OF THE RHEA BIRTH COHORT IN CRETE, GREECE

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Background and aims: Dioxins and dioxin-like compounds bioaccumulate through the food chain and act as endocrine disruptors. Diet during pregnancy is the main source of *in-utero* exposure to dioxins, with meat, fish, and milk intake as the main contributors. In animals, anogenital distance is used as an indicator of *in-utero* androgenic exposure. Only few human studies evaluated the association between *in-utero* exposure to environmental pollutants and anogenital distance in newborns, with inconsistent results. We examined the association between diet during pregnancy and anogenital distance in children in a population based mother child cohort in Crete (Rhea study).

Methods: We studied 492 mother-child pairs (mean age: 18 months, range: 4-36 months) from the Rhea study. Maternal dietary intake during pregnancy was assessed by a validated food frequency questionnaire. Daily frequencies were multiplied with portion sizes to estimate food intake in grams per day. Anogenital distance (AGD-anus to upper penis), anoscrotal distance (ASD-anus to scrotum) and penis width (PW) were measured for boys; anoclitoral (ACD-anus to clitoris) and anofourchetal distance for girls (AFD-anus to fourchete). Ratios of anogenital distances divided by body weight were calculated. Dietary intake was categorized in tertiles (using the lowest tertile as reference) and multivariate linear regression models were used.

Results: Higher meat and high-fat meat intake was associated with shorter anogenital distance especially for boys (p for trend<0.05 for ASD). Pregnant women in the highest tertile of high-fat meat intake (>70gr/day) gave birth to boys with shorter ASD (b coefficient -2.8; 95%CI: -5.16,-0.49), and ASD weight-ratio (b coefficient -0.24; 95%CI: -0.45,-0.02), in early childhood. No associations were found for fish and dairy intake.

Conclusions: The findings from this study suggest a potential association between high fat meat intake during pregnancy and shorter anogenital distance in male children, in Greece.

BRAIN CANCER ASSOCIATED WITH INCREASED MOBILE PHONE USERS: EVIDENCE FROM TAIWAN

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Background and Aims: Recent studies have shown that low-energy electromagnetic waves may affect human cognitive and brain function. However, evidence that mobile phone electromagnetic waves act as a carcinogen is still insufficient. Mobile phone was first introduced into Taiwan in 1989, its usage has reached 88.9% of the nation's population by 2007. Because use of mobile phones is different between cities and counties, the study aimed to investigate the numbers of mobile phone users in cities and counties and the corresponding trend in the brain cancer incidence from 1999 to 2007.

Methods: We used data on a total 22 cities and counties in Taiwan. Age-specific incidence rate (per 100,000 persons) of brain cancer from 1999 to 2007 were obtained from the cancer registry and standardized based on the 2000 WHO world standard population. Person-number and times of mobile phone usage were obtained from the Taiwan Directorate General of Budget, Accounting and Statistics.

Results: We used simple linear regression to compare trends (1999-2007) of standardized incidence rates between Taipei City (largest number of mobile phone users.) and Chiayi County (smallest number of mobile phone users.) (B=0.41, p=0.048). However, after adjustment for confounders (population density, average population served per physician, annual electricity consumption in the cities and counties, and the number of HIV infections), multiple regression results showed that the incidence of brain cancer and the number of mobile phone users had no significant correlation.

Conclusions: The results of this investigation did not support the hypothesis that the number of mobile phone users in Taiwan cities and counties had different brain cancer incidence.

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MIXTURES OF PLASTIC ASSOCIATED CHEMICALS, HIGHLY CHLORINATED PCBs, CADMIUM AND MERCURY ARE RELATED TO ATHEROSCLEROSIS

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Background and Aims: We have previously shown that several environmental contaminants are related to atherosclerosis. In real life however, we are exposed to a mixture of contaminants. Therefore, the present study aims to investigate whether mixtures of environmental contaminants are related to atherosclerosis in the elderly.
Methods: We used the grey scale of the intima-media complex, which is a measure of the lipid infiltration in the vascular wall, as the outcome variable in a sample of 1016 subjects aged 70 years. Predictions were generated from a linear model with 15 contaminants (4 PCBs, 4 plastic associated chemicals and 8 metals), their pair-wise interactions and the established risk factors cholesterol, BMI, blood pressure, smoking, sex and diabetes using the elastic net. These predictions were used as the outcome in a model which was simplified using a backwards step-down procedure until 95% of the variance in the predictions was accounted for. Each variable's partial R^2 statistic was used as a measure of that variable's relative importance in the final model. PCBs 170 and 209 were used as markers for high-chlorinated PCBs.
Results: The interaction between Mono-methyl phthalate (MMP) and Cadmium was the most important (rank 5, partial R^2 = 3.8%) followed by the interactions between high-chlorinated PCBs and Cadmium (rank 7, partial R^2 = 2.2%) and high-chlorinated PCBs and MMP (rank 10, partial R^2 = 1.2%). An interaction of lesser importance between MMP and Mercury could also be seen (rank 14, partial R^2 = 0.5%). All interaction effects affected the grayness of the intima-media complex and had p-values < 0.001.
Conclusions: The present study is amongst the first to investigate effects of mixtures of environmental contaminants on human health. The main finding is that MMP and Cadmium, highly chlorinated PCBs and MMP and Cadmium as well as MMP and Mercury may act in synergy to influence atherosclerosis development.

THE INFLUENCE OF ANTIOXIDANT VITAMINS INTAKE DURING PREGNANCY ON INFANT CORD BLOOD MERCURY CONCENTRATIONS

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Background and Aims: Antioxidant vitamins(Vitamins A, C, E) belong to the unenzyme antioxidant system, and play an important antioxidant effect in the human body. Many animal experiments suggested that vitamin supplements would affect the concentration of mercury in vivo. This research attempts to analyse the relationship between pregnancy antioxidant vitamins intake and cord blood mercury level. And to explore the protective effect of antioxidant vitamins to the injure of mercury.

Methods: One maternal and child health center or general hospital was selected in each geography district, China. About 200 pairs of mothers and full-term infants were recruited from October to December 2008 in each hospital. The umbilical cord blood was collected from each infant, then the concentration of total mercury was analysed. All mothers were asked to fill a questionnaire, and 1246 mother answered the questions about the vitamin A, C, E consumption during pregnancy.

Conclusions: The proportion of continued taking vitamins A, C, E were 12.0%, 13.3% and 12.8%, respectively. The proportion of intermittent taking were 29.8%, 34.3%, 32.0%, and the not taking were 58.2%, 52.3%, 55.2%. The difference of mercury concentrations between the discontinuous and continued taking was not statistically significant. The differences between the not taking and intermittent taking were statistically significant (*P* values were 0.019, 0.001, 0.026), The differences between the not taking and the continued taking were also statistically significant (*P* values were 0.001, 0.000, 0.000). But with the increase of antioxidant vitamins taking frequency, the mercury concentrations of umbilical cord blood elevated. There was no difference on babies' birth length or birth weight among different vitamins and different frequency consumption. And the influence on the head circumference of birth was statistically significant , *P* values were all <0.05. So Our study found that antioxidant vitamins intake during pregnancy couldn't lower the umbilical cord blood mercury level, but increase it. This may be related to mothers' living habits during pregnancy. Antioxidant vitamins intake during pregnancy was positively related to the baby's brain development.

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Background and Aims: Anxiety has been expressed in regard to the danger of pregnant women eating seafood because of a reported danger to the fetal brain from mercury contained in seafood. However the studies that have shown this have been of populations where the seafood mainly consumed is high in the food chain, and includes pilot whale and tiger shark. This study aimed to assess the contribution of different components of the diet to the UK pregnant woman's blood mercury level in an area where the general consumption of fish is lower, and the species consumed are more often at the middle and lower ends of the food chain.

Methods: The study used information from 4484 pregnancies in the Avon Longitudinal Study of Parents and Children (ALSPAC), using blood collected in acid washed vacutainers when the women first reported for antenatal care. Information on the diet was collected from the women themselves using a detailed food frequency questionnaire. Statistical analysis used forward and backward stepwise regression with total mercury level as the outcome.

Results: The median of the total blood mercury distribution was 1.86µg/L, substantially higher than found in the pregnant women in the NHANES study in the US [0.89µg/L]. However the level of the 95th centile was significantly lower in ALSPAC than that of the US study (4.02 v. 5.98).

Altogether in ALSPAC the maternal diet was responsible for only 16.53% of the variation in total blood mercury. This included 6.95% of the variation due to consumption of seafood, i.e. 42% of the dietary variation. Other features of the UK diet positively associated with increased blood mercury levels included wine, herbal drinks and the use of "health foods".

Conclusions: Consumption of seafood in the UK is responsible for only a small proportion of the variance in blood mercury.

TRAFFIC-RELATED AIR POLLUTION, ASTHMA AND HAY FEVER AT THE AGE OF 11

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Background and aim: In the PIAMA-study, we found positive associations between residential exposure to traffic-related air pollution and the incidence and prevalence of asthma and asthma symptoms until age 8. Puberty is an important milestone for the development of asthma and allergy. We therefore extended our previous analyses with three years of follow-up and studied the association between residential exposure to traffic-related air pollution and asthma and hay fever at age 11 years.

Methods: We estimated exposure to NO_2, fine particulate matter, and soot at the birth address by land-use regression models. Associations of exposure to air pollution with questionnaire-reports of diagnoses and symptoms of asthma and hay fever and were explored by multiple logistic regression analysis in approximately 2600 children. Effects were first estimated for all children and then for boys and girls separately by adding a gender-air pollution interaction term to the model.

Results: The participants' median age was 11.3 years (range 10.1-12.8). Overall, air pollution was (marginally) significantly associated with shortness of breath [adjusted odds ratio (95% confidence interval) 1.36 (1.05-1.77) per 3.5 $\mu g/m^3$ (interquartile range) change in $PM_{2.5}$] and nocturnal dry cough [1.30 (0.99-1.69)]; doctor-diagnosed hay fever [1.43 (1.03-1.97)], and symptoms of allergic rhinitis [1.25 (0.96-1.63)] during the past 12 months. Associations between $PM_{2.5}$ and these symptoms of asthma were largely limited to girls, while associations with hay fever were found in boys and girls. However, effects of air were not significantly different between boys and girls. Air pollution was associated with doctor-diagnosed asthma in girls [1.72 (1.00-2.96)], but not in boys [0.83 (0.50-1.35)], p-value interaction < 0.05].

Conclusions: Exposure to traffic-related air pollution is positively associated with symptoms of asthma, hay fever and related symptoms at age 11 years. The association with asthma may be stronger in girls than in boys.

WOMEN AND WATERPIPE SMOKING: LIBERAL SYMBOL OR SEXUAL ALLURE?

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Background and Aims: Despite emerging evidence on its adverse health effects, waterpipe tobacco smoking (WTS) is becoming more prevalent than that of cigarettes among women and girls in Syria. In the face of a strong taboo against female smoking, adult family members appear to be more permissive towards women smoking waterpipe than cigarettes. The aim of this paper is to assess whether seductive images and sexual allure themes are present in women and men discourses about waterpipe.
Methods: Nineteen focus group discussions (FGDs) and eleven in-depth interviews were conducted in Aleppo, Syria in 2008. Men and women, waterpipe smokers and non-smokers were recruited from both urban and rural areas. Separate FGDs were conducted by gender, age group, and waterpipe smoking status. The discussions were thematically analyzed. The main themes were the image of women smoking waterpipe and men's attraction to these women. Moreover, the sexual allure conveyed through waterpipe smoking, as well as WTS as a symbol of emancipation, were illustrated.
Results: Focus group participants stated that women smoke waterpipe to draw the attention of men, that women smoking waterpipe are attractive, and described the specific communication used to convey sex appeal while smoking waterpipe. Smoking waterpipe is a sign of strength and power for 'liberal women', and a way to prove themselves. Women smoked waterpipe as a way to express their emancipation and waterpipe smoking is one step forward toward gender equalization.
Conclusions: In-depth exploration of the social aspects of WTS in a specific context is crucial to understanding WTS behavior. This has significant implications on future interventions curbing the use of WTS.
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MATERNAL SMOKING, POLYMORPHISMS IN *CYP1A1*, *CYP2E1*, *EPHX1*, *NAT2, NQO1*, AND CHILDHOOD ACUTE LEUKEMIA

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Background and Aims: Antenatal passive exposure to tobacco smoke could influence early steps of leukemogenesis. This study aimed to explore the effect of maternal smoking during pregnancy on childhood acute leukemia (AL), accounting for genetic polymorphisms that modulate metabolite production.
Methods: Data are drawn from the national population-based study ESCALE, which included 764 AL and 1681 controls in 2003-2004. Mothers of cases and controls were interviewed by telephone on their tobacco consumption during pregnancy, using a standardized questionnaire. A sub-sample of 493 cases (433 lymphoblastic (ALL) and 51 myeloblastic (AML)) and 549 controls, with European ancestry from at least 2 grandparents, was genotyped on Illumina high throughput platforms. Genotype imputation was used to complete the data for untyped polymorphisms. Candidate alleles were *CYP1A1*2A/2B* (rs4646903), *CYP2E1*5* (rs2031920, rs3813867), *NQO1*2* (rs1800566), *NAT2*5* (rs1801280) and *EPHX1* polymorphisms in exons 3 (rs1051740) and 4 (rs2234922). Logistic regression models were adjusted on the gender*age quota sampling variable used for the selection of controls, birth order, breastfeeding and socioeconomic parental situation. Gene-environment interactions were also assessed by case-only analyses.
Results: ALL and AML were associated neither with maternal smoking during pregnancy, nor with candidate polymorphisms in *CYP1A1*, *CYP2E1, EPHX1* and *NQO1.* The presence of two slow *NAT2*5* alleles was significantly associated with ALL (OR=1.7 [1.2-2.6]). Analyses suggested an interaction borderline of significance between the slow *EPHX1* phenotype (rs1051740 CT or CC, rs2234922 AA) and the slow *NAT2* phenotype (rs1801280 CC). There was no interaction between any of the polymorphisms under study and maternal smoking.
Conclusions: The ESCALE study did not evidence the interaction between maternal smoking and *CYP1A1*2A/2B* suggested previously (Clavel et al., 2005). The association with NAT2 slow phenotype is compatible with the only previous study reporting on this phenotype in childhood ALL (Krajinovic et al., 2000). The interaction *EPHX1-NAT2* needs replication.

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ENVIRONMENTAL RADON EXPOSURE AND CANCER INCIDENCE IN GEORGIA

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Background. Radon is a lung carcinogen exhibiting complex interrelationships with its geologic origins and potential exposure routes. Georgia (GA) has high concentrations of naturally occurring radon and no analytic studies have assessed the impact of exposure on cancer risk in the state.

Methods. A geographic information system was used to evaluate relationships between radon and cancer incidence using GA Comprehensive Cancer Registry (2000-2007) data. Lung (N=43,910), female breast (N=41,515), colorectal (N=29,251), bladder (N=5,607), leukemia (N=24,003), and kidney (N=8,143) cancer cases were obtained at the individual-level. Because it is unlikely to be related to radiation exposure, cervical cancer cases (N=2,893) were also obtained from the registry for use as controls. Radon data for GA were obtained from the University of GA Cooperative Extension and Florida Department of Health. Kriging was used to smooth exposure data. Based on the final kriging model, a predicted radon concentration was assigned to each cancer case or control based on their latitude and longitude of residence at diagnosis. Spatial and non-spatial logistic regressions were used to evaluate the relationship between log-transformed predicted radon concentrations and cancer incidence.

Results. There were 25,237 radon (mean=5.5±425 pCi/L; max=67,487 pCi/L) measurements in GA. In unadjusted models, there was a significantly increased odds of exposure to radon for bladder (odds ratio: 1.10; 95% confidence interval: 1.02, 1.18), colorectal (1.08; 1.02, 1.15), breast (1.25; 1.17, 1.32), leukemia (1.15; 1.08, 1.23), and kidney cancer (1.13; 1.05, 1.20) cases. A positive, though non-significant, relationship was detected for lung cancer (1.04; 0.98, 1.10). After adjustment for race, age at diagnosis, cancer stage, and county-level median household income, a significant relationship persisted for breast cancer (1.11; 1.04, 1.19).

Conclusions. Preliminary relationships were detected between elevated radon exposure and cancer incidence, especially breast cancer. Detailed analyses including spatial regression and cluster modeling at the individual-level are underway.

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COMPARISON OF TWO METHODS FOR CONTROLLING IN-VEHICLE EXPOSURE IN STUDIES OF ACUTE CARDIOPULMONARY EFFECTS OF TRAFFIC-RELATED AIR POLLUTANTS

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Background: Associations between traffic-related air pollutants (TRAPs) and acute cardiopulmonary outcomes may be confounded by psychological stress, noise, and other exposures. Laboratory-based exposure studies of the health effects of vehicle emissions can control these factors, but may differ in important ways from 'real-world' conditions. We compared two methods for controlling exposure to particulate TRAPs among volunteers during car rides simulating a rush-hour commute.
Methods: A total of 47 adult subjects were passengers during two 2-hr car rides, at least 1 week apart, in a Ford Taurus sedan. The route was primarily on the New Jersey Turnpike, a major highway with heavy diesel truck traffic. Twenty subjects had one ride with the external air intake vent open, and one ride with the vent closed. Twenty-seven subjects wore a powered air-purifying respirator (PAPR) with the vent open during both rides, but with a high-efficiency particulate air (HEPA) filter in place in the PAPR during only one of the car rides. All subjects were blinded to the exposure conditions, which were administered in random order. Measurements in the vehicle and inside the respirator facepiece included total particle count and particulate matter less than 2.5 μm ($PM_{2.5}$). Subjects reported levels of stress by questionnaire before, during, and after the rides.
Results: Closing the vent reduced in-vehicle mean particle number and $PM_{2.5}$ concentrations by 53% and 29%, respectively. In contrast, the PAPR with filter in place reduced mean particle number and $PM_{2.5}$ inside the respirator facepiece by greater than 99.9% and 83%, respectively. Changes in stress levels were similar comparing subjects under the PAPR filter/no-filter conditions to subjects under the vent open/closed conditions.
Conclusions: The PAPR was an efficient, well-tolerated, and cost-effective method for controlling particle exposure in blinded, crossover studies of acute health effects of exposure to particulate TRAPs.

THE RELATIONSHIP OF ENVIRONMENTAL EXPOSURE TO POLYCHLORINATED BIPHENYLS AND P,P'-DDE WITH HUMAN SPERM SEX-CHROMOSOME DISOMY

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Background and Aims: Chromosomal abnormalities contribute substantially to reproductive problems, yet environmental risk factors have not been well investigated. We evaluated associations between PCBs and p,p'-DDE exposure with sperm sex-chromosome disomy.
Methods: We conducted a cross-sectional study of 192 men from subfertile couples. Multiprobe fluorescence in situ hybridization (FISH) for chromosomes X, Y, and 18 was used to determine XX, YY, XY, and total sex chromosome disomy in sperm, using a semi-automated scoring method. Serum was analyzed for concentrations of 57 PCB congeners and p,p'-DDE. Poisson regression models were used to calculate incidence rate ratios (IRRs) for disomy by exposure quartiles controlling for potential confounders and semen parameters.
Results: The median percent disomy was 0.3 for XX and YY, 0.9 for XY, and 1.6 for total sex chromosome disomy. After adjustment, total sex chromosome disomy IRR for the highest vs. lowest quartile of serum DDE exposure was 1.27 (95% CI: 1.22-1.33). IRRs showed significantly increasing trends for increasing quartiles of p,p'-DDE in XX, XY, and total sex chromosome disomy. There was a significant increase in IRRs of YY, XY, and total sex chromosome disomy for increasing quartiles of the ∑4prevalent PCBs (118, 138, 156, and 180) and ∑estrogenic PCBs (44, 49, 52, 101, 187, 174, 177, 157/201). There was also an increase in XY and total sex chromosome disomy for increasing quartiles of ∑dioxin-like PCBs (95/66, 74, 77/110, 105/141, 118, 156, 167, 128, 138, 170). For XX disomy, however, IRRs decreased significantly with increasing quartiles for all PCB summary measures examined (∑4prevalent, ∑estrogenic, and ∑dioxin-like).
Conclusions: Our findings suggest DDE may be associated with increased XX, XY and total sex chromosome disomy, while PCB exposures may be associated with increased YY, XY and total sex chromosome disomy, but decreased XX disomy. These findings require confirmation in further studies.

PUBLIC PERCEPTION OF CLIMATE-CHANGE AS A HEATLH RISK IN SEOUL, KOREA

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Background and Aims: "Risk Society" is the terminology used in order to define modern society owing to the manners that it organizes in response to the risks and growing environmental concerns. Moreover, environmental and public health policies related to the issues should be considered on the basis of the public risk perception in order to provoke the better public willingness to adapt them. Although the importance of climate-change adaptation has been consensus, there have been relatively little climate-change health risk perception concerns. Therefore, this study aims to identify public risk perceptions on climate-change health impacts while analyzing the influencing factors benefitting the climate-change adaptation policy implementation.
Methods: The survey was conducted in a form of telephone interviews in December 2008 with probability-proportional-to-size-samples of 1,200 adults in Seoul by trained interviewers. Logistic regressions were performed using STATA/SE 10.01 and spatial analysis was assisted with ArcGIS 10.
Results: Most of the respondents believe that global climate-change is serious (93.25%), health risk of the climate-change is hazardous (81.33%), and general climate-change risk awareness dramatically increases health risk recognition (OR: 16.15, 95%CI: 9.20 to 28.37, p=0.000). Age square, day time residence area and low income are significant factors influencing the risk perception, but their impacts or confidence intervals are limited. There is no clear spatial clustering of the risk perception, and former exposures to the environmental risk communication regarding ozone, heat wave and fine dust warning have no impact on it. However, the regional differences on the risk perception and exposure levels of the risk communication exist.
Conclusions: In this paper, we attempted to address the climate-change related health risk perception while comparing the regional variation. Although there are limited variables available, the results have some important implications regarding general climate-change risk awareness, socio-economic status to health risk, and regional disparity of risk communication.
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PARTICULATE AIR POLLUTION, MYOCARDIAL INFARCTION AND NEIGHBORHOOD, DEPRIVATION – A CASE-CROSSOVER ANALYSIS

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Background: Large multi-city studies conducted in the United States and in Europe have demonstrated that short-term exposure to airborne particulate matter is associated with an increase in daily mortality and hospital admissions for cardiovascular diseases**.** Several sub-group of the population are recognised to be more vulnerable, specifically disadvantaged groups.
Objectives: To evaluate whether socioeconomic status (SES) modified the short-term association between PM_{10} and onset of myocardial infarction (MI) in France.
Methods: The study population comprised all MI events (*n* = 2140) occurring among adults aged 35-74 years in Strasbourg (France) during years 2000-2007. SES was estimated at French census block level using a deprivation index classified into five categories. Hourly PM_{10} concentrations were modeled using the ADMS-Urban air dispersion model. A time-stratified case-crossover analysis was performed to estimate the associations between daily PM_{10} concentrations and MI events, stratifying by neighborhood deprivation category. Different exposure lags were tested for PM_{10} concentrations: lag01, average of the same and previous day, lag02, average of the same and 2 previous days and lag03 or the same and 3 previous days.
Results:A significant influence of neighborhood SES was found with a greater PM_{10} effect among subjects living in the most deprived neighborhoods. The relative excess of MI risk per 10-µg/m^3 increase in PM_{10} ranges between 15% for lag01 (95%IC [1,1%;30.8%]) and 18% ([3.1 to 37.1) for lag02, but only in the most deprived census blocks (p ,for heterogeneity between neighborhoods SES categories ranges from 0.04 to 0.07 across lags).
Conclusion:These findings suggest a strong differential susceptibility according to SES related factors. This might be due to pre-existing health conditions that render people living in more deprived areas more frail, to exposure in other microenvironments that add to the stress due to ambient air (e.g. poor housing, workplace pollution, commuting time) or to other unknown vulnerability factors.

Key words: air pollution; coronary heart disease; neighborhood; socioeconomic status; small-area analysis

ESTIMATING PERSONAL EXPOSURE TO INDOOR AND OUTDOOR AIR POLLUTANTS DURING SCHOOL DAY IN PRIMARY SCHOOLS

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Background and Aims: Studies that characterize personal exposure to indoor and outdoor air quality of school children have been limited. This study aimed to extend the knowledge of air quality in schools, develop methodology for estimating personal exposure to air pollutants during school day, and contribute to the current international need for further research in indoor air quality.
Methods: Four primary schools in southern England were selected for the study, in urban, suburban and rural environments. Air quality monitoring was conducted in three rounds (autumn, winter, summer) during the academic year 2009-2010. Each round involved monitoring for one week in four locations typical of children's exposure. Measurements were carried out for particulate matter count of size range 0.5-5.0μm ($PM_{0.5-5.0}$), carbon dioxide (CO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), formaldehyde (HCHO), and total volatile organic compounds (tVOC). Time-activity patterns of children in schools were recorded, and used to create a representative personal exposure matrix for each child according to time spent in different environments. Statistical testing compared estimated personal exposure and measured concentrations in school classrooms.
Results: We found important differences between personal exposure and measured concentrations during the summer round in all schools, in particular for CO (t-test p-value range: 0.004-0.11), NO_2 (<0.001-0.13), HCHO in two schools (0.001-0.15), and $PM_{0.5-5.0}$ for one school (0.08-0.11). We observed no significant differences during autumn and winter rounds. Results, however, suggested an increase in the weekly variability of greater than 50% in pollutant levels for $PM_{0.5-5.0}$, NO_2, and tVOC in three of the four schools, comparing personal exposure to measured concentrations.
Conclusions: These findings show the importance of characterization of personal exposure to indoor and outdoor air pollutants in schools. The findings provide useful methodology that will lead to better quantification of environmental exposures in children, thus strengthening the estimation of the exposure-risk association.

SERUM PFOA AND PFOS LEVELS AND LIVER FUNCTION BIOMARKERS IN THE C8 SCIENCE PANEL STUDY

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Background and Aims: Perfluorooctanoate (PFOA) and perfluorooctane sulfonate (PFOS) have been found in relatively higher concentration in liver; in rats, they have been associated with hepatocellular adenomas. Some studies in humans have reported non consistent associations between PFOA and liver enzymes. The aim of this study is to examine the cross-sectional association between serum levels of PFOA and PFOS with markers of liver function in adults.
Methods: In the C8 Science Panel Study in the Mid Ohio Valley, associations between liver markers and PFCs have been investigated in 47,092 eligible adults. We studied alanine transaminase (ALT), gamma-glutamyltransferase (GGT), and total bilirubin as markers of liver function. Linear and logistic regression models (using high enzyme levels as endpoint) were fitted adding potential confounders (age, physical activity, Body Mass Index, ethnicity, alcohol consumption, socio-economic status, fasting status, month of blood sample, and insulin resistance).
Results: Ln-transformed values of ALT are significantly associated with ln-PFOS in linear regression models (beta 0.020, SE=0.003, $p<0.001$), and in logistic regression models with a steady increase in the OR estimates across deciles (p-value for trend across deciles <0.001), and a significant OR for ln-unit of PFOS (OR=1.13, 95% C.I. 1.07-1.18, $p<0.001$). No association was observed between GGT and PFOS; linear regression models show a positive association between bilirubin total and PFOS (beta 0.051, SE 0.003, $p<0.001$). Findings for PFOA will also be presented but must first be presented to the local community.
Conclusions: This study includes a large population exposed to higher than background levels of PFOA and typical levels of PFOS. The association of ALT with PFOS confirms previous findings, while the association of bilirubin total was in the opposite direction than previously observed.

THE USE OF INSTRUMENTAL VARIABLES TO REDUCE CONFOUNDING AND REVERSE-CAUSATION BIAS IN A CROSS-SECTIONAL STUDY FOR PFOA IN RELATION TO CHOLESTEROL

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Background and Aims: Studies of association between an exposure and response in cross-sectional studies may give biased estimates due to unmeasured confounding or reverse causality. However, if we can identify a variable that is (1) associated with the exposure (2) conditionally independent of the response given the exposure; and there is an association between this "instrumental" variable and the response, we may infer a causal relationship between the exposure and the response and derive an unbiased estimate of this relationship. This is illustrated by application to the relationship between serum PFOA and cholesterol.
Methods: The C8 Science Panel Study in the Mid Ohio Valley comprises studies on various outcomes, including cholesterol, in relation to exposure to PFOA in drinking water. Our analyses are based on 56,544 people aged over 18, who had lived in six contaminated water districts, and participated in the survey in 2005-6. Water district was strongly associated with serum PFOA, and thus is a good instrument if the populations of each water district have similar distributions of unmeasured risk factors for cholesterol. We assess the use of water district and alternatives as an instrument for measured serum PFOA, to estimate the association between PFOA and cholesterol.
Results: Water district was strongly associated with serum PFOA (Cragg-Donald F statistic = 3699, R^2=0.43). The IV estimated coefficient for association of log serum PFOA with log LDL cholesterol was 0.0072(se= 0.0017). In comparison, a simple linear regression estimate, adjusted as was the IV estimate for age, gender, BMI and medication was 0.015 (se=0.001).
Conclusions: While some types of confounding are avoided by the IV estimate, differences in unmeasured risk factors across water districts may cause bias. In this case both the conventional and IV estimates show an association, which strengthens previous conclusions about the relationship between serum PFOA and cholesterol.

TRANSPORTION, AIR POLLUTION AND PHYSICAL ACTIVITIES (TAPAS), A 6-CITY INTEGRATED HEALTH RISK ASSESSMENT PROGRAM OF ACTIVE TRAVEL POLICIES: THE PARIS CASE STUDY

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Background and Aims: Active transportation helps in decreasing the burden of rising chronic diseases, the epidemic of obesity and air pollution emissions. Within the general program developed by the TAPAS consortium we present here the Paris case study.

Methods: We collected data from national or private surveys. Indicators collected are: demographic/geographical characteristics of the city, prevalence and type of active transportation, accident rates, and exposition to pollutants. In addition, we conducted a pilot study using heart rate monitors and specific indicators measured within a trip to measure the energy expenditure (EE) in different transportation modes. Second, we are developing a systematic approach to address and involve stake holders in the active travel initiative.

Results: Paris has 2.2 million inhabitants. The number of people that declare practicing a leisure time physical activity for at least 20 minutes (min) per day is 55.4% and the average daily air pollution (with the suburbs) is 20.9 $\mu g/m^3$ for PM10, 13.5 $\mu g/m^3$ for PM2,5 , 79.7 $\mu g/m^3$ for O_3 According to a recent national survey (2000-2008) the number of trips by foot constitutes 46.63% of the total transportation modes with an average time of 14.33 min; the bike represents 2.69% for an average duration of 20.69 min per trip. The public transportation and the car represent 33.52% and 12.12% respectively. Cycling accidents in 2008 were 567 with 5 reported deaths. The pilot study for EE revealed that for a same itinerary a 70 kg male subject increases his EE (kcal/hr) without significantly increasing the time spent commuting (e.g.173 kcal/hr for the subway *vs* 495 kcal/hr for cycling). Finally, on-going meetings with several stake holders are arising great interest in the TAPAS initiative leading to valuable collaborations.

Conclusion: The following on-going research offers valuable proof and insight to the development of possible further future policies that would promote the use of active transportation.

ETHICAL CHALLENGES IN EPIDEMIOLOGIC STUDIES ON AIR POLLUTION AND HEALTH

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The importance of clean air for healthy life was recognised already in the Hippocratic corpus in 5th century BCE. (*On Airs, Waters, and Places*). Epidemiologic studies continue to play an important role in providing evidence about adverse effects of ambient air pollution during different periods of life on respiratory, cardiovascular, carcinogenic diseases and adverse pregnancy outcomes. These studies support air pollution regulations; although recent epidemiologic evidence suggests that air pollution levels below current standards increase health risks. Epidemiologist conducting studies may face ethical challenges at different phases from design and conduct to interpretation and reporting of results.

Typically large populations are exposed to varying levels of air pollution. Often the average increase in the risk of adverse effects is from low to moderate, but the population health impact on common diseases can be substantial. Our design features or analytical approaches may be critical in indentifying susceptible groups, such as pregnant women, infants, senior citizens or individuals with chronic illnesses.

Air pollution exposure is often higher in socioeconomically deprived populations and low socioeconomic status may be related to susceptibility to adverse effect of air pollution. Choices of study design and analytical approach may either emphasize elimination of confounding due socioeconomic factors or elaboration of environmental inequity.

Production of air pollution can be linked to strong economic and political interests and therefore epidemiologists may feel pressure in publishing the results. What is the role of scientific community in supporting the epidemiologists?

Air pollution and green house gas productions are often linked, but there may be situations where alternative choices of energy production weaken green house gas emissions but strengthen ambient air pollutant emissions (e.g. gasoline or diesel engines).

This session provides a forum for identification of and discussion on ethical issues related to studies on air pollution epidemiology.

EFFECTS OF AIR POLLUTION AND TEMPERATURE ON VASCULAR FUNCTION IN PEOPLE WITH DIABETES

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Background and Aims: Diabetes is associated with impaired vascular function, and people with diabetes may be vulnerable to air pollution and temperature effects on cardiovascular morbidity and mortality. In people with diabetes, we investigated how changes in pollution and temperature influenced changes in brachial artery diameter that may reflect biologic mechanisms through which pollution influences the risk of clinical cardiovascular events.
Methods: The complete study population consisted of 49- to 85-year old Boston residents (N=64) with type 2 diabetes, observed up to 5 repeated times. Baseline brachial artery diameter (BAD), and flow- and nitroglycerin-mediated dilation were measured by ultrasound at each visit. Air pollutant exposures for black carbon (BC), organic carbon (OC), nitrogen dioxide (NO_2), $PM_{2.5}$, particle number (PN), sulfates (SO_4) and particulate mass components (nickel and zinc) were measured at our stationary ambient monitoring site. We applied linear models with fixed effect for subjects, adjusting for temperature, date and season. Effect estimates were scaled by the interquartile pollutant range (IQR).
Results: Smaller diameter was associated with increases in the means of the one- to four- day levels of pollution. For example, decreases in BAD occurred with increases in the mean 4-day levels of BC (-0.04 mm, 95% C.I.: -0.07 - -0.002 for an IQR=0.3 $\mu g/m^3$), OC (-0.07 mm, 95% C.I.: -0.11- -0.03), $PM_{2.5}$, NO_2, and CO. In contrast, diameter was larger by 0.13 mm (95% C.I.: 0.075 - 0.19) for an increase of 10 degrees C in the previous 24h mean temperature. FMD responses were less consistent, with a suggestion of positive associations mostly in subjects with smaller BAD (female).
Conclusion: The pollution- and temperature- associated changes in brachial artery diameter that we observed may reflect biologic mechanisms through which pollution increases cardiovascular risk in people with diabetes.
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TEMPERATURE VARIABILITY AND LONG-TERM SURVIVAL

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Background and Aims: Time series studies show that cold and hot temperatures, and their extremes, are associated with increased death rates. Few if any studies have evaluated longer-term temperature associations with deaths. Because there is evidence of adaptation to usual temperature, but higher deaths at unusual temperatures, we hypothesized that a long-term exposure relevant to mortality might be temperature variability.
We investigated whether the variance of summer (June-August) and winter (December-February) temperatures were associated with survival in four cohorts of persons with predisposing diseases in 135 US cities. Rather than modeling exposure cross-sectionally, as typical in cohort studies, we treated temperature variance as a time varying exposure.
Methods: We used Medicare data (1985-2006), and constructed cohorts of persons hospitalized with: chronic obstructive pulmonary disease (COPD), diabetes, congestive heart failure (CHF), and myocardial infarction (MI). Yearly summer and winter temperature variance were linked to the individuals during follow up in each city. We applied Cox's proportional hazard model for each cohort within each city, adjusting for individual risk factors, and long term trends, and pooled results across cities.
Results: Significant summer hazard ratios for mortality, ranged from 1.038 (95% Confidence Interval (CI): 1.024, 1.052) per an IQR increase in summer variance for persons with CHF, to 1.055 (95% CI: 1.035, 1.076) for persons with an MI. Associations during winter were also significant, with a hazard ratio of 1.017 (95% CI: 1.009, 1.025) for CHF, and 1.018 (95% CI: 1.008, 1.028) for persons with MI, per IQR increase in winter variance. Associations were higher in the elderly and lower in cities with a higher percent of green space.
Conclusions: Increases in temperature variability in the cold and warm seasons were associated with increased mortality of the elderly. Some adaptation measures, such as green space, may ameliorate this effect.
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MOBILE PHONE USE AND HEALTH: INNOVATION IN RECRUITMENT TO THE UK COSMOS COHORT STUDY

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Background: UK COSMOS is a new cohort, contributing to the international COSMOS study on mobile phone use and health. A 2009 UK pre-test study which used paper and online questionnaires, showed that paper-based recruitment procedures were too costly for large-scale recruitment. Ethical approval was granted to conduct the whole recruitment procedure online – consent, participant registration and questionnaire. To our knowledge this is the first UK health study to collect consent online.
Methods: The main recruitment campaign launched in April 2010, with postal invitations to almost 2.4 million UK mobile users via their network operator. Respondents logged into a secure website to consent and register, before completing the baseline questionnaire on mobile usage, lifestyle and health. Participants could log in/out to complete the questionnaire in their own time. We used e-mail and SMS to remind participants to complete the questionnaire if they did not do so in one session.
Results: To date, 67,988 people have joined the cohort (pre-test = 246, main launch = 67,742). The overall recruitment rate across both phases was 2.83%. 99.6% of the cohort completed the recruitment process online. The cohort comprises 46% males, 54% females, with median age of 48. Age distribution is similar by sex. Distribution of mobile call usage is similar by sex (by design the cohort was stratified by mobile phone usage), but varies by age. Preliminary analysis of e-mail/SMS reminders suggests SMS may be more effective than e-mail in promoting questionnaire completion.
Conclusions: We have demonstrated use of online e-consent and data collection in epidemiological research. Future large-scale epidemiological studies may benefit from the cost-savings and streamlining inherent in this approach. During 2011, we will continue our innovative use of new technologies by piloting recruitment via SMS invitation (ethical approval already obtained) to boost the cohort size and potentially improve response rates.

THE VICIOUS CYCLE OF WATER- PARASITE, IS THE FIRST PROBLEM OF CHILDREN'S ENVIRONMENTAL HEALTH AS A FACTOR IN MALNUTRITION AND INFECTION IN CHRONIC DEGENERATIVE EMERGING ECOSYSTEMS

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Background and Aims: The problem of environmental sanitation of the water in *emerging countries* such as the case of **México** is already an alarming problem. Infections from parasites, bacteria, viruses and protozoa produce malnutrition, intestinal infections and serious injury in child populations. Vectoring caused by the mixture of wastewater (WW) flowing water bodies used by marginalized populations is still a problem exceeded for intestinal infection levels in children 8 months to 5 years. The study of sampling 100 children in **Coahuixco** in communities, state of **Puebla**, **Mexico**, we throw the result that the strategy based on post-infection parasite established by the government is inefficient, expensive and only reveals that there are adequate controls in the relationship: *Downloads WW-Infiltration Reusable Water Bodies* used by the communities.
Objectives: Propose as to reduce intestinal infections in children in high poverty communities with diagnostic methods for rapid response.
Methods: We used GIS techniques Stool, fresh *in situ* fixation $(CH_2O)n$ the characterization with high resolution microscopy and differentiation sex parasites in ♀ **-** ♂ to reduce reinfection.
Results: We found the following species: *C. mesnili*, *E. Coli*, *E. histolytica*, *G. lamblia* and *A. lumbricoides*. He threw 29% positive (+), we proposed solutions downloads (WW) with chlorine tablets (Cloralex-MX) in toilets to inactivate upstream WW and type bag filter housings for drinking water (Pentair's water supply-USA). **Conclusions:** We must change the policy to combat the environmental prevention parasitemias by a WW controlling discharges and water supply otherwise the infant mortality will not decline.
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URBAN SPRAWL AND BODY MASS INDEX: A FIXED-EFFECTS ANALYSIS IN TWO COHORTS OF OLDER WOMEN IN THE UNITED STATES

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Background and Aims: Growing research has highlighted how dense neighborhoods with connected street networks may influence body mass index (BMI) by providing opportunities for walking or bicycling. We aim to study whether this relationship exists prospectively in individuals who change neighborhoods.
Methods: This study examines the effect of changes in the county sprawl index, a measure of residential density and street accessibility, and changes in BMI in a sample of Nurses' Health Studies (NHS and NHSII) participants throughout 831 counties across the continental United States who moved at least once between 1986 and 2005 (n=10,519 nurses with 14,326 moves for NHS and n=11,560 nurses with 17,414 moves in NHSII).
Results: For NHS, the mean change in the county sprawl index from pre-move to post-move address was -9.3 (standard deviation 34.7), while for NHSII, the mean change in the county sprawl index was -10.8 (standard deviation 44.2). The mean change in BMI was 0.2 kg/m^2 (standard deviation 1.6) for NHS and 1.2 kg/m^2 (standard deviation 2.3) for NHSII. At first move, the average age of NHS participants was 60.3 years (range 39-83), and 40.1 years (range 26-57) for NHSII. In fixed-effects analyses adjusting for age, smoking status, race, and husband's education, moving to a county with a one standard deviation decrease (37.6) in the county sprawl index (indicating a move to a less dense, less compact county) was associated with a two-year change in BMI of 0.005 kg/m^2 (95% CI -0.024, 0.035) in NHS and -0.004 kg/m^2 (95% CI -0.037, 0.030) in NHSII. We found no evidence of effect modification by age, smoking status, race, or husband's education.
Conclusions: None of the associations examined in this study were statistically significant, indicating that moving less dense, less compact county is not associated in our study with change in BMI within two years.

PILOT TESTING OF HEALTH-RELATED INDICATORS OF CLIMATE CHANGE IN EUROPE

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Background and Aims: The WHO European Centre for Environment and Health has completed the Climate, Environment and Health Action Plan and Information System (CEHAPIS) project involving the specification of health-related indicators of climate change. These indicators will be integrated in the Environment and Health Information System (ENHIS) to monitor climate change-related environmental health issues and public health benefits of adaptation and mitigation policies.
Methods: Pilot testing of seven indicators was conducted using data from CEHAPIS project partners and international databases. Methodologies were finalized and recommendations developed for improving data availability.
Results: Population-weighted exposure to ground level ozone across Europe was estimated using compiled datafrom the European Environment Agency. Surveys of policies to prevent heat-related health effects in France, Hungary and Spain demonstrated substantial between-country variation, and utility of the proposed indicator. Daily data from Budapest, Hungary was used to demonstrate a methodology of heat wave exposure assessment. An easy-to-use excess mortality estimation method was shown to be sufficiently sensitive only for high intensity heat waves. Population exposure to ragweed pollen in Hungary was unusually low during the dry hot summer of 2007, which matched expectations. Information on pollen exposure in other countries was not readily available. In Ireland, unusually high and early seasonal peaks of Salmonellosis and Cryptosporidiosis were also observed in 2007. The temporal resolution of the European Centre for Disease Prevention and Control infection surveillance data was insufficient for assessing the effects of climate variability in most countries.
Conclusions: Exposure to ozone and policies to reduce health effects of heat are indicators ready for implementation in ENHIS. Necessary actions concerning surveillance, data accessibility, legislation, and institutional infrastructure were recommended to the European Commission in order to advance the implementation of the CEHAPIS indicators and monitor health-related aspects of climate change.
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A CONCEPTUAL FRAMEWORK FOR SUSTAINABLE FOOD PRODUCTION: THE ENVIRONMENTAL NUTRITION MODEL

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Background and Aims

Climate change is emerging as a major challenge of the 21st century. Agriculture both affects and is affected by climate change, yet agriculture and food production has been largely overlooked in discussions on climate change policy. A new paradigm is needed for sustainable food system development and climate change mitigation. Central to this new paradigm is a comprehensive understanding of how food systems shape and are shaped by biological, social and environmental relationships and interactions.

Methods

Research was conducted along several consecutive strands: 1) Current food production practices; 2) Life cycle analysis on multiple foods of plant and animal origin; 3) Quantification of food systems waste generation, including greenhouse gas emissions; 4) Determinants of food consumer demand; and 5) Population food eating patterns. These and other lines of inquiry established the need for a framework and led to the development of the Environmental Nutrition Model.

Results

The Environmental Nutrition Model is a graphic conceptual framework that encompasses the multifaceted associations of the food system with the physical and social worlds, and its intended and undesirable consequences in the environment and in the health of populations. It delineates the inputs and outputs of the food system, showing desirable (food) and undesirable (waste) products. The lifecycle of foods, determined by the processing, transportation, storage, retail and waste disposal practices are defined and affected by consumer demands in a given society.

Conclusions

This Environmental Nutrition Model will be a useful didactic and research tool to explain, understand and ultimately contribute to the necessary modifications and changes of the current food systems to achieve more sustainable practices. The graphic model will be presented.

AMBIENT AIR POLLUTION AND CARDIOVASCULAR MORBIDITY AMONG POTENTIALLY SUSCEPTIBLE GROUPS

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Background and Aims: Evidence suggests that risks associated with exposure to ambient air pollutants are not uniform across individuals; however, there is considerable uncertainty in estimates for susceptible populations.
Methods: We conducted a five-year study (2003-07) examining the association of fine particulate matter ($PM_{2.5}$) and gases with cardiovascular hospital admissions in Denver, Colorado. We investigated the relationships between daily counts of cardiovascular disease admissions and same-day concentrations of ambient air pollutants ($PM_{2.5}$ mass, elemental carbon [EC], organic carbon [OC], sulfate, nitrate, source-apportioned PM, gases) among potentially susceptible subgroups defined by comorbid illness (using secondary diagnoses, e.g. hypertension, diabetes), age, race, sex, and payment type.
Results: The mean daily concentration of $PM_{2.5}$ mass was 8.0• g/m^3 (standard deviation 5.1• g/m^3). We observed increases in cardiovascular disease hospital admissions, particularly for ischemic heart disease, in relation to increases in $PM_{2.5}$ mass, EC, and OC concentrations as well as several of the PM source factors. For the PM species, the associations were strongest for EC (relative risk [RR per interquartile range] = 1.019; 95% confidence interval [CI] 1.010-1.028 per 0.33• g/m^3 increase) and OC (RR=1.017; 95%CI 1.006-1.028 per 1.7• g/m^3 increase). We did not observe consistent evidence of heterogeneity of these associations by subgroups. Some indication of stronger effects among patients with comorbid ischemic heart disease (IHD), including coronary atherosclerosis, compared to patients without comorbid IHD and among non-white patients compared to white patients was observed, although confidence intervals were wide and overlapping.
Conclusions: Although associations were detected among the total population at relatively low PM mass and component concentrations, we did not observe strong evidence of effect modification by potentially susceptible subgroups. The use of secondary diagnoses may have limited our ability to detect comorbid illness.

The views expressed are those of the authors and do not necessarily reflect the views or policies of the U.S.EPA.

FOOD PRODUCTION, POPULATION DIETARY PATTERNS AND CLIMATE CHANGE

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Background and Aims: Substantial evidence exists linking food production and environmental degradation. Often overlooked is the interconnection between food consumption patterns at the population level and climate change. The aim of this study was to compare the greenhouse gas (GHG) emissions (CO_2, CH_4, and N_2O) from current agricultural operations to produce the foods actually consumed by a health-oriented population of vegetarians and nonvegetarians.
Methods: Food consumption patterns of vegetarians were compared with nonvegetarians by using data from the Adventist Health Study, a cohort of 34,000 California Adventists, of which 45% were vegetarians. Consumption of 10 foods of a 50 food-item questionnaire were significantly different between the two dietary groups. Using primary agricultural data from California and published emission factors, we estimated CO_2 emissions associated with three production inputs: primary energy, pesticides, and fertilizers, utilized to produce each of the ten foods, including the production of the feed given to animals. We also quantified emissions for CH_4 from ruminant digestion and manure handling and storage, and N_2O from crop N fertilization and animal waste management.
Results: Production of the plant foods consumed by the average vegetarian results in greater emissions compared to nonvegetarians: 35 versus 27 Kg of CO_2-eq/yr. Conversely, the per capita consumption of animal foods by vegetarians results in much less emissions compared to nonvegetarians: 19 versus 475 Kg of CO_2-eq/yr. Overall, the per capita difference in annual emissions is 449 Kg of CO_2-eq greater for the nonvegetarian diet.
Conclusions: These findings support the hypothesis that plant-based diets have markedly lower GHG emissions and thus less global warming potential than meat-based diets, although exceptions may occur in relation to some agricultural practices, transportation and processing. Daily food choices of large segments of the population may ultimately result in major impacts on the environment and have public health consequences.

ACUTE EFFECTS OF WOODSMOKE EXPOSURE AS MEASURED BY PERSONAL CARBON MONOXIDE ON HEART RATE VARIABILTY IN GUATEMALA

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Background and Aims: Evidence suggests that fine particulate air pollution is a cause of cardiovascular disease, but little is known about the effects of indoor air pollution from household solid fuel use in developing countries. In the RESPIRE randomized trial of a chimney woodstove, we examine short-term associations between personal carbon monoxide (CO), as a proxy for woodsdmoke, and heart rate variability (HRV).
Methods: Electrocardiogram sessions lasting 20 hours were repeated up to three times among 49 intervention (chimney stove) and 70 control (open fire) women 38 to 84 years of age. HRV values (SDNN, RMSSD, HF, LF, VLF) were recorded for each 30-minute period. Continuous personal CO exposures were measured starting 24 hours before and during each electrocardiogram. Linear mixed effects models with random intercept for subject, random intercept for study day nested within subject, and a first-order autoregressive term within subject-day were used to estimate the association between natural log transformed 30-min HRV and CO (1-hour, 4-hour, and 8-hour moving averages), adjusting for hour of day (dummy variable for each hour), age, body mass index , asset index, ever smoking, secondhand tobacco smoke, wood-fired sauna use, season, ambient temperature, and rainfall.
Results: The means of 30-min average personal CO levels were 2.6 (n=4265, SD=2.5, range=0.2-20.6) and 1.0 (n=4426, SD=1.3, range=0.2-9.3) ppm in the open fire and chimney stove groups, respectively. All models we ran suggest HRV increases with personal CO. Each 1 ppm increase in 4-hour moving average CO was associated with a 4.6% (95% CI: 1.2, 8.2) increase in LF and a 2.4% (95% CI: 0.3, 4.6) increase in VLF. Associations with 8-hour moving average CO were similar and were significant for LF, VLF, and RMSSD.
Conclusions: Personal exposure to woodsmoke was associated with increased HRV, particularly the low frequency components, suggesting that woodsmoke exposure has acute effects on the autonomic control of the heart.

PREVALENCE OF INFECTIOUS DIARRHEA CAUSED BY *SALMONELLA SPP.* IN SLOVAKIA (SR)

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Background: Salmonella infections are caused by non-typhoid salmonellas which are transmitted from animals to human with typical clinical symptoms including severe diarrhea with fever, etc. (Bálint et al., 2000). They are Salmonellas primarily adapted to animals causing zoonoses. Apart from other characteristics of pathogenicity and virulence factors common also for typhoid salmonellas they increasingly produce enterotoxin which is similar to enterotoxic *E. coli*. Together with cytotoxin of other invasive enteropathogens they cause inflammatory type of diarrhea. The source of infection include warm-blooded and cold-blooded vertebrates (Rovný et al., 1995).
Material and methods: The diagnosis of salmonellosis is confirmed by the clinical picture testing stool, urine, hemocultivation, cultivation of pus or other liquid, obtained by puncturing.
Results: During years 2000 - 2006 salmonellosis mostly occurred in Slovakia in months May -September with the highest incidence of 2886 cases (June 2000), 2819 (July 2001), 2449 (June 2002), 2265 (June 2003), 2086 (September 2004) and 1879 (September 2005). In October no occurence of salmonellosis was monitored during the whole period. The increase was recorded in months November - December (1675-1438, 2000; 1535-1552 in year 2001; 962-1118 in year 2002; 947-1213 in year 2003; 1126-1127 in year 2004; 1071-734 in year 2005). The most frequent causes of salmonellosis included infected households (28% of cases), public supply (25%) school meals (20%), catering (8%), hospitals (5%), social institutions (2%), import (2%), other (4%).
Conclusion: Sustainability of good health is the main objective of the European Union and the organizations which through their activities are involved in processes to improve public health, disease prevention, and identifying sources of health hazards.
Acknowledgements: This work was supported by the Agency of the Ministry of Education, Science, Research and Sport SR for EU Structural funds projects: ITMS 26220120023, ITMS 26220120041.

EFFECTS OF THERMAL STRESS ON MORTALITY IN THE OLDER POPULATION OF HONG KONG

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Background and Aims: A wide body of epidemiological evidence demonstrated consistent associations between temperature and daily mortality mainly from ecological time series studies. But few studies have examined these associations in a cohort.

Methods: We used a matched case-control design with time-dependent covariates to assess short-term effects of apparent temperature (AT) on mortality in a cohort of 66,820 persons aged 65 years or older, with a total of 14,446 deaths after about 10 years of follow up. The cases and controls were matched by duration of exposure with adjustment for particulate matter of aero-diameter ≤ 10μm (PM_{10}) and potential confounding factors. We examined the associations of mortality with mean AT, defined by moving averages of AT at current day up to the previous 13 days for cool season (≤20.8 ^{o}C) and up to 7 days for warm season (≥28.3 ^{o}C).

Results: In the cool season, a 1^{o}C decrease of AT in moving average of current day up to previous 6 days was associated with 3.1 % (95% confidence interval:1.9%, 4.3%), 3.5% (1.4%, 5.6%) and 3.9% (0.1%, 5.9%) increase for all-cause, cardiovascular and respiratory mortality, respectively. In the warm season, a 1^{o}C increase of AT in moving average of current and previous one day was associated with 1.1 % (–1.0%, 3.2%), –0.8 % (–4.6%, 3.2%) and 2.2 % (–0.3%, 7.7%) change for the corresponding mortality categories.

Conclusions: In the cool season apparent temperature was associated with increased risks of all-cause and cardiorespiratory mortality. But in the warm season the associations were not observed in the sub-tropical city where air conditioners are commonly used.

IMPACT OF EMISSIONS FROM ALUMINUM ELECTROLYSIS PLANTS ON AMBIENT AIR POLLUTION AND PREGNANCY OUTCOMES AND NEWBORN'S HEALTH

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Background and Aims: We studied two aluminum-producing plants located in the cities of Kamensk-Uralskiy and Krasnoturyinsk (Middle Urals) emitting pollutants creating multicomponent environmental contamination. The change from Soderberg to prebaked anodes implemented early this century for some of the electrolyzers in Kamensk-Uralskiy has allowed total atmospheric emissions to be reduced 3.5 times. The purpose of our study was investigated the possible adverse effects of ambient air pollution on pregnancy and birth outcomes, exposed to such pollution in these towns.
Methods: We studied ambient air pollution with fluorides, benzo(a)pyrene, alkali and sulfur dioxide during the warm and cold seasons of 2004 at a distance of up to 3 kilometers from the aluminum plants. Information on the health status of pregnant woman and newborn dwelling in the same areas was obtained from official medical documentation for the same period. The association of health with ambient air pollution was analyzed using linear multiple regression models.
Results: The maximum daily average concentrations in Krasnoturyinsk and Kamensk-Uralskiy were (in mg/m^3) respectively, 0.0166-0.0806 and 0.008867-0.0433 for HF, 0.024-0.124 and 0.014-0.064 for low soluble fluorides, 0.000011-0.00005 and 0.000013-0.000067 for benzo(a)pyrene, 0.0144-0.0622 and 0.0047-0.0152 for NaOH, 0.075-0.125 and 0.01-0.0425 for SO_2.
There was not found any association of the pregnant women's health outcomes with ambient air pollution. The incidence of illness in newborn was higher in Krasnoturyinsk than in Kamensk-Uralsky, including intrauterine growth retardation (IUGR), 128,0‰ vs. 37,0‰ and low birth weight (LBW; < 2,500 g) - 70,0‰ vs. 42,0‰, respectively. IUGR was associated with concentrations of low soluble fluorides (B=176.423±60.445) and SO_2 (B=194.015±46.297), and also LBW with benzo(a)pyrene (B=8582.681±2478.736) and NaOH (B=11.860±4.605).
Conclusions: Industrial emissions from aluminum electrolysis plants contaminate the environment of adjoining residential areas (particularly where the use of Soderberg anodes continues) demonstrating association with considerable impairment to newborn's health.

COPHES GUIDELINES TO MEASURE EXPOSURE OF CHILDREN AND THEIR MOTHERS: SELECTION OF PARTICIPANTS, RECRUITMENT AND FIELD WORK IN DEMOCOPHES

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Background and Aims: In support of the European Environment and Health Action Plan, European scientists have started to define, organize and manage a coherent human biomonitoring (HBM) approach. COPHES (Consortium to Perform HBM on a European Scale) provides the scientific and conceptual background. DEMOCOPHES, the respective pilot study, will work on the hypothesis that HBM can be performed in a coherent and harmonized way throughout Europe.
Methods: Commonly developed protocols, strategies and scientific tools serve as the basis to measure exposure of 120 mother and child pairs to mercury, cadmium, cotinine and phthalates in 17 participating countries. To develop a common protocol for recruitment and fieldwork was a challenging task. Selecting participants from inhabitant registries is the optimum strategy, but due to country-specific restrictions a second option, the selection of participants via schools, is offered. Participants are chosen from two sampling locations: one area with low and another with a high degree of urbanization. A written consent, questionnaires, a protocol sheet, urine and hair samples and individual letters of the results for the participating families are the common fundamental fieldwork instruments.
Results: The essential elements for quality control of field work were identified and will be applied according to the developed SOPs: fieldwork manuals are being prepared, interviewers will be trained and check-lists for internal and external quality control will be used.
Conclusions: On the basis of a well reasoned fieldwork concept and SOPs for all steps of the study including chemical analyses and statistical data treatment, evaluation of DEMOCOPHES will help COPHES to establish harmonized procedures for HBM in Europe. HBM can support policy in a multitude of ways, inter alia, as a tool to support REACh, to identify exposed subgroups and to help evaluate policy actions for exposure reduction.

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European NO2 land use regression incorporating satellite- and ground-based measurements

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Background and Aims: Land use regression (LUR) models have increasingly been applied to assess air pollution exposures typically at the city level. Fewer examples at the continental scale exist. With recent improvements in data quality and availability, including pollutant measurements from satellites such as Ozone Monitoring Instrument (OMI), modelling over larger areas at finer spatial resolutions is possible.
Methods: Land use regression was used to model ambient NO2 using ca. 2000 monitoring sites across Western Europe from the Airbase network. The network includes sites located in background, industrial and traffic environments. Characteristics of land use in buffers from 100 to 10,000m included high and low density residential, industrial, ports, urban green space, total built up, and natural areas. Major, secondary and local roads, derived from a 1:5,000 road network for Europe, were extracted in buffers up to 1000m. Information on altitude, population density and distance to sea were also available. LUR models with and without satellite-derived (OMI) NO2 concentrations were explored for years 2005-2007 for all sites combined.
Results: Preliminary results for year 2007 indicate a model performance of R2 = 0.49, with a SEE of 0.452 based on annual-mean concentrations (natural log) at monitoring sites. Inclusion of satellite data improves model performance (R2: 0.44 without satellite data, 0.49 with satellite data). Current refinements to the model are expected to improve performance. Preliminary models include satellite measurements, proportion of built up land, local roads and major roads as the most important independent variables. LUR models for 2005 and 2006 will also be presented.
Conclusions: Preliminary results support the potential to build a Europe-wide LUR models for NO2 using readily available data. Satellite-derived measures of ground-level NO2 appear to improve model performance. Our results will be used to construct high resolution (~100m) maps of NO2 concentrations across Western Europe.

ASSESSMENT OF HEALTH COSTS AND BENEFITS FOR ACTIVE TRANSPORT

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Backround: There is a growing awareness that significant health and environmental benefits could be achieved by reducing car use and shifting instead to active transport. We estimate health impacts due to a shift from car to bicycling or walking.
Methods: We evaluate four effects: changes in exposure to ambient air pollution for individuals who change their transportation mode, their health benefit, health benefit for the general population due to reduced pollution, and risk of accidents. We consider only mortality in detail. For the dispersion of air pollution from cars we use results of the Transport phase of the ExternE project series and derive general results that can be applied in different regions. We calculate physical activity health benefits of bicycling and walking based on the most recent review by the World Health Organization.
Results: For a driver who switches to bicycling for a commute of 5 km (one way) 5 days/week 46 weeks/yr health benefits from physical activity are worth about 1300 €/yr, and in a large city (>500,000) the value of the associated reduction of air pollution is around 30 €/yr. For individuals who makes the switch, changes in air pollution exposure and dose implies a loss of about 20 €/yr under our standard scenario but that is highly variable and could even have the opposite sign. The results for walking are similar. Increased accident risk for bicyclists implies a loss that is an order of magnitude smaller than health benefits of physical activity. Uncertainty analyses show the order of magnitude of these estimates is robust.
Conclusion: Despite large uncertainties it can be concluded that health benefits due to physical activity is by far the most important item. We illustrate results comparing costs and benefits of the Vélib bicycle sharing program of Paris.

ASSOCIATION BETWEEN PARENTAL ALCOHOL-RELATED BEHAVIORS AND CHILDREN'S DRINKING

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Background and Aims. Many researches have evidenced a high prevalence of youthful use of alcohol. Aim of this study was to acquire information about the pupil's alcohol-related behaviors and parent's use of and attitudes toward alcohol in order to assess the presence of early risk behaviors in pupils.
Methods. The data were collected using a questionnaire anonymous, semi-structured and self-administered. A total of 281 pupils resident in Catania (Males: 49.8% Females: 50.2%), aged between 6 -12 years have joined the survey .
Results. 42.3% of the pupils have already tasted alcohol (M: 49.3% F: 35.5%, $p < 0.025$), in particular the 29.9% the wine (M: 35.0% F: 24.8%), the 30.6% the beer (M: 40.7% F: 20.6%, $p < 0.0005$) and 12.8% the strong drinks (M: 16.4%, F: 9.2%). 40.2% of the pupils (ages 6-12) drink alcohol (M: 44.3% F: 36.2%). Overall, 60.5% of pupils live with families who use alcohol at the meal (M: 63.6% F: 57.4%) and the fathers drinking are more frequent than mothers drinking (M: 63.7% F: 24.9%, $p < 0.0005$). The pupils that had tasted alcohol and live with parents drinker (52.9%) are significantly more numerous ($p < 0.0005$) than those living with parents non-drinker (21.6%). At the end, the percentage of pupils drinker (54.1%) living with parents drinker was significantly higher ($p < 0.0005$) than that living with parents non-drinker (18.0%).
Conclusions. Results highlight an early/widespread alcohol use and an elevated prevalence of pupils who use alcohol. Moreover the findings suggest that living with parents drinkers favor the initiation and use of alcoholic beverages.
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TRANSPORTIATON, AIR POLLUTION AND PHYSICAL ACTIVITIES (TAPAS), A 6-CITY INTEGRATED HEALTH RISK ASSESSMENT PROGRAM OF ACTIVE TRAVEL POLICIES: THE BARCELONA CASE STUDY

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Background and Aims: Within the TAPAS research program, quantitative assessments are developed for six case study cities in Europe, linking determinants of active travel to potential co-benefits and co-risks of modal shifts from motorized to non-motorized modes of travel. We describe here the Barcelona case study.
Methods: We identified local sources of information from government agencies describing active travel and environmental conditions. We aimed at selecting policies of local and international interest, with quantifiable or demonstrated effectiveness. We reviewed local and regional governmental policy documents; met individually with agency representatives, elected officials, and others; and organized a local stakeholder workshop. We are also conducting experimental work generating new data to help fill research gaps in current framework.
Results: Barcelona, capital of the Catalan region of Spain, has 1.6 million inhabitants. Only 60% of Catalans reach recommended levels of physical activity, 20% are entirely sedentary. With a low 2% of trips made cycling, Barcelona and its mild Mediterranean climate (average 17.3 degrees Celsius, 74 day of rain) has high potential to increase cycling. Within the city, 45% of trips are made on foot, 30% by public transport, 10% by car. Due to the greatest car density in Europe (6.1 cars/km^2), Barcelona is highly polluted, with, on average: 40$\mu g/m^3$ PM10 , 19$\mu g/m^3$ PM2.5, and 50$\mu g/m^3$ NO_2 concentrations in 2009. Each year 1500 pedestrians are injured, 100 seriously and 15 die. Cyclists account for 300 injuries and about 2 deaths per year. Relevant policies we are considering for assessment include 1) Bike sharing system (Bicing), 2) bike lane network; 3) intermodality; 4) traffic calming. We have piloted successfully the experimental study of commuter exposure-health relationships and the survey of active travel determinants.
Conclusion: Barcelona is an interesting case for assessing potentials to increase physical activity while addressing challenging environmental conditions to mitigate risks.

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PRENATAL EXPOSURE TO CHLORDECONE AND INFANT'S GROWTH IN GUADELOUPE

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Background and Aims: The estrogenic insecticide chlordecone was extensively used from 1973 to 1993 in French West Indies, to control banana root borer. Its persistence in soils has lead to the widespread pollution of the environment including tap water sources and crops. Foetal exposure to endocrine disrupting chemicals may increase obesity risk. The effect of prenatal chlordecone on infant's growth is unknown. Our objective was to study the association between prenatal chlordecone on infant's growth at birth and 3 months.
Methods: 1042 pregnant women have been enrolled in a prospective cohort study in Guadeloupe between 2004 and 2007. A sub-cohort has been followed at 3, 7 and 18 months with weight and height collected in 303 term newborns at birth and in 248 infants at 3 months. Chlordecone has been assessed in 253 maternal blood samples at delivery and in 211 cord blood samples (detection limit =0.06 ng/L).
Results: Chlordecone has been detected in 55.9% of cord blood samples and in 89.7% of maternal samples. When detected, the median value for chlordecone was 0.30 ng/ml in cord blood and 0.39 ng/ml in maternal blood. Newborns with chlordecone in cord blood higher than the median presented smaller length at birth than newborns with chlordecone below the median or not detected values (p-trend=.02) after adjustment, but no difference in ponderal index, birthweight, or head circumference. Infants with chlordecone level in cord blood higher than the median had higher ponderal index at 3 months (p-trend=.07). Associations were found between chlordecone in maternal blood and ponderal index (p-trend=.04), weight (p-trend=.003) and weight gain at 3 months (p-trend=.007) after adjustment for maternal age, infant's age, maternal BMI, smoking, alcohol, diabetes, infant's gender, breastfeeding, and lipids.
Conclusion: Chlordecone at birth was associated with a decreased length at birth and increased ponderal index at 3 months.

EXPOSURE TO PARENTAL SMOKING AND THE RISK OF SMOKING UPTAKE IN PUPILS

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Background and Aims. There is increasing evidence that contact with other smokers, particularly in the family, is a strong determinant of risk of smoking uptake. Aim of the study was to acquire information about the pupil's smoking habits and parent's use of and attitudes toward tobacco in order to assess the presence of early risk behaviors in pupils.
Methods. Population data, initiation and smoking behavior of pupils, smoking habits of cohabiting family were collected by an anonymous and semi-structured self-administered questionnaire. The research involved 281 pupils (M: 49.8% F: 50.2%) of a primary school in Catania between 6-12 years of age.
Results. The 6.0% of the pupils had already tried to smoke tobacco, males (10.7%) significantly more numerous than females (1.4%), aged between 7-12 years (M: 9.1a; F: 10.0A). The 2.1% of pupils were occasional smoker, usual smokers are only males (M: 6.0%, F: 0.0%), aged between 7-12 years. The 47.7% of pupils living with family smoking, 21.7% of households only the father smoker (M: 20.7% F: 22.7%), and in the 7.5% only the mother (M : 9.3%, F: 5.7%), while in the 17.1% smoked both parents (M: 18.6% F: 15.6%). Pupils who have tried smoking and living in households where the parents smoking (10.6%) were significantly more numerous compared to peers who had already had the same experience (2.0%) but living with family Non-smoking. Finally, the students who live with smokers smoking family amounted to 4.5%, while non-smokers who live with family are the 1 .3%.
Conclusions. We note, with concern, that the smoker initiation involved a significant percentage of school children - part of which says smoking - half of which is exposed "to smoke" in a familiar environment. Still, the smoking habits of family members seem to favor the smoker testing of pupils being however an entirely avoidable health risk.
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ORGANOCHLORINE PESTICIDES AND PCBs IN NEWBORNS IN A GENERAL POPULATION OF A STRONGLY INDUSTRIALIZED AREA

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Background and Aims: During pregnancy, organochlorine pollutants (OCs) are transferred from mother to fetus through the placenta (Vizcaino et al. 2011). Prenatal exposure may be related to future health problems of infants (Gladen et al. 1988). The body burden of compounds arriving to fetus depends on the environmental conditions in which the mothers live. In the present study prenatal exposure to OCs in a strongly industrialized area (Asturias, Spain) is investigated.
Methods: As part of the INMA (Environment and childhood) project (Ribas-Fito et al. 2006), 226 cord serum samples from the cohort of Asturias were analysed for OCs, including pentachlorobenzene (PeCB), hexaclorobenzene (HCB), 7 polychlorobiphenyl congeners (PCBs), 4 hexachlorocyclohexane isomers (HCHs) and dichlorodiphenyltrichloroethane (DDT) and its metabolites. The analyses were performed using liquid-liquid extraction, followed by gas chromatography electron capture detection (GC-ECD).
Results: 4,4'-DDE was the most abundant compound (median concentration of 0.51 ng/ml), and was detected in 99 % of the samples, while 4,4'-DDT (0.07 ng/ml) was found in 68 % of the samples. PCB congeners 118, 138, 153 and 180 were detected in more than 90 % of the samples, with PCB153 as the most abundant congener (0.14 ng/ml). HCB (0.14 ng/ml) and • -HCH (0.05 ng/ml) could be detected in respectively 96 and 86 % of the samples.
Conclusions: Prenatal exposure to OCs and PCBs is also occurring in Asturias. Comparing with other previously published INMA cohorts the observed concentrations are lower than those in samples from Menorca, but similar to those found in Valencia (Vizcaino et al. 2011).
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LEAD EXPOSURE ALTERS NEURAL MECHANISMS OF LEARNING: A PILOT STUDY OF FEAR-POTENTIATED STARTLE IN ELDERLY MEN

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Background and Aims: Physiologically-based indicators of neurological function could provide mechanistic insight into toxicant actions on the brain, and perhaps prove a more objective and sensitive measure of such effects than other methods. We explored the effects of lead exposure on classical conditioning of the acoustic startle reflex (ASR)—a simple form of learning in the brain—in a population of elderly men.
Methods: Fifty-one men from the Normative Aging Study (NAS) with patella and tibia bone lead measurements made with K-X-Ray-Fluorescence participated in a fear-conditioning protocol. One of two visual conditioned stimuli (CS) on a computer was paired with a mild finger shock. Eye-blink responses (electromyogram) to a loud noise burst were recorded with surface electrodes. Conditioning was indexed as the difference in z-scored eye-blink responses to noise bursts delivered in the presence of the paired and non-paired CS after the pairing process—when no shocks were delivered.
Results: The mean age of the men was 76 years (standard deviation [sd]=5.9) and mean patella lead concentration was 22.4µg/g bone (sd=12.2; range=5-63). In unadjusted analyses among 37 men with valid eyeblink responses at the end of the protocol, conditioning was 0.56sd less (95% CI:-1.02, -0.11; p=0.02) per 20 µg/g patella lead (the interquartile range of the parent NAS population). Tibia results were similar. Adjusting for age weakened associations only slightly, but there was no association between age itself and conditioning. Baseline startle amplitude was associated with age (β=-26.577µV per year; 95% CI:-47.67, -5.48; p=0.0137), but not with conditioning.
Conclusions: In elderly men patella bone lead concentrations, a marker of cumulative lead exposure, predicted learning in a fear-conditioning startle paradigm. While the data are taken from a relatively small sample, this initial exploration offers the possibility that the ASR may provide a new paradigm to explore the effects of neurotoxicant exposure.

EXPOSURE TO SECONDHAND SMOKE AND REPRODUCTIVE OUTCOMES BY MATERNAL HISTORY OF ASTHMA

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Background and Aims: Cigarette smoking in women is highly prevalent in South European countries. Multiple studies confirm that tobacco consumption is associated with reduced birthweight. Less clear is the reproductive effects of secondhand smoke (SHS) exposure. An issue that has not been clarified is the reproductive effect of these exposures among subgroups, and particularly the potential higher risk among mothers with a history of asthma. We assessed the role of pre-natal maternal tobacco use and SHS on reproductive outcomes and assessed the interaction with maternal history of asthma.
Methods: Data was collected from two birth cohorts, the INMA study, established in Spain and the Rhea study in Crete, Greece. Given that decreased birthweight is determined mostly by exposure to smoking during the later half of pregnancy we measured cotinine at the 32 weeks of pregnancy in 2219 and 510 women, respectively.
Results: All women had detectable levels of cotinine. Only 35% and 3% reported not being exposed to SHS or active smoking in the INMA and Rhea cohorts, respectively. Active smoking (cotinine>100ng/mL) was related to a 150g decrease in birthweight and a relative risk of 2 for small for gestational age and fetal growth restriction only in the INMA cohort. Among those exposed to SHS (cotinine:20-100ng/mL) the decrease in birthweight was 20 and 26g, respectively, but these differences could be due to chance. These results were not modified by maternal asthma. Household exposure to SHS was associated with lower birthweight, but only in the Greek cohort.
Conclusions: In countries with high prevalence of smoking and SHS exposure, cotinine levels compatible with no active smoking during the third trimester of pregnancy had a non-significant decrease in birthweight or impaired reproductive outcomes, perhaps due to the lack of unexposed women. Maternal history of asthma did not modify the results.
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ARE SEVERE HEAT WAVE EPISODES STILL AFFECTING MORTALITY IN ITALIAN CITIES?

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Background and Aims: In July 2010 the North and Centre of Italy were affected by severe heat-wave episodes. In most Italian cities an operational program for the prevention of heat-health effects is ongoing since 2004, based on city-specific Heat Health Watch Warning Systems (HHWWS). The objective is to evaluate the impact of 2010 heat-wave in Italian cities and to discuss possible public health implications.
Methods: Mortality data for all natural causes in subjects aged 65+ was retrieved from the national mortality surveillance system. The impact of the 2010 heat-wave was first explored computing excess mortality during high-risk warning days (HHWWS: level 2 and 3), as difference between observed and expected mortality from historical time series data.
A time-series approach (GEE) was then used to estimate the increase in mortality during heatwave days compared to non heat-wave days in a reference period (2007-2010) Heat-wave was defined as 2 or more consecutive days with maximum apparent and minimum temperature above the 90th monthly percentile.
Results: During the July heat-wave (between 1-24 July), a significant excess in mortality was observed in 11 cities (+854 deaths, around +30% increase). Results from the GEE model showed a significant increase during heat-wave days compared with non heat-wave days in several cities (+31.3% in Torino, +36.3% in Genova, +21.4% in Rome).
Conclusions: Although other analysis suggest a temporal reduction in the impact of heat on elderly mortality in Italian cities due to the introduction of heat-response plans, these results show that in 2010 heat wave episodes still have a significant impact on mortality. The evaluation of prevention measures to identify the most effective in coping with heat-waves should become a public health priority.

HOW TO IDENTIFY HIGH RISK POPULATION SUBGROUPS FOR HEAT PREVENTION PROGRAMS: AN INDICATOR OF SUSCEPTIBILITY BASED ON ADMINISTRATIVE DATA

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Background and Aims

A key component of heat prevention programs is the identification of high-risk population. This study presents an indicator of susceptibility to heat based on data from current informative systems and developed within the Italian Heat Health Prevention Plan.

Methods

We analysed the cohort of residents in Rome 65+ years in the period 2005-2007 (N=624,561). Variables considered were age, gender, civil-status and socio-economic position, and a list of diseases associated to heat extracted from the hospital information system. Vital status was retrieved from the Regional-Mortality-Registry. We used a Poisson generalised linear model to predict the probability of dying during days of heat wave (HWd) and no HWd for each combination of the above risk factors, separately for the 65-74 and 75+ years old. Two indicators were tested: the absolute (AD) and relative difference (RD) of the predicted probabilities. The observed relative risk (RR) of dying during HWd and no HWd were computed for increasing values of the indicator, both in the studied and a validation population.

Results

The RD indicator for the 65-74 yrs-old and AD for the 75+ were chosen. Indicators discriminate well those with the highest RR of dying in HWd vs no HWd, as well as those who seem to be protected during HWd. Among the 65-74 yrs-old, subjects in the highest 5% of the score distribution have at least a chronic pathology associated to heat and the 90% have COPD. While among the 75+ yrs group, 60% have at least three chronic diseases, 80% are women, and 90% are not married. Socio-economic-position doesn't differ according to susceptibility levels.

Discussion

The indicator might represent a valid standardized approach for the selection of subjects to be targeted to prevention programs. However its performance should be enhanced taking into account other sources of data, as the pharmaceutical registry.

PRENATAL EXPOSURE TO ORGANOCHLORINE COMPOUNDS AND ULTRASOUND MEASURES OF FETAL GROWTH

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Background and Aims: Prenatal exposure to some organochlorine compounds (OCs) has been associated with adverse pregnancy outcomes but no study has assessed OC exposure effects by using ultrasound measurements. To investigate the possible association between fetal growth and maternal (n=485) and cord (n=490) concentrations of some OCs, including *4,4´*-DDT, *4,4´*-DDE, hexachlorobenzene (HCB), β-hexachlorocyclohexane (β-HCH), 4 polychlorinated biphenyl (PCB) congeners (118, 138, 153 and 180), and their sum (ΣPCBs) in a mother-infant birth cohort in Valencia, Spain.
Methods: We fit linear mixed models to estimate longitudinal growth curves for estimated fetal weight (EFW), abdominal circumference (AC), femur length (FL), and biparietal diameter (BPD) in each trimester of pregnancy. Standard deviation (SD) scores were calculated from longitudinal growth curves, adjusted for gestational age and potential growth determinants. Size at 12, 20, and 32 weeks was assessed by unconditional SD scores. We studied the association between fetal growth and maternal and cord OC concentrations by multivariate regression analyses.
Results: We found statistically significant inverse associations between EFW, FL and cord serum *4,4'*-DDE concentrations at mid-pregnancy, and between EFW, AC and cord serum HCB or β-HCH concentrations at end-pregnancy. We found statistically significant inverse associations of FL and BPD with PCB 138 concentrations at the beginning of pregnancy and between AC, FL and PCB 153, 180 and ΣPCBs at mid- and end-pregnancy. The range of decrease for the four fetal parameters was between -5 and -14% for each 10-fold increase in the OC concentrations.
Conclusions: These results suggest that prenatal exposure to some OCs may impair fetal growth. This effect is mainly demonstrated during mid- and end-pregnancy, and OC measures in cord serum are, in general, a better biomarker of exposure to detect impairment of fetal growth. Ultrasound measures constitute a promising way to examine how early prenatal OC exposure affects fetal growth.

ASSESSING HEALTH IMPACTS OF CHANGES IN INDOOR PARTICLE CONCENTRATIONS FROM CHANGES IN ENERGY EFFICIENCY: METHODOLOGICAL CONSIDERATIONS

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Background and Aims: Major changes to the energy efficiency of dwellings are planned in pursuit of greenhouse gas mitigation targets. This has renewed interest in the potential health impact of such changes, specifically the degree to which reduced ventilation may affect exposure to particles derived from outdoor sources. However, for health impact calculations, theoretical considerations suggest that exposure-response coefficients derived from studies of outdoor air pollution need to be adjusted to account for time-activity patterns and the relationship between outdoor concentrations and indoor particles from outdoor sources.
Methods: Our starting point is the use of $PM_{2.5}$-mortality coefficients from published sources, specifically the American Cancer Society. Using evidence on the relationship between indoor and outdoor concentrations, combined with estimates of time-activity patterns, we derive an adjusted coefficient for use in health impact studies. Two key assumptions are: (i) indoor $PM_{2.5}$ of outdoor origin is directly proportional to outdoor concentrations; (ii) indoor $PM_{2.5}$ of indoor origin is independent of outdoor concentration.
Results: Building physics models and empirical data provide sets of estimates for the relationship between outdoor levels of $PM_{2.5}$ and those in the indoor environment derived from outdoor sources. These distributions of estimates suggest that the relative risk suitable for health impact calculations of changes in indoor $PM_{2.5}$ exposures should be up to 50% greater than the published coefficients from semi-ecological cohort studies. Different parameters may be applied to obtain the increment in mortality per unit exposure in different conditions.
Conclusions: For health impact calculations of the effect of changes in dwelling-related air exchange rates on exposure to particles from outdoor sources, it is important to adjust the coefficients of exposure-response relationships derived from published epidemiological studies based on outdoor measurements. This scaling implies the burden of mortality associated with indoor air pollution exposures is appreciably greater than previously estimated.

CHILDHOOD LEUKEMIA AND MATERNAL OCCUPATIONAL EXPOSURES TO ORGANIC SOLVENTS IN COSTA RICA

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Background and aims

Parental occupational exposures to organic solvents are being suggested as risk factors for childhood leukemias, although evidence is inconsistence. We report results from a case-control study of parental occupational exposures to organic solvents and its association with childhood leukemia.

Methods

Incident cases during 1995-2000 were identified from the National Tumor Registry (N= 300), with 579 population controls.

Evaluation of retrospective occupational exposures of parents to 12 organic solvents was performed combining data from (1)exposure matrix (JEM), and (2)interview individual data. JEM estimates three intensity levels of exposure to 12 agents, 25 occupations, 40 uses and 21 years. The questionnaire includes information on type of substance; use; period; frequency and duration of exposure; occupation; and PPE.

Results

Risks for benzene, toluene, xylene and turpentine were analyzed individually and also combined. Models were performed using data on exposed versus (vs) unexposed; high vs low exposures and high vs unexposed. Risks were higher for **high vs unexposed** for benzene before and during pregnancy (OR=2.61 95%CI 1.20-5.65, number of cases [NC] 16; and OR=2.56 95%CI 1.13-5.75, NC 14 respectively); toluene (OR=2.27 95%CI 1.1-5-0, NC 27); xylene (OR=2.6 95%CI 1.20-5.6; NC16); and turpentine (OR=2.3 95%CI 1.1-5.0; NC 14). **High vs low** exposures before pregnancy, were significantly elevated for benzene (OR=4.54; 95CI% 1.10-18.78), NC 16/8); xylene (OR=4.95; 95CI% 1.10-22.26, NC 16/7). For the four substances combined (OR=4.82 95%CI 1.13-20.7, NC 16/8), and

exposed vs unexposed (OR=1.32 95%CI 1.1-1.71, NC 46), and high vs low exposures (OR=2.77 95%CI 1.0-7.7, NC 29).
All models were adjusted for maternal exposure to pesticides and urban/rural residency. ORs and/or NCs were low for other solvents.

Conclusions

Maternal exposures to aromatic substances seem to be associated with the outcome. There is correlation between the exposures to aromatic solvents. Dose-response analysis is suggested for benzene, xylene before pregnancy and exposures to aromatics combined before and during pregnancy.

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A MULTISTATE LIFE TABLE MODEL INCLUDING DISEASE RECOVERY FOR ASSESSING THE HEALTH IMPACTS OF CHRONIC ENVIRONMENTAL EXPOSURES

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Background and Aims: Multistate life tables, which model the movement of individuals within a population over time between various health states, provide benefits over standard life tables since they account for the many chronic health conditions associated with environmental exposures. However, these models have not previously included disease recovery. This is an important omission for certain conditions, such as asthma, from which people may recover during their lifetime. As such, this work aims to develop and apply a tool capable of including disease recovery for use in environmental risk assessment.
Methods: We present details of a new multistate life table model. The starting point for the method is age- and disease-specific mortality, disease prevalence and incidence rates. Individuals within the population may move between good health, several disease states, a recovered state and, ultimately, death. Time spent with disease is weighted for reduced quality-of-life. The model estimates quality-adjusted life expectancy (QALE) and can be used to study patterns of mortality and morbidity over time in response to changes in environmental exposures.
Results: We describe illustrative examples of the application of the model for health impact assessments of housing interventions in England and Wales. In particular, we show that a relatively modest decrease (3 $\mu g\ m^{-3}$) in average indoor $PM_{2.5}$ exposure results in an increase in QALE at birth of around two months, with ~600 fewer new diagnoses of asthma in children under 15 and ~3,000 fewer new cases of coronary heart disease per year.
Conclusions: The new model provides substantial benefits for performing environmental health impact assessments. Including disease recovery is an important step towards modelling the effects on population health of complex actions and interventions in a comprehensive manner. The model will provide useful information for policy-makers, helping them to more effectively determine the health impacts of environmental policies.

ALTERNATIVE EXPOSURE ASSESSMENT METHODS FOR RESIDENTS NEAR INCINERATORS: A SIMULATION STUDY

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Background and Aims: A multisite project on health effects of exposure to incinerators (Moniter Project) was undertaken in Emilia-Romagna region (Italy). A retrospective cohort of residents (period 1995-2006) was enrolled to study mortality and morbidity effects. Residential exposure to incinerators was estimated from a dispersion model using emission data at enrolment (1995). Individual residential exposure was assigned to the cohort (about 250.000 subjects). A successive categorization (quintiles) was made for epidemiological analyses. Cumulative exposure could not be calculated for all cohort members. We have conducted a simulation study, using a sub-sample of the cohort with complete cumulative exposure data, to evaluate the consequences of possible misclassification of this exposure assessment method.
Methods: For a sub-cohort (about 30.000 subjects), information about residential history from the start of the plant (1980) was available, and cumulative exposure (period 1980-1995) for each subject was calculated using two different dispersion maps over time, and residential mobility. A validation study was performed to estimate possible misclassification of exposure at enrolment, calculated as for the whole cohort. A simulation procedure was used with 1000 datasets with a mean incidence rate ratio (IRR)=1.5 between the highest and the lowest exposure class of cumulative exposure and a statistical significant trend.
Results: When we compared categories of prevalent exposure at baseline with cumulative exposure, 73.5% of subjects remained in the same class and 5.2% move to nonadjacent categories. Extreme classes (lowest and highest) showed higher concordance (81.7% and 84.50%). Overall weighted kappa was 85.3%. The simulation study provided a median value of 1.414 for the IRRs between extreme categories [range:1.06-2.04] with 29.2% of the simulations overestimating the IRR. The positive trend remain significant in 63.9% of simulations.
Conclusions: We found a moderate agreement between baseline and cumulative exposure. However, in case of nondifferential misclassification between nonadjacent categories, caution regarding estimation has to be considered.

As, Hg AND Ni LEVELS IN SERUM AND SEMINAL PLASMA AND MALE INFERTILITY

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Background/Aims: An increasing number of studies suggest that chemical and physical agents in the environment, introduced and spread by human activity, may affect male fertility in humans.
We investigated the relationships between exposure to heavy metals (Arsenic, Lead, Nickel) in the serum and in seminal plasma and the presence of possible alterations of sperm parameters of male exposed to air pollution of an area of high environmental crisis.

Methods: A case–control study was conducted. The cases (87) were recruited from Melilli, the controls (13) were recruited by Regalbuto, a rural area. The heavy metals concentrations were detected by a Perkin Elmer Elan DRC-e ICP-MS. The progressive motility (a+b) of spermatozoa was evaluated.

Results: Lead, arsenic and nickel showed higher concentrations in cases than controls in both serum and seminal plasma. The samples showed a motility reduction from 45% to 23 % (50% reduction). In both volunteers, sperm density and morphology were into the reference limit of WHO parameters, whereas a slight decrease was detected in progressive motility in male volunteers living in the study area.

Conclusion: Our results suggest that the presence of Lead, Nickel and Arsenic in the reproductive tract of men may be related to a moderate alteration of motility of spermatozoa. This study suggest that heavy metals may have adverse impacts on male reproductive health.

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EXPOSURE TO AIR POLLUTION FROM TRAFFIC AND CHILDHOOD ASTHMA IN THE SWEDISH BIRTH COHORT BAMSE

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Background and Aims: Epidemiological studies of the association between traffic-related air pollution and long-term effects on the development of childhood airway disease have shown inconsistent results. We aimed to assess the development of allergic and non-allergic asthma in children up to 8 years of age, in relation to exposure to residential outdoor air pollution from traffic during the 1st year of life.
Methods: The spatial distribution of nitrogen oxides from traffic (traffic-NO_x) and inhalable particulate matter from traffic (traffic-PM_{10}) in the study area was assessed using emission inventories and dispersion models. Estimated levels were used to assign first-year exposure levels for children in prospective birth cohort BAMSE (n=4089), by linking to geocoded home addresses. Children were followed with questionnaires at 0, 1, 2, 4 and 8 years, and blood samples were taken at 4 and 8 years. Asthma was defined as ≥4 episodes of wheeze in the last 12 months or 1 episode in combination with inhaled corticosteroids. *Asthma* at 4 and 8 years was subdivided in *allergic* or *non-allergic* according to presence of sensitization to inhalant allergens. The association between air pollution and asthma was analyzed using multiple logistic regression.
Results: Air pollution exposure during the first year of life was associated with non-allergic asthma (OR for 47 μg/m³ traffic-NO_x corresponding to the 5^{th}–95^{th} percentile difference in the cohort =2.4; 95% CI=1.0 – 5.6 at 4 years, and 2.6; 0.9 – 8.1 at 8 years). No association with allergic asthma was found (OR = 1.5; 95% CI=0.4 – 5.1 at 4 years and 0.8; 0.2 – 2.4 at 8 years). Results were similar using traffic-PM_{10}, which was highly correlated to traffic-NO_x (r=0.95).
Conclusions: Exposure to moderate levels of locally emitted air pollution from traffic during infancy appears to increase the risk of non-allergic asthma in children up to 8 years of age.

MODELING OF INDOOR CONCENTRATIONS AND TOXICOLOGICAL ASSESSMENT OF CANDLE BURNING EMISSIONS

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Background and Aims: the burning of candles is one of the most important indoor sources in terms of direct emission of airborne pollutants. The aim of this study is to determine and quantify the toxicological impact of some selected chemical products emitted from the burning process of candles.
Methods: the work investigated different types of candles selected on the basis of fragrances (bark, frangipane, opium, rhubarb, aloe) and raw materials (paraffin, slack wax, and 'intermediate' wax).
The analysed products of combustion were: BTEX, formaldehyde, acetaldehyde, acrolein, PAHs, CO, SO2, NO2 and particulate matter. The design and development of a combustion chamber enabled the standardization of the 'combustion system' with its several variables.
Exposure limits for each studied substance were selected analysing data in scientific literature and international guidelines.
Indoor concentrations were predicted by ConsExpo 4.0 model. The construction of exposure scenarios was focused on the worst-case conditions: 4 candles burned for 4 hours, minimum volume for an indoor environment (25 m3) and minimum ventilation (0.1 ach).
Results: estimated indoor airborne concentrations generated by the combustion of candles charged with fragrance oils exceeded only the acrolein exposure limit by an order of magnitude. However, the predicted indoor concentrations of acrolein were an order of magnitude lower than usual indoor background levels measured in urban areas.
As regards raw materials, slack wax showed concentrations an order of magnitude higher than particulate matter, SO2 and NO2 exposure limits. Moreover, benzo(a)pyrene concentrations were equal to the relative exposure limit.
Conclusion: the different chemical composition of candles and related raw materials significantly affects the emission factors and estimated indoor concentrations of the selected airborne pollutants.
The slack wax was characterized by some critical points in terms of possible health risks, owing to the differences in terms of oil percentage in raw materials.

CADMIUM TOXICITY: A POSSIBLE CAUSE OF MALE INFERTILITY.

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Background/Aims: Human, animal and in vitro studies suggest that heavy metals may have adverse impacts on male reproductive health, even at relatively low-level exposures. Epidemiological studies provided equivocal results concerning the effects of cadmium (Cd) on hormone concentration, male infertility and sperm parameters. Very few human observational studies have analyzed the relationship between male reproductive function and heavy metal concentrations in diverse biological fluids.
A case–control study was conducted to examine relationships between environmental exposures, particularly to Cd, with male infertility.

Methods: A case–control study was conducted. The cases (87) were recruited from Melilli, the controls (13) were recruited by Regalbuto, a rural area. The Cd concentrations were detected by a Perkin Elmer Elan DRC-e ICP-MS in seminal plasma. The progressive motility (a+b) of spermatozoa was evaluated.

Results: Cd showed higher concentrations in in seminal plasma of cases (1.67 µg/l) while in controls is lower (0.55 µg/l).
In both volunteers, sperm density and morphology were into the reference limit of WHO parameters, whereas the cases samples showed a motility reduction from 45% to 23 % (50% reduction).

Conclusion: Our results indicate that the males exposed to environmental Cd showed a deleterious effect on fertility.

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META-ANALYSIS OF THE EFFECTS OF FORMALDEHYDE EXPOSURE ON THE RISK OF SPONTANEOUS ABORTION

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Background and Aims: We reviewed the evidence supporting an association between formaldehyde exposure and increased risks of spontaneous abortion or miscarriage. Several reports of adverse reproductive effects have been associated with formaldehyde exposure in humans and animals. An earlier meta-analysis reported non-significant increased summary risks based on maternal and paternal exposures (Collins et al., 2001). The aim of the current meta-analysis is to update the earlier effort with focus solely on maternal exposures.
Methods: We systematically reviewed the epidemiologic literature on the relationship between formaldehyde exposures and spontaneous abortions in humans. We selected to review six research articles concerning 3,233 women (528 with spontaneous abortion) which contain information suitable for meta-regression analysis. Pooled ORs and 95% CIs were obtained using fixed-effects and random-effects models with inverse variance weights. We tested heterogeneity using Cochrane's homogeneity statistic and quantified with the Q statistic. The potential for publication bias was assessed using the p-values from each of the included studies to compute the number of potentially unpublished studies with non-significant findings which would be necessary to change the meta-regression conclusions.
Results: While there was some heterogeneity in the reported results, it was not statistically significant (Q=10.95; p=0.0523). A fixed-effects model, which did not account for variation among the 6 studies, indicated the OR value of 1.95 for exposed women compared to unexposed (95%CI: 1.43-2.65). A random-effects model, which did account for variation among the studies, indicated the OR value of 1.91 for exposed women compared to unexposed (95%CI: 1.18-3.10).
Conclusions: Our updated meta-analysis supports the conclusion that formaldehyde exposure may increase the risk of spontaneous abortion among women. We computed that more than 25 additional unpublished studies with non-significant results would be necessary to change this conclusion.

Disclaimer: This abstract does not necessarily reflect EPA policy.

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INDIVIDUALIZED VS ECOLOGICAL AIR POLLUTION TIME SERIES: A COMPARATIVE STUDY OF MODELLING SPATIOTEMPORAL VARIABILITY

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Background and Aims: Studies of air pollution effects on health are often based on ecological measurements covering a large area with a few fixed monitoring sites. Recently several attempts are made to produce individualized exposure assessment appropriate for large scale use. We used a land use regression (LUR) model to assess daily exposure to NO_2 and PM_{10} for 50 addresses spread within the Greater Athens Area. This individualized exposure assessment was compared to a time-series of ecological measurements, based on the daily average from fixed monitoring sites that has been used in the past, in order to estimate exposure for all subjects.
Methods: We used semiparametric regression for modelling the spatiotemporal NO_2 and PM_{10} variability for geocoded addresses, using traffic load in a 100m radius buffer as well as daily meteorological variables. We evaluated the geographical variability introduced by the individualized time-series of NO_2 and PM_{10} concentrations in the study area using linear mixed models. We also assessed the validity of the individual series by comparing with the 2010 fixed site monitoring air pollution data which were not included in our model building process.
Results: We calculated the differences between the ecological and each individualized series. The mean difference (SD) was -3.26 (11.844) • g/m^3 ranging from -64.7 to 74.8 • g/m3. Thus the individualized series were on the average higher compared to the ecological series. The differences between ecological and each individualized series were higher in the summer by 5.26 (95%CI 4.86,5.65) • g/m^3 compared to the winter period and their median correlation was 0.67 (range 0.66-0.68). The model showed good validity with the 2010 data.
Conclusions: Our LUR model introduces substantial geographical variability and is well correlated with the ecological measurement on the time scale. It represents a substantial improvement over the ecological measurement for a more personalized exposure assessment.

QUANTIFICATION OF FREE AND CONJUGATED BISPHENOL A IN HUMAN FETAL LIVER TISSUE

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Background and Aims: The high production monomer, bisphenol A (BPA), is incorporated into polycarbonate plastic and epoxy resin for use in a variety of consumer products. Human biomonitoring studies of urine and serum BPA levels indicate continuous exposure that varies with age, race, gender, and diet. Animal studies have linked BPA to adverse health effects, ranging from reproductive to neuroendocrine dysfunction; however, the relevance of toxicological exposure levels to circulating human levels remains less characterized.
Methods: Here, we use high-performance liquid chromatography (HPLC) coupled with API 2000 electrospray triple-quadrupole mass spectrometer (ESI-MS/MS) to quantify BPA levels in fetal human liver tissue obtained from normal subjects from the University of Washington Laboratory of Developmental Biology (n=10).
Results: Total and free BPA were detected in 100% of the samples. Total BPA, a measure of free plus glucoronide conjugated BPA, ranged from 4.24 to 96.8 ng/g, with a mean value of 33.7 ng/g and a median value of 30.3 ng/g. Free BPA concentration ranged from 3.63 to 47.2 ng/g (mean: 22.4 ng/g and median: 21.3 ng/g). Fetal tissue samples exhibited a high ratio of free BPA to glucoronide conjugated BPA, ranging from 0.92 to 6.70, with a mean ratio of 3.48. Neither free, glucoronide conjugated, nor total BPA was associated with sex ($p>0.48$).
Conclusions: Our results suggest that the developing fetus may have reduced capacity to detoxify BPA. Quantification of internal doses of both free and conjugated BPA provides an opportunity to better understand the ontogeny of xenobiotic metabolism and its contribution to toxicity in sensitive populations. Furthermore, comparison of human tissue levels of BPA with levels measured in dosed laboratory animals will allow for more sophisticated interpretation of the relevance of toxicological studies.
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MEASUREMENT ERROR OBTAINED DUE TO THE USE OF NO_2 EXPOSURE ESTIMATED INSTEAD OF MEASURED

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Background and Aims: Given the large costs and the lack of light measurement devices to measure individual exposure to certain pollutants, it is very common in epidemiology to estimate the exposure to pollution using models based on ambient measurements. This estimation does not usually take account of uncertainties that may lead to attenuation of the effect, bias and loss of power. The aim of this study was to compare the results of a traditional analysis with those obtained when using a model that incorporates the uncertainty of all modelling steps.
Methods: The INMA birth cohort study in Sabadell includes 657 pregnant women from whom information from questionnaires is collected at 12 and 32 weeks of pregnancy and at delivery. NO_2 measurements used to develop a land use regression (LUR) model are made at 57 sites in the city, and are supplemented by personal, home-indoor and home-outdoor measurements for 57 cohort subjects. We developed linear regression model of personal exposures to NO_2 for all women. We first modelled subjects' home-outdoor concentrations as a function of the LUR outputs, and home-indoor as a function of information provided by questionnaires (gas cooking, ventilation, etc.). These two predictions then fed into the personal exposure model. We compare a frequentist approach to a Bayesian modelling approach accounting for uncertainty.
Results: Estimations obtained for personal NO_2 for both methods were similar. The only observed differences between both approaches were observed at the standard deviation of the coefficients estimates. Higher values were obtained through the bayesian model (0.43 and 0.66 for outdoor and indoor NO_2, respectively) than for the linear model (0.27 and 0.53).
Conclusions: Although no good predictive models were obtained for either of the two methods, the bayesian approach seemed to better incorporate the uncertainty associated to the various modelling steps.

A MODEL-BASED APPROACH TO LIMIT OF DETECTION IN STUDYING ENVIRONMENTAL CHEMICAL EXPOSURES AND TIME TO PREGNANCY

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Background: Human exposure to persistent environmental pollutants often results in a range of exposures with a proportion of concentrations below laboratory detection limits. Growing evidence supports that inadequate handling of concentrations that are below the limit of detection (LOD) may bias health effects in relation to chemical exposures. We sought to quantify such bias in day specific probability of conception during the fertile window, and propose a model-based approach to reduce the biases.

Methods: We assumed a flexible multivariate skewed generalized *t* distribution constrained by LODs, which realistically represents the underlying shape of the chemical exposures. Correlations in the multivariate distribution provided information across chemicals. Simulating 1000 datasets with three chemicals exposures having 40-60% below LODs, we compared results from the proposed approach to those from naïve substitution by LOD/$\sqrt{2}$ for concentrations below LODs. We further applied the proposed approach to data from the Longitudinal Investigation of Fertility and the Environment (LIFE) Study adjusting for age, parity, daily usage of cigarettes and alcohol.

Results: Simulations revealed relative biases 25%, 94%, and 96%, respectively for the three chemicals using substitution, while the proposed approach results are 8%, 9%, and 5%. In LIFE data, polychlorinated biphenyl (PCB) #105, #209, perfluorooctane sulfonamid (PFSA), and cadmium had 26%, 77%, 91% and 43%, respectively, below the LODs. Posterior means (95% credible intervals) for these chemicals are 0.073(-0.303,0.457), 0.240(-0.132,0.604), -0.25(-0.690,0.124), and -0.120(-0.559,0.299) using substitution and -0.015(-0.397,0.407), 0.137(-0.193,0.477), -1.179(-1.929,-0.491), and -0.169(-0.746,0.380) using proposed approach. Substitution yields no significant chemical effects, where the proposed approach shows PFSA is significant and negatively associated with fecundity.

Conclusions: In estimating effects of chemical exposures on conception probabilities, the substitution can lead to biased estimates while the proposed method yields more accurate estimates. In LIFE study data, we found a statistically significant negative association between PFSA and day specific conception probabilities.

DETERMINATION OF RISPERIDONE IN BLOOD AND HAIR BY LC-ESI-MS-MS-TQD.

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Background/Aims: Mental illnesses produce some of the most health problems faced by society. Scientists have long known that these mental illnesses arise from combinations of genes and environmental factors. Now the role of the environment in the etiology of mental illness has become more clear.

The antipsychotic drugs are commonly used for the treatment of schizophrenia and anxiety disorders. Although hair analysis has become a test widely used to detect the use/abuse of many toxic and therapeutic substances, very few data are available regarding hair testing for antipsychotic drugs. The risperidone (RSP) is one of the less investigated substances.

The possibility to identify and quantify antipsychotic drugs in human hair could be an interesting epidemiological, clinical and forensic tool in therapeutic drug monitoring. The aim of the present pilot study was to develop and validate a method for the quantitative determination of RSP in blood and hair samples by LC-ESI-MS-MS.

Methods: study was carried out on blood and hair samples collected from psychiatric patients treated with risperidone. Each patient gave informed consent. Hair samples were washed, decontaminated, pulverized, incubated in 1 ml of HCl 0.1N and extracted with chloroform:isopropanol (80:20; v/v) at pH 7, pH 9 and pH 11. Blood specimens were extracted with 1-chlorobutane after alkalinization with sodium borate (pH to 12). Bupivacaine was used as internal standard. Hair and blood extracts were analyzed by LC-ESI-MS-MS-TQD using Varian 320MS. Validation experiments (specificity, interferences, interday and intraday precision and accuracy, LOD, extraction yield, interferences and ion suppression) were performed.

Results: Our preliminary results showed that this method allows to detect and quantify risperidone in hair and blood of the patients chronically treated with doses ranging from 1 to 8 mg/daily.

Conclusion: Hair testing can be used in monitoring of chronic antipsychotics intake; however, further studies are required to improve its epidemiological applications

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ASSOCIATION OF PRENATAL EXPOSURE TO METHYLMERCURY AND n-3 FATTY ACIDS WITH NEUROBEHAVIORAL TEST PERFORMANCE AT AGES 7 AND 10 YEARS

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Background and aims: Methylmercury, a worldwide contaminant found in fish and seafood, can have serious adverse effects on the developing nervous system. However, essential nutrients such as the long-chain n-3 polyunsaturated fatty acids, including docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) in fish provide beneficial effects on brain development. Underestimation of the effects of both mercury toxicity and fish benefits may occur from the lack of mutual adjustment. We examined these effects in regard to neurodevelopment in176 children in a Faroese singleton birth cohort.
Methods: We determined the cord blood mercury concentration and the relative concentrations of cord serum phospholipid fatty acids. Maternal hair mercury at parturition was also measured. Neuropsychological performance in verbal, motor, attention, spatial, and memory functions was assessed at 7 and 10 years of age. The sum of DHA and EPA represented the total n-3 fatty acid concentration (correlation=0.98, $p<0.001$) and was included as the nutrient adjustment. Multiple regression and structural equation models (SEMs) were carried out to determine the confounder-adjusted effect of methylmercury exposure.
Results: Indicators of prenatal methylmercury exposure were significantly associated with naming, verbal learning, and spatial performance. The association strengthened after adjustment by fatty acids. Taking into account correlations among related measures to derive latent exposure and response variables in SEMs, we found significant associations of mercury exposure with deficits in verbal and memory performance at 7 years and 10 years of age, and also in spatial function at 10 years.
Conclusions: Prenatal exposure to methylmercury was associated with deficits at school age in domains known to be sensitive to this neurotoxicant. This effect was strengthened after nutrient adjustment. These findings suggest that essential fatty acid information needs to be included or modeled in analyses of similar studies to avoid underestimation of the methylmercury effects.

COMPARISON OF EFFECTS INDUCED BY FORMALDEHYDE EXPOSURE ON ALVEOLAR AND BRONCHIAL EPITHELIAL CELLS IN VITRO

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Background and Aims Exposure to formaldehyde (FA) at environmental concentrations is suspected to be associated to asthma and respiratory disorders. Nevertheless, the physiopathology of this relation is still unclear and experimental data are needed. In vitro experimentation is complementary to epidemiological studies. However experimental procedure parameters need to be adapted, such as the choice of target cells of respiratory tract. The aim of this study was to compare the inflammatory response of FA exposure at environmental level on alveolar and bronchial epithelial cells.

Methods
Human alveolar (A549) and bronchial (BEAS-2B) epithelial cells were exposed at the air-liquid interface in a Vitrocell exposure module to FA (50 µg/m3) (or air for control) during 30 min. After 24h post-incubation, cellular viability was assessed using LDH release. Two chemokines (IL-8, MCP-1) were assayed in the apical supernatant by ELISA. In addition, to modulate inflammatory response, pre-sensitization was performed using LPS (5 µg/mL) (to mimic a bacterian activation), TNFα (1 ng/mL) or macrophages conditioned media (to mimic the macrophages/epithelial cells cooperation) during 16h before exposure.

Results
Whatever the cell type, cell viability was unaffected by air or FA exposure compared to cells not exposed at the air-liquid interface. Without presensitization or after LPS presensitization, FA had not effect on A549 or BEAS-2B, compared to air-exposed cells. FA exposure, after TNFα presensitization, resulted in an inflammatory response, an increase of IL-8 production by A549 cells; after macrophage conditioned media presensitization, an increase of IL-8 production by A549 cells, and decrease of MCP-1 production by BEAS-2B cells was observed.

Conclusions
After presensitization FA exposure at environmental levels provokes an inflammatory response in epithelial cells of the respiratory tract. Moreover, this response is differently modulated depending on the level of the cells in the respiratory tract.

APPLICATION OF ECOTOXICOLOGICAL TESTS FOR MONITORING ATMOSPHERIC PARTICLES.

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Theme: Exposure assessment, methods.

Background and aims: Particle size distribution is important for human exposure and risk assessment, as well as for understanding the mechanisms of atmospheric processes. In the present study, the toxicity of particulate matter (PM10) was determined using a rapid and cost-effective bioluminescence assay, the Microtox bioassay. However the ecotoxicological effects of the particulate matter, has not been investigated, thus the current study is a preliminary effort to correlate physicochemical properties of particulate matter to biological impact.
Methods: Samples were collected in an heavy industrialized area of Sicily (Italy). Dust emissions seem to be the most serious problem in the area, as the measured ambient concentrations of suspended particles are at high levels and exceed local and international standards. The air quality control around the area is monitored by a measurement stations network, which has been installed by the CIPA. The ecotoxicological test was based on the measurement of bio luminescence inhibition of the marine bacteria *Vibrio fischeri* within a short exposure time. The % bioluminescence inhibition or the EC50 value (the % of sample concentration that causes 50 % effect on the test organism) of a sample was calculated as an end point. The light emitted from the control sample and the samples have been measured using the Microtox model 500 analyzer after 5,15 and 30 min exposure of the bacteria.
Results: Were tested 20 filters containing PM10, the result EC50 was corrected for the toxicity of white filters. The average EC50 results after 5 minutes of exposure is 26.50%, is 49.48% after 15 and after 30 is 53.07%.
Conclusions: This assay shows good correlations to detect toxicity across a wide spectrum of toxicants. The effect of pollutants on *Vibrio fischeri* is known in the literature for water and sludge, further studies will be able to relate additional information concerning the air.
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AN EXPLORATORY STUDY OF QUALITY OF LIFE AND PERCEPTION OF ENVIRONMENTAL POLLUTION IN TARANTO, ITALY

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Background and Aims: WHO has defined the city of Taranto (Apulia, South-Eastern Italy) as a high environmental crisis risk area with excess total and cancer mortality[1]. Since the late '60's, heavy industries (steel & cement plants, oil refinery) have been located very near residential areas. There are no studies investigating residents' perception of environmental pollution in Taranto [2-4].

Methods: We used qualitative and quantitative methods to assess perception of environmental quality, pollution and quality of life (QOL) in a convenience sample of high-school parents (N=118). A survey questionnaire for assessing demographics, perception of environmental quality via visual analogue scales (VAS) and the Italian version of WHOQOL-BREF were used [5].We also conducted qualitative interviews with 27 subjects to further illustrate residents' perception of their environment.

Results: The subjects' (50 men, 67 women), mean age was 47.25±13.41. Majority were married (71.8%), had a high-school diploma or above (87%), lived with others (92.8%), were employed with regular (93.0%) low-to-middle income (<=2000 €, 68.6%). Subjects' mean rating of components of the environment in Taranto (VAS) were 22.7% air, 41.94% drinking water, 44.96 % sea water, 38.37 % other water, 37.76 % soil, 47.95% meat, 44.33% poultry, 55.72 % shellfish, 58.74% fish and 45.83% produce. Mean WHOQOL-BREF scores for the physical (71.39±14.56), psychological (59.40±9.26) and environmental (52.68±13.84) domains were significantly lower than Italian population norms (t_{phy}=5.48, , p<.001; t_{psy}=10.27, p<.001, t_{env}=5.47, p<.001; df=494) but not social relationships (70.47±16.47)[6]. Qualitative analysis revealed main themes of discourse as: difficulty breathing mornings and evenings, noxious air, ability to tell refinery and steel factory emissions apart by smell, reminiscence of childhood with cleaner environment, expression of helplessness regarding environmental pollution.

Conclusions: The results of our study show lower QOL, grim perception of the environment in a sample of Taranto residents; indicating a need for large scale, population-based studies investigating QOL effects of environmental pollution in the region.

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EFFECTS OF FORMALDEHYDE EXPOSURE ON UPPER RESPIRATORY TRACT CANCERS: WEIGHT OF EVIDENCE

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Background and Aims: Formaldehyde is ubiquitous in ambient and indoor air. Human exposure primarily results from off-gassing of processed wood products and as a combustion by-product. Evidence of carcinogenicity beyond nasopharyngeal cancer (NPC) includes other site-specific relationships in the upper respiratory tract (URT).
Methods: We systematically evaluated the epidemiologic literature on the relationship between formaldehyde exposures and URT cancers.
Results: The National Cancer Institute cohort study of 25,619 workers exposed to formaldehyde reported increased NPC mortality risk (SMR=2.1, 95% CI: 1.05-4.21) and demonstrated exposure-response relationships with cumulative exposure to formaldehyde (*p-trend*=0.025) and peak exposure to formaldehyde (*p-trend*<0.001). These results were substantiated by a robust collection of exposure-response results from case-control studies. Luce et al. (2002) pooled standardized data from 12 separate studies of sinonasal cancer providing the strongest evidence that formaldehyde is associated with sinonasal cancer. Together with the NPC findings in the neighboring tissue of the URT, this is evidence of a causal association of formaldehyde exposure with sinonasal cancer. The evidence for a specific effect on the risks of buccal, oropharyngeal, hypopharyngeal, and laryngeal cancers is slight when examining each of these extremely rare URT endpoints individually. However, the large NCI study showed a statistically significantly increased risk for URT cancers as a group and for buccal cavity cancers. Further evidence includes a nearly 4-fold increased risk of hypopharyngeal cancer (Laforest et al., 2006) and the demonstration of an exposure-response relationship for duration of formaldehyde exposure and risk of laryngeal cancer (Shangina et al., 2006).
Conclusions: We conclude that there is causal evidence for NPC and sinonasal cancer in neighboring tissues of the URT and the other sites of first contact with inhaled exposure to formaldehyde and these collective results support a broader pattern of carcinogenicity within the URT.

Disclaimer: This abstract does not necessarily reflect EPA policy.

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SERUM HORMONE PROFILE AND PUBERTY DEVELOPMENT IN BOYS WITH PRENATAL PCB EXPOSURE

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Background and Aims: Certain persistent pollutants, such as PCBs and DDTs, are thought to cause endocrine disruption. We examined the serum hormone profile in boys at puberty age in regard to their prenatal pollutant exposures.

Methods: In 1986-1987 cord blood was sampled from a Faroese birth cohort and kept frozen. In 2000-2001, birth cohort members were invited for clinical examinations at age 14 years and underwent Tanner staging and, finger length measurement, and serum hormone assessment. Of 436 boys participating (85%), complete data were available for 361 boys (71%). The cord blood has now been analyzed for the persistent pollutants. Associations between exposures and endocrine outcomes were explored by regression analysis after confounder adjustment.

Results: Prenatal exposure to PCBs and DDTs showed a negative association with serum concentrations of testosterone and luteinizing hormone and a positive association with sex-hormone-binding globulin. No association was seen with inhibin B and follicle-stimulating hormone, and the same was true in regard to Tanner stage and testicular size. Results were similar for the different PCBs and DDTs, which correlated closely among themselves.

Conclusions: These results suggest that an antiandrogenic effect of persistent pollutants may be mediated centrally, rather than through direct testicular toxicity.

Community Perceptions of Living Next to a Major Railyard: The ENRRICH Project.

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BACKGROUND:
The BNSF San Bernardino Railyard (SBR) is a major trade gateway in the United States and one of the busiest facilities of its kind in California. Local community and air pollution control agencies have identified SBR as a significant public health and environmental justice issue. The Environmental Railyard Research Impacting Community Health (ENRRICH) project has aims to examine potential health effects associated with residential proximity to this railyard. As part of a qualitative preparatory phase we explored community members perceived environmental health risks and their thoughts about possible changes in their environment. We see this input as essential to the conduct of respectful health research that will include mitigation foundation development.

METHODS:
Community-based participatory research (CBPR) strategies were utilized to engage the community residents living in close proximity to the railyard. Semi-structured key informant interviews (n=12) and five focus groups (n=53) were conducted in English and Spanish. Following Grounded Theory methodology, interviews and focus groups were recorded, transcribed verbatim, translated, thematically coded for recurrent themes and organized into overarching categories.

RESULTS:
Five over arching themes were found: perception of health consequences, perceived factors influencing health, community infrastructure and challenges, community relationship with SBR, and desired changes for the community. Residents understand the threat of outdoor air pollution and associated risks, but barriers including lack of community infrastructure, violence and the economic downturn hinder their motivation and ability to act. While seen as a nuisance and somewhat recognized for its inherent risks, residents often chose not to engage in thoughts about health consequences since air pollution was not an immediate visible and pressing concern as they battle with the impacts of the economic downturn and poverty to survive.

CONCLUSION:
Resident perspective is critical to inform the health research and risk reduction mitigation plans, adding complexity to the planned health outcomes research.

CHILDREN'S BURDEN OF DISEASE CAUSED BY LEAD EXPOSURE IN CHINA

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Background and Aims: To explore Chinese children's disease burden of mild mental retardation (MMR) caused by lead exposure

Methods: Articles on children blood lead levels (BLLs) published from 1994 to 2008 were collected through Chinese Biomedical Disk, Chinese Journal Full-test Database and other ways according to formulated criteria. The children's incidence rate of MMR (IMMR) and disease burden (DALYs) due to lead exposure were estimated using the methods recommended by WHO.

Results: The study showed that the mean BLLs of urban and rural children were 7.26μg/dl, 7.88μg/dl, and the IMMR were 18.1‰, 19.5‰, both of that were higher than the average level of Western Pacific Region with 7.7‰. The DALYs of children in city due to lead exposure were 39.4 (DALYs per 1000 children), while the DALYs in rural area were 43.2. Before the leaded gasoline banned in China, the urban children's mean BLLs were 9.33μg/dl, IMMR was 21.8‰ and the loss of DALYs were 47.8; while those dropped to 7.04μg/dl, 17.5‰ and 38.2, respectively after the ban. For rural children, the mean BLLs were 8.22μg/dl, IMMR was 20.2‰ and DALYs were 44.0 before the ban, while those dropped to 7.70μg/dl, 19.6‰ and 42.7, respectively after.

Conclusions: We can conclude that ban of leaded gasoline reduced the BLLs of children, and then reduced the disease burden caused by lead-induced MMR, yet that in rural areas decreased relatively by less; the incidence rate of MMR was still in the high level. It was urgent and necessary that we should prevent and control the children's lead exposure to reduce the economical loss and social effect.

LUNG CANCER MORTALITY RISK AMONG AN OCCUPATIONAL COHORT EXPOSED TO A MIXTURE OF COMMERCIAL AND NON-COMMERCIAL AMPHIBOLE ASBESTOS FROM VERMICULITE MINING OPERATIONS IN LIBBY, MONTANA

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Background and Aims: Vermiculite mining and milling in Libby, MT supplied the majority of North American demand for vermiculite during the 20th century. Libby vermiculite is contaminated with amphibole asbestos, including, winchite, richterite and tremolite. Libby workers and residents in the community were exposed to this mixture of largely non-commercial asbestos fibers for decades. Several million homes in North America may have vermiculite attic insulation from the Libby, MT mine.
Methods: Our analysis is based on 880 workers hired after 1959 when fiber concentrations were lower and possibly more consistent with potential environmental exposure. We used Cox proportional hazards models with time-dependent covariates to assess the effects of Libby amphibole asbestos on lung cancer mortality. Multiple exposure metrics including cumulative exposure, residency-time weighted exposure, and metrics mathematically allowing for effects of fiber clearance or translocation were evaluated. We compared lung cancer potency results using slopes and their corresponding risks with the slopes and risks from other investigations of the Libby worker cohort.
Results: There are four researchers who have recently published lung cancer potency results for the Libby amphibole asbestos worker cohort: Sullivan (2007), Berman and Crump (2008), Larson et al. (2010) and Moolgavkar et al. (2010). The adjusted lung cancer mortality slopes per calendar year from these four studies ranged from 1.6x10E-3 to 4.2 x10E-3 per fiber/cc-year. Risks derived through life tables based on age-specific cancer mortality rates from these four studies ranged from 0.01 to 0.08 per fiber/cc. Uncertainties in the application of these epidemiologic data are discussed.
Conclusions: Libby amphibole asbestos, a mixture composed primarily of non-commercial amphibole asbestos, has repeatedly been shown to be associated with lung cancer mortality by different investigators using varying definitions of this occupational cohort.

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INTERACTIONS BETWEEN PARTICULATE AND TEMPERATURE ON MORTALITY OF CIRCULATORY SYSTEM DISEASES IN BEIJING, CHINA

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Background and Aims: To explore the interaction between particulate matter (TSP and PM_{10}) and temperature on mortality caused by circulatory system disease in different genders.

Methods: A Poisson semi-parametric generalized additive models (GAM) was used to examine whether there is interactive effects of particulate matter and temperature on mortality of circulatory system disease. The split point of low, medium, high temperature layer was determined based on the sensitivity tests. The interaction between atmospheric particulate matter (TSP and PM_{10}) and daily average temperature on daily mortality caused by circulatory system disease was analyzed through comparing the effects of atmospheric particulate matter in high/low and medium temperature layer.

Results: A 10μg/m^3 increase in TSP and PM_{10} with an increase of 0.055%(P=0.160) and 0.268%(P=0.002)in mortality cause by circulatory system disease. According to the results of sensitivity tests, P_{20}/P_{80} and P_{25}/P_{75} were determined as the split point of low, medium, high temperature layer. In the model with P_{20}/P_{80} split point as the temperature stratification, a 10μg/m^3 increase in TSP was associated with an increase of 0.244%(P=0.088), 0.015%(P=0.0180) and 0.437(P<0.001) in mortality cause by circulatory system disease at high, medium and low temperature, while in the model with P_{25}/P_{75} split point as the temperature stratification, the increased percentage were 0.196%(P=0.126), 0.016%(P=0.733) and 0.116%(P=0.054). With the 10μg/m^3 PM_{10} increase, the percentage of mortality will in crease 0.408%(P=0.066), 0.240%(P=0.011) and 0.342%(P=0.072) in high, medium and low temperature when P_{20}/P_{80} as the split point of temperature, 0.602%(P=0.007), 0.209%(P=0.030) and 0.340%(P=0.047) when P_{25}/P_{75} as the split point of temperature.

Conclusions: All results suggested that both particulate matter and daily average temperature may effect on daily mortality caused by circulatory system diseases independently. Forthmore, there was interaction on the mortality caused by circulatory system diseases between TSP, PM_{10} and high/low temperature.

CROSS-SECTIONAL ASSOCIATION BETWEEN ROAD TRAFFIC NOISE AND HYPERTENSION IN A POPULATION-BASED SAMPLE IN GIRONA, SPAIN (REGICOR-AIR PROJECT)

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ABSTRACT

Background and aims: Long-term exposure to traffic-related noise may increase blood pressure levels and induce hypertension, especially at night-time; however the evidence is still heterogeneous. Besides, long-term exposure to traffic-related air pollution has been also associated with cardiovascular health and it may confound the effects of road traffic noise on common cardiovascular endpoints. We evaluated the association between traffic-related noise and hypertension, adjusting for traffic-related air pollution in the city of Girona, north-eastern Spain within the REGICOR-AIR project.

Methods: We evaluated 3480 baseline participants (35-83 years old) corresponding to the population-based HERMES cohort (years 2003-2005) with blood pressure measurements and with socio-demographic, dietary and physical activity information. Outdoor residential road traffic noise levels for night ($L_{Aeq,night,9pm-7am}$) and 24 hours ($L_{Aeq,24h}$), and outdoor residential nitrogen dioxide (NO_2) levels were derived with a validated city-specific noise model (Environmental Noise Directive 2002/49/EC) and a land-use regression model, respectively. Logistic regression models were performed for hypertension (defined as systolic blood pressure ≥140mmHg or diastolic blood pressure ≥90mmHg or hypertension treatment) and traffic-related noise, adjusting for relevant confounders.

Results: A non-significant association was found between long-term exposure to road traffic noise and hypertension for an increase in 10dB(A) in $L_{Aeq,night}$ (OR=1.02; 95%CI 0.86-1.20) and in $L_{Aeq,24h}$ (OR=1.04; 95%CI 0.88-1.22). This association remained unchanged after adjusting for NO_2. No significant associations were observed in the stratified analyses by gender or age groups.

Conclusions: The overall non-significant positive effect estimates are in line with some previous epidemiological studies. However, we could not confirm some of the reported significant effects observed in previous studies by gender or age groups. Further analyses will include the evaluation of coping behaviour against noise and sensitivity analyses on the noise exposure assessment. Furthermore, we will also study the association between blood pressure and road traffic noise.

INTERACTIONS BETWEEN PARTICULATE AND TEMPERATURE ON NON-ACCIDENTAL DEATHS OF DIFFERENT GENDERS IN BEIJING, CHINA

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Background and Aims To explore the interaction between particulate matter (TSP and PM_{10}) and temperature on non-accidental deaths of different genders.

Methods A Poisson semi-parametric generalized additive models (GAM) was used to examine whether there is interactive effects of particulate matter and temperature on non-accidental deaths. The split point of low, medium, high temperature layer was determined based on the sensitivity tests.

Results According to the results of sensitivity tests, P_{20}/P_{80} and P_{25}/P_{75} were determined as the split point of low, medium, high temperature layer. In the model with P_{20}/P_{80} split point, a 10μg/m^3 increase in TSP was associated with an increase of 0.308%, 0.042% and 0.498% in non-accidental deaths of women at high, medium and low temperature, while were higher than the increase of 0.046%, 0.002%and 0.338% of men. In the model with P_{25}/P_{75} split point as the temperature stratification, the increased percentage of women were 0.318% and 0.171% respectively in high and low temperature layer, were higher than men -0.062% and 0.064%. The percentage increase of non-accidental deaths in women was closed to men in medium temperature layer. With the 10μg/m^3 PM_{10} increase, the percentage of mortality of women will increase 0.814%, 0.219% and 0.638% in high, medium and low temperature when P_{20}/P_{80} as the split point, while mortality of men will increase -0.057%, 0.085% and 0.263%.In the model with P_{25}/P_{75} split point, the increased percentage of women were 1.160%, 0.194% and 0.452% in high, medium and low temperature layer, were also higher than men0.058%, 0.083% and 0.154%.

Conclusion The interaction on daily non-accidental deaths between atmospheric particles matter and daily average temperature in different gender was different. The impact on women was more than men.

SURVEY ON THE LEVEL OF BLOOD LEAD AND OTHER HEAVY METAL ELEMENTS IN CHILDREN AROUND COPPER SMELTER AREA

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Background and Aims: To describe the impact of copper smelter on blood lead and other heavy metal elements concentrations of children living around.

Methods: Eighty children at the age of 6-11 from 4 schools which located within 5 km, between 5-10km, over 10km away from the copper smelter were chosen, respectively. The children's venous blood were collected by purple-cap tube and measured by ICP-MS to detect the levels of lead, zinc, iron, copper, selenium, nickel, mercury, cadmium, chromium and manganese. Arithmetic mean was used to describe the normal distribution measurements, geometric mean (GM) for those geometric normal distribution, and median for other distributions.

Results: The GM of blood lead was 28.53μg/L (15.28~53.83μg/L), much lower than reported Chinese children's average level of 76.71μg/L; the GM of blood copper was 926.67μg/L (729.07~1305.90μg/L), nearly equal to the level of 910μg/L of children 6-13 years old reported by Changli Zhang; and the mean of zinc with 5.23 mg/L (3.64~7.60 mg/L) was also nearly equal to Zhang's study. Meanwhile, the mean of selenium was 131.78μg/L, the GM of cadmium and manganese were 0.16μg/L and 17.19μg/L, the median of iron, nickel, mercury, and chromium were 69.98 mg/L, 2.38μg/L, 0.55μg/L and 1.73μg/L, respectively. The results of stratified analysis showed that (1) There was no dose-response relationship between the distance from the cooper smelter and the concentrations of blood heavy metals; (2) The boys' blood levels of lead, iron and zinc were significantly higher than girls' ($P<0.05$), while other heavy metals without gender difference; (3) There was no significant correlation between age of children and the levels of blood heavy metals.

Conclusions: The concentrations of heavy metal elements of children investigated were largely in the range of healthy children's blood heavy metal levels reported; there was no significant correlation between children's residences and their heavy metal levels.

CORDBLOOD ACRYLAMIDE LEVELS AND GENE EXPRESSION IN NEWBORN EXPOSED DURING PREGNANCY

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Background and Aims: Hemoglobin acrylamide adducts (HbAA) are biomarkers of exposure to acrylamide (AA). The highest AA concentrations are found in potato chips and french fries. Concerns about AA exposure *in utero* and the risk of adverse health effects are justified by AA potential carcinogenicity. Aim of this study was to investigate the association between exposure to AA in newborn during pregnancy and expression levels of 43 genes indicative of genotoxic and immunotoxic events.
Methods: The study included newborns from Greece, Norway, Spain, Denmark, and the United Kingdom (No=1151) whose mother gave informed consent at the time of recruitment in the EU funded Integrated Project NewGeneris (Newborns and Genotoxic exposure risks). HbAA were measured by the "adduct FIRE procedure" using LC-tandem mass spectrometry and gene expression by RT-PCR techniques. Mean ratios were computed to estimate the effect of each gene expression on HbAA level. The relationships between Hb-AA (log transformed) and genes expressions were investigated within each country by using the log-linear and in all newborns by fitting the mixed-effects linear regression model adjusting for selected covariates (child gender, ethnic group, gestational age, smoking during pregnancy). Multiple comparisons was accounted by the false discovery rate (FDR) correction and adjusted p-value < 0.05 were considered significant.
Results: Two genes were found to be associated with Hb-AA levels among newborns from all countries: HS00427977_M1_ERH_GTX_ITX (MR=0.79; 95%CI:0.71-0.89), and HS00925195_M1_PRKCA_GTX (MR=0.93; 95%CI: 0.88-0.98). The association with the former gene was observed in newborns from UK (MR=0.70; 95% CI:0.57-0.87) and Spain (MR=0.66; 95% CI: 0.54-0.82) where some other genes showed a statistically significant relationship with Hb-AA. The analysis of newborns from Greece revealed a significant correlation between HS00925195_M1_PRKCA_GTX (MR=0.91; 95%CI: 0.86-0.98) and Hb-AA. Further associations detected in other countries will be presented.
Conclusions: The results suggest that an increased expression of the above-mentioned genes, both involved in cell cycle regulation, is associated with a decreased level of Hb-AA in newborns possibly due to acrylamide exposure via maternal food intake during pregnancy.

SURVEY ON LIVING ENVIRONMENT OF FAMERS IN CENTRAL PLAIN CHINA

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Background and Aims: To describe the farmers' living environment in investigation area. And to provide information and basis for formulating environmental comprehensive management plans.

Methods: We have chosen 560 farmer households as the subjects of household-spot observation and inquiring survey. The study was implemented by trained observers according to formulated observation outline.

Results: (1) Hygiene conditions: the households surveyed were generally in good hygiene conditions, except 20.9% of them. Less than 20% of households deposited chemical fertilizer, pesticide, farm tools and grains together; about 50% of households discarded their garbage and sewage randomly; 60% kept free-roaming poultry and poultry droppings could be found in 30% of them. (2) Kitchens: 96.4% of households owned separate kitchens. The availability of clean fuel was low, and firewood and coal were still the main cooking fuel, accounting for 60.7% and 40.8%; tightness of kitchen chimney in 24.6% of households were in poor conditions. (3) Drinking water: 66.4% of the households used shallow groundwater in distributed supply, among them 78.4% used manual-operating well and 21.6% open well. There were also some risk factors of drinking water safety, for example, 6.7% of the wells located within 20m away from the toilets and 56.5% of households used water containers. (4) Toilet: the households hardly had sanitary latrines. Although most of toilet had roof-toilet, 46.1% of the toilets were in poor hygiene conditions. (5) Village environment: 81.1% of villagers showed their approval about the living condition, and 18.9% dissatisfied with it; 69.8% of them considered the poor river water did adverse effect on daily life, 56% believed that usage of river water had being influenced and 32.9% believed it might contaminate groundwater.

Conclusion It was necessary to improve the living environment, such as promoting the use of clean fuel, providing safety drinking water and protect the river pollution.

EXPOSURE TO PM2.5 AND CAUSE-SPECIFIC MORTALITY RISK IN ADDITIONAL FOLLOW-UP OF THE HARVARD SIX CITIES STUDY: IDENTIFICATION OF SUSCEPTIBLE SUB-POPULATIONS

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Background and Aims: Long-term exposures to particulate matter < 2.5 microns ($PM_{2.5}$) have consistently been associated with increased mortality. Effect modification by gender, socioeconomic status, obesity and smoking has been suggested in many studies. We assessed effect modification of the $PM_{2.5}$ and cause-specific mortality associations in the Harvard Six Cities Study.
Methods: The Harvard Six Cities adult cohort study consists of 8,111 white adults recruited 1974 to 1978. Participants completed a questionnaire at enrollment with information on personal characteristics. Vital status and cause of death have been updated through 2006 using the National Death Index. Annual $PM_{2.5}$ was measured by study or USEPA monitors depending on the calendar year. We used Cox proportional hazards regression models to estimate hazard ratios (HR) and 95% confidence intervals (CIs). Effect modification by gender, smoking status, education, obesity, and occupational dust and fume exposure was examined in stratified models and with interaction terms.
Results: With 196,547.25 total person-years of follow-up, there were 4,044 deaths, including 1,680 and 318 from cardiovascular disease and lung cancer, respectively. For each 10 µg/m3 increase in $PM_{2.5}$ in the year of death, the HR for cardiovascular and lung cancer mortality was 1.24 (95%CI 1.12-1.36) and 1.36 (95%CI 1.07-1.69) in models adjusted for BMI, smoking, gender, age, calendar time and education. We observed little evidence of effect modification for cardiovascular mortality. For lung cancer, effects were strongest for participants with less than a high school education (HR=1.83), ever smokers (HR=1.44) and those with dust/fume exposure (HR=1.64). However, none of the interaction terms were statistically significant.
Conclusions: In this continued follow-up of the Harvard Six Cities Cohort, $PM_{2.5}$ is associated with increased risk of mortality from cardiovascular disease and lung cancer. Unlike other investigations, no effect modification for cardiovascular mortality was observed and modifiers of the lung cancer association were modest.

Lung Cancer Effect Modification			
High School	HS or greater	1.08 (0.78-1.48)	0.14
	< HS	1.83 (1.26-2.67)	
Smoking	Ever smoker	1.44 (1.13-1.84)	0.94
	Never smoker	1.11 (0.49-2.55)	
Obesity	Obese	1.29 (0.41-4.06)	
	Not obese	1.37 (1.08-1.73)	
Gender	Male	1.47 (1.11-1.95)	0.30
	Female	1.13 (0.75-1.70)	
Dust or Fumes	No	1.07 (0.72-1.59)	0.07
	yes	1.64 (1.20-2.24)	

Cumulative Exposure to Lead is associated with Increased Risk of Type-2 Diabetes: the VA Normative Aging Study (NAS)

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Background:

There is limited evidence of the effect of lead exposure ontype-2 diabetes. Lead has high affinity for osteocalcin, and suppresses the mRNA expression of osteocalcin, which causes insulin resistance and reduced adiponectin expression. The aim of this study is to explore the potential role of cumulative lead exposure as measured in cortical bone (tibia) by K-X-ray fluorescence in the etiology of type-2 diabetes.

Method:

We examined 878 subjects who participated in the bone lead sub-study of the Normative Aging Study between 1991 and 1996. Given the decades-long half-life of tibia bone lead, we investigated development of type-2 diabetes from the baseline of the original cohort (1962-1969) through 2007 (person-years= 55,667). Diabetes status was determined from physician diagnosis, anti-diabetic medication use, fasting glucose≥126 mg/dl, or two-hour glucose tolerance test≥200 mg/dl. Age-adjusted tibia lead levels were categorized into high and low groups at median. Log rank test and proportional hazards (PH) model were used to examine the difference of diabetes onset age between high and low lead groups.

Result:

Of the 878 subjects at baseline, 278 subjects developed diabetes. Tibia lead levels were slightly higher in diabetics (22.9 vs. 21.1 μg/g, p=0.07). Log-rank test showed a significant difference in survival functions between high and low tibia lead groups (p=0.007). The average onset ages were 74.7 (SE=0.52) in high lead group and 80.8 (0.64) in low lead group. After controlling for age at first bone lead measurement, education, and smoking status, the PH model showed that compared to the low tibia group, the high tibia group had a 1.33 (95%CI: 1.03, 1.71) times the risk to develop type-2 diabetes.

Conclusion:

The results suggest that cumulative exposure to lead facilitates the development of type-2 diabetes. Additional research in this area is needed.

DECREASED VACCINATION RESPONSES IN CHILDREN WITH PRENATAL AND POSTNATAL EXPOSURES TO IMMUNOTOXICANTS

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Background and Aims: Polychlorinated biphenyls (PCBs), perfluorinated compounds (PFCs), and methylmercury may cause immunotoxic effects, but the human health significance of this potential is unknown. We assessed the possible adverse effects on serum concentrations of specific antibodies against childhood vaccines.
Methods: Within a cohort of 656 singleton births formed in the Faroe Islands during 1999-2001, we measured serum antibody concentrations against tetanus and diphtheria at ages 5 years (before and after a booster vaccination) and at 7 years. We analyzed PCBs, PFCs, and mercury concentrations in blood samples from pregnancy and the child at ages 5 and 7 years. The results were analyzed by regression analysis and structural equation models.
Results: A total of 587 children participated in the examinations at ages 5 and/or 7 years. Both PCBs and PFCs revealed negative associations with antibody concentrations. The strongest associations suggested a decrease in the antibody concentration by about 20% for each doubling in PCB exposure and up to 50% for a doubling in PFC exposure. The risk of having an antibody concentration below a clinically protective level of 0.1 IU/L increased with the exposures.
Conclusions: Immunotoxicant exposure in children affects their serum concentrations of specific antibodies against vaccination toxoids, thereby counteracting the intended protection offered by childhood vaccinations. These observations may potentially reflect a more general immune system dysfunction, which could have wider implications.

TRITIUM: RELATIVE BIOLOGICAL EFFECTIVENESS AND CANCER RISK

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Background and Aims: The relationship between exposure to tritium, a source of beta radiation, and risk of cancer has received little attention in the epidemiological literature. For radiation protection purposes, and for radiation risk assessments, tritium dose and gamma radiation doses are often combined. This is done under the assumption that the biological effectiveness of the absorbed dose of tritium relative to the absorbed dose of gamma radiation, or RBE, is 1. In this paper, we utilize Bayesian methods in order to evaluate the excess relative rate (ERR) of leukemia and leukemia excluding CLL per unit of absorbed dose of tritium as well as its RBE compared to absorbed dose of gamma radiation.
Methods: In order to conduct this analysis, we utilize an incidence density sampling procedure to select cases and controls from the Savannah River Site occupational cohort of workers employed from 1951-1999. Markov chain Monte Carlo methods are used for the analysis in order to incorporate informative priors.
Results: The ERR/10mGy and associated 90% highest posterior density (HPD) of leukemia and leukemia excluding CLL are 0.272 (0.024, 0.660) and 0.304 (0.044, 0.753), while the RBEs are 8.36 and 5.36, respectively.
Conclusions: This is the first empirical estimate of tritium's relationship to cancer risk based on epidemiological data.

CHARACTERIZING PERSONAL INDOOR AND OUTDOOR AIR POLLUTION EXPOSURE OF PREGNANT WOMEN POPULATION

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Background and Aims: Recently there has been an increasing interest in investigating the ambient air pollution effect on pregnancy and foetus development. An important issue is to improve the exposure assessment approach. Barcelona has one of the highest levels of traffic related air pollution in Europe. We aimed to characterize the relationship between personal, indoor and outdoor exposure to air pollution during pregnancy.
Methods: Personal, indoor and outdoor air pollution monitoring for $PM_{2.5}$ mass and absorbance, NO and NO_2 was simultaneously conducted in a sample of 54 pregnant women resident in Barcelona for 2 and 7 days respectively, from November 2008 to November 2009.
Results: Geometric mean exposure of outdoor samples were relatively high: (GM (GSD)) $PM_{2.5}$=18 µg m^{-3} (1.6), 'soot' as filter absorbance=2.70 $10^{-5}m^{-1}$ (1.8), NO=23 µg m^{-3} (2.5) and NO_2 =35 µg m^{-3} (1.3). The $PM_{2.5}$ personal and indoor exposure levels were higher than the outdoor levels and showed good correlation (personal vs indoor ρ=0.81, personal vs outdoor ρ=0.39 and indoor vs outdoor ρ=0.63). A similar pattern was observed for the levels of 'soot' and NO for which we observed a higher correlation between personal and outdoor levels ρ=0.57 and ρ=0.76 respectively. Personal NO_2 mean values were lower than indoor levels, 33 µg m^{-3} (1.4) and 36 µg m^{-3} (1.4) but well correlated. Preliminary results are showed for NO_2 and NO.
Conclusions: This is the first study in Barcelona evaluating exposure levels, variation and correlation between personal indoor and outdoor air pollution exposures values in pregnant women. The differences in the personal and outdoor values indicate the need to evaluate the measurement error when performing an exposure assessment.

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CHRONIC SOCIAL STRESS AND CARDIOVASCULAR RESPONSE TO CONCENTRATED PARTICULATE AIR POLLUTION (CAPS) IN RATS

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Background and Aims: Epidemiologic evidence suggests that chronic stress may alter susceptibility to air pollution. Persistent spatial confounding between these exposures, however, limits the utility of epidemiologic methods alone to disentangle these effects, and it can not identify physiologic mechanisms.
Methods: Using a rat model of social stress, we examine continuous respiratory and cardiovascular responses to concentrated fine ambient particles (CAPs). Twenty-four 12-week old male Sprague-Dawley rats are randomly assigned to four groups (Stress/CAPs; Stress/Filtered Air (FA); Non-stress/CAPs; Non-stress/FA). Stress group animals are individually introduced into a dominant male's home cage twice weekly. Blood drawn at sacrifice is analyzed for immune and inflammatory markers.
CAPs are generated using the Harvard fine particle concentrator, which enriches real-time urban ambient fine particles by approximately a factor of 30. CAPs/FA exposures are delivered in single-animal plethysmographs, 5 hours/day on 10 days, with respiratory function continuously monitored using a Buxco system during CAPs exposures. Cardiovascular measures are collected via telemetry during CAPs and stress exposures. Lungs, hearts, and adrenals are fixed at constant pressure and random slices obtained for histology.
Results: We previously reported that stressed animals display higher average CRP, TNF-alpha, and white blood cell counts. In response to CAPs, stressed animals display increased respiratory frequency, lower flows and volumes -- suggesting rapid, shallow breathing patterns. Preliminary cardiovascular data indicate elevated heart rate (HR), systolic and diastolic blood pressures (SBP, DBP) during stress exposures.
Conclusions: Our findings suggest that chronic stress may alter respiratory and cardiovascular responses to air pollution in animals. Higher CAPs exposures were associated with a rapid shallow breathing pattern, only under chronic stress. Stress exposures also induce increases in HR, SBP, DBP, and temperature. Blood measures point to possible inflammatory pathways. Preliminary analyses suggest stress-related alterations in CAPs response; further investigation is needed to identify possible physiologic pathways for differential susceptibilities.

THE COOKING USING DIFFERENT FUELS AND THE LEVEL OF INDOOR AIR PAHS

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Background and Aims: To understand the impact of cooking by daily fuels on the levels of indoor air polycyclic aromatic hydrocarbons (PAHs).

Methods: Four households with similar house structure and economic conditions were chosen in a village of North Jiangsu province. Fuels (including straw, coal and liquefied petroleum gas (LPG)) were used to cook the same foods in each kitchen. Indoor air PAHs (including those adsorbed on PM_{10} and in gaseous state) were collected and detected during cooking.

Results: The majority of PAHs (including PAHs adsorbed on PM_{10} and in gaseous state) in indoor air produced by all 3 fuels burning was those under 4-ring and gaseous PAHs. The median percentages of PAHs under 4-ring and in gaseous state accounting for total PAHs were 93.86% (93.63% ~ 94.52%) and 94.20% (81.36% ~ 94.34%), respectively. The levels of total PAHs in kitchen air produced by straw, coal and LPG burning were 4.70μg/m^3, 3.91μg/m^3 and 3.65μg/m^3, respectively. The levels of gaseous PAHs in kitchen air brought by all 3 fuels combustion were higher than those adsorbed on PM_{10}. The median difference between gaseous and adsorbed on PM_{10} was 3.05μg/m^3 (2.49μg/m^3 ~ 3.29μg/m^3). The levels of PAHs adsorbed on PM_{10} in kitchen air produced by straw, coal and LPG burning were 0.738μg/m^3, 0.204μg/m^3 and 0.198μg/m^3 respectively, while the levels of gaseous PAHs were 3.97μg/m^3, 3.70μg/m^3 and 3.45μg/m^3 respectively. PAHs under 4-ring adsorbed on PM_{10} accounted for 64.22% (63.13%~82.52%). PAHs under 4-ring dominated gaseous PAHs and received 95% (95.49% ~ 96.41%) as well.

Conclusions: The majority of PAHs in indoor air brought by all 3 fuels combustion was PAHs under 4-ring and in gaseous state. Straw burning produced the maximum PAHs, coal finished the second, and LPG got the minimum.

VALIDATED MEASURES OF CHRONIC OCCUPATIONAL NOISE ON HYPERTENSION DIAGNOSIS

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Background and Aims

Studies report positive associations between occupational noise and cardiovascular illness, although several potential casual pathways exist. Noise may directly affect auditory function as a physical exposure, or as a chronic stressor. Noise effects may also be confounded by work-related physical hazards, including heat and chemical agents. Finally, accurate ascertainment of true occupational noise exposures is complicated, due to more vigilant use of hearing protection (HP) in noisier environments.

Methods

We use a unique dataset of in-ear (past HP) noise dose measurements to adjust ambient noise measurements. We then perform multivariate logistic regression analyses predicting hypertension onset, using each of three alternative noise metrics: (1) ambient noise, (2) HP-adjusted ambient noise, (3) hearing loss (an indicator of chronic noise exposure from all sources).

Cohort data is derived from company records and health claims files for aluminum manufacturing employees in eight U.S. states. The dataset includes noise measures on 14,807 employees, with sufficient detail at the individual, job, and plant levels to examine multiple workplace factors affecting cardiovascular health.

Results

Preliminary analyses reveal significant variability, within and across plants, in noise exposures and hypertension outcomes. Analyses using ambient noise display consistent *inverse* associations with hypertension, which may be due to exposure misclassification or healthy worker effects. Preliminary analyses using hearing loss suggest non-significant positive associations with hypertension onset overall, though a subset of

plants demonstrate significant risks predicted by hearing loss.

Conclusions

Just as pathways for chronic noise exposures on cardiovascular health remain unclear, it remains unknown whether hearing protection can modify hypertension risk. If more refined analyses of HP-adjusted noise exposures better predict hypertension, this suggests that HP interventions may effectively reduce cardiovascular risk.

TRAFFIC-RELATED AIR POLLUTION AND RISK OF CONGENITAL ANOMALIES IN BARCELONA

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Background and aim: There is a growing number of studies on ambient air pollution and risk of congenital anomalies. In a recent meta-analysis, NO_2 and SO_2 exposures were related to increases in risk of coarctation of the aorta and tetralogy of Fallot, and PM_{10} exposure to an increased risk of atrial septal defects. So far no refined spatial exposure models have been used in this field. We conduct a study of traffic-related air pollution exposure estimated by land-use regression models and risk of congenital anomalies in Barcelona.
Method: Cases with congenital anomalies and control births are selected from the population-based Barcelona Birth Defects Register (REDCB) between 1995 and 2006. In Barcelona, traffic related air-pollution levels have been measured and refined exposure modelling techniques are employed to develop a detailed spatial land-use regression (LUR) model, within the framework of ESCAPE Project. The geocode of the maternal residence at birth will be linked to the exposure estimates for PM_{10}, $PM_{2.5}$, NOx and NO_2. Logistic regression models will analyse the risk of congenital anomaly groups and air pollution exposures.
Results: A total number of 3129 cases have been registered, the most frequent groups are congenital heart defects (34%), urinary tract defects (19%), limb reduction defects (13%), and central nervous system defects (13%), 25% of cases had a chromosomal anomaly. The mean maternal age was 32 years both for cases and controls. Control mothers were higher educated (43% vs 39% in cases had completed the university) and lived in less deprived areas. The Barcelona LUR models explained 72% of intraurban NO_2 variability, 79% of $PM_{2.5}$ variability. Findings on the association between exposure to traffic-related air pollutants and risk of specific congenital anomalies will be presented.
Conclusion:
This study will allow corroboration of the findings of previous studies, using more refined spatial models of air pollution.

THE EFFECTS OF DAILY FUELS COMBUSTION ON INDOOR AIR QUALITY IN RURAL CHINA

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Background and Aims: To understand the influence of daily fuels (including biogas, straw, coal, and liquefied petroleum gas (LPG)) in rural China on the levels of indoor air SO_2, NO_2 and CO.

Methods: In rural northern Anhui province, we chosen 20 households, with the same house structure and completely separated kitchens which had very similar size, ventilation and stoves location. Of them, biogas, straw, coal, or (LPG) were used as the daily fuel in each 5 households respectively. Successively 48h SO_2 and NO_2 in kitchens and bedrooms were collected by Radiello passive diffusion tubes and 48h CO successively measurements were taken using EL-USB-CO (Lascar, UK).

Results: Among the 4 daily fuels, there was no any difference in levels of SO_2, NO_2 and CO in bedroom air, which were much lower than those in kitchen air. The levels of 3 indoor air pollutants in the kitchen air produced by coal combustion were significantly higher than those produced by other fuels. The geometric mean of SO_2 and NO_2 were 3196.48μg/m^3 and 67.90μg/m^3, respectively. And means of the top 3 peak concentrations of CO were 633.9ppm, 510.27ppm and 408.80ppm, respectively. In addition, straw had a relatively large effect on indoor air quality (IAQ). The levels of NO_2 and CO in kitchen air from straw combustion were higher than those from LPG and biogas. The geometric mean concentration of NO_2 was 25.40μg/m3, and means of the top 3 peak concentrations of CO were 75.11ppm, 42.98ppm, 31.07ppm, respectively. LPG and biogas showed less influence on 3 kitchen air pollutants.

Conclusion: IAQs in kitchen air were mainly influenced by daily fuels in study area, while those in bedroom air were barely influenced. Coal burning brought the most serious indoor air pollution, and LPG and biogas were relatively clean.

THE LEVEL AND DISTRIBUTION OF POLYCYCLIC AROMATIC HYDROCARBONS IN SEDIMENTS OF THE HUAIHE RIVER AND THEIR ECOLOGICAL RISK

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Objective Describing the levels and distributions of 16 PAHs in the sediments of the Huaihe River.

Method Searching and collecting articles on the PAHs in the sediments of the Huaihe River from year 1980 to 2010, integrating and analyzing the levels and distributions of 16 kinds PAHs in the 35 reported sections of the sediments in Huaihe River basin and evaluating the potential ecological risk.

Result (1) The average content of the PAHs in the sediments of the Huaihe River was 143.1ng/g, which was lower than those in other rivers basin in China, such as Yangtze River in Nanjing, Yellow River and Pearl River. (2) The level of the PAHs in the sediments showed great surge along the stem of the Huaihe River. The level of PAHs was 1293.0ng/g at the Fengtai Bridge (Huainan, 2007), 1278.0ng/g at the Luo River Power Plant (Huainan, 2007) and 1007.7ng/g at the Pingwei (Huainan, 2006), while 5.4ng/g at Han Ying (Bengbu, 2007) and 6.7ng/g at the Pier One (Bengbu, 2007). (3) Based on Long's method of Effort Range Low and Medium (ERL/ERM) calculated potential ecological risk of PAHs in the sediments was less than 10%. The level of Dibenzo (a,h) anthracene was 156.5ng/g and its ecological risk was between 10% and 50%. (4) Benzo (b/k) fluoranthene, indeno (1,2,3-cd) pyrene and benzo (ghi) perylene and so on were detected in 31 of 35 sections, which imply there were the biological toxic side effects in sediments of huaihe River.

Conclusion Compared with other river basin, the contents of the PAHs in the sediments of the Huaihe River were lower in the overall situation and the potential ecological risk was on the relative low level. However, attention should be pay to the detected PAHs with no minimum safe value in some sections.

URINARY BIOMARKERS OF EXPOSURE TO GLYCOL ETHERS AND ADVERSE PREGNANCY OUTCOMES

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Background and aims : Glycol ethers (GE) are widely used solvents present in various products such as paints, cleaning agents or cosmetics. GEs toxic effects are attributed to the production of alkoxycarboxylic acids, some of them are known developmental toxicants (MAA and EAA) or embryotoxic (BAA) in animals. The aim of our study was to test the association between levels of alkoxycarboxylic acids and the occurrence of adverse pregnancy outcomes.

Methods : The PELAGIE birth cohort included 3,421 pregnant women before 19 weeks of gestation between 2002 and 2006. At inclusion, women provided a urine sample. Urinary levels of 8 alkoxycarboxylic acids were assessed by chromatography (LOD=0.05mg/L) in a nested case-control study comparing 174 cases of fetal growth restriction, 111 preterm births, and 505 controls, odds ratios (OR) were estimated using logistic models adjusted for potential confounders. The study of the association with birth weight and gestation length was restricted to controls using linear regression models.

Results : The percentage of samples in which alkoxycarboxylic acids were identified ranged from 4.4% for EAA to 71.5% for BAA (metabolite of EGBE, present in cleaning products) and 91.3% for PhAA (metabolite of EGPhE, present in cosmetics). Frequently detected BAA and PhAA were not asssociated with fetal growth. EEA was the only metabolite showing an association with fetal growth restriction (OR =2.17 95% CI : 1.0-4.8) and birth weight decrease (b= - 193.1 g; p=0.02). No association was seen with preterm birth or gestation length.

Conclusions : Frequently detected alkoxycarboxylic acids in pregnant women (BAA and PhAA) are not associated with growth restriction. EAA, a known developmental toxicant in animals, is the only GE metabolite associated with fetal growth restriction in our study.

GREEN SPACE, HEALTH INEQUALITY, AND PREGNANCY

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Background and Aims: Green spaces have been suggested to improve both perceived and objective physical and mental health and well-being; however, there is no available evidence on the impact of green spaces on pregnancy. The aim of this study was to investigate the impact of surrounding greenness and proximity to major green spaces on birth weight (BW) and gestational age at delivery (GA) and to describe the effect of socioeconomic status (SES) on this relationship.
Methods: This study was based on a cohort of births (N=8246) that occurred in a major university hospital in Barcelona during 2001-2005. We determined surrounding greenness as average of Normalized Difference Vegetation Index (NDVI) (Landsat ETM+ at 30mx30m resolution) in a buffer of 100m around each maternal place of residence. To address proximity to major green spaces, a binary variable was created indicating whether maternal residential address falls within a buffer of 500m from boundaries of a major green space, according to the *Ecologic Map of Barcelona*. SES data at both individual (ethnicity, occupation, and education) and area (MEDEA index at census tract level) was obtained for each participant. For each indicator of green exposure, linear regression models were constructed to estimate change in BW and GA adjusted for relevant covariates.
Results: None of the indicators of green exposure were associated with BW and GA. After stratifying the analysis according to education level, we detected an increase in BW (grams) among lowest education level group (N=164) who were either living close to a major green space (Regression coefficient (95% confidence Interval (CI)) of 189.8 (23.9, 355.7) or had higher surrounding NDVI (Regression coefficient (95% CI) of 436.3 (43.1, 829.5)). This finding was not observed for GA.
Conclusions: Our study suggests a beneficial effect of exposure to green spaces on birth weight among lower SES groups.

LAG STRUCTURE AND HARVESTING EFFECTS OF AIR POLLUTION ON DAILY OUTPATIENT VISITS

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Background and Aims: To explore whether there is harvesting effect between air pollutants and daily outpatient visits in Zhengzhou.

Methods: We collected air quality data, weather data and daily outpatient visits for the department of respiratory medicine, cardiovascular internal medicine and neurology from December 1, 2008 to November 30, 2009 in Zhengzhou, and then used generalized linear distributed lag models to explore the relationship between air pollutants and daily outpatient visits, after adjusting confounding effects of long-term and seasonal trend, daily temperature and relative humidity.

Results: PM_{10} and NO_2 were significantly associated with daily outpatient visits for the department of cardiovascular internal medicine. An increase of 10 μg/m^3 in PM_{10} was associated with an ER of 3.55% (95% CI: 0.28%~6.93%) outpatient visits for the department of cardiovascular internal medicine. And an increase of 10 μg/m^3 in NO_2 was associated with an ER of 17.72% (95% CI: 2.84%~13.48%) outpatient visits for the department of cardiovascular internal medicine. We didn't observe harvesting effects between PM_{10} and NO_2, and daily outpatient visits for the department of cardiovascular internal medicine. PM_{10}, SO_2 and NO_2 were not significantly associated with daily outpatient visits for the respiratory internal medicine and neurological internal medicine. Also, SO_2 was not significantly associated with daily outpatient visits for the department of cardiovascular internal medicine.

Conclusion: Daily PM_{10} and NO_2 concentration were positively associated with daily outpatient visits for the department of cardiovascular internal medicine in Zhengzhou, and there is no harvesting effect.

EVALUATION OF THE FREQUENCY OF CONSUMPTION OF FOODS CONTAINING GENOTOXIC COMPOUNDS IN A COHORT OF MEXICAN PREGNANT WOMEN

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Background and Aims
Prenatal exposure to polycyclic aromatic hydrocarbons (PAHs) and heterocyclic aromatic amines (HCAs) are associated with increased risk for adverse birth outcomes. In addition to air pollution, foods may contribute to PAH/HCA exposures, which form depending on cooking methods. To evaluate the contribution of ambient pollution exposures to pregnancy outcomes, we are following a cohort of low-socioeconomic status pregnant women in Mexico City. The aim of this preliminary study was to assess the frequency of dietary PAH/HCA intake and consumption habits in our cohort.

Methods
A food frequency test and a 24-hour dietary recall were applied to participants at different times during prenatal follow-up. This questionnaire includes foods with a high content of PAHs/HCAs. Additionally, we are collecting information on participants' air pollutant exposure, medical, obstetrical and nutritional variables.

Results
Data from 300 women were analyzed. Total energy intake was 1954 ± 421.9 (mean±SD) calories per day. Dietary distribution of macronutrients was 15.4% proteins, 54.7% carbohydrates and 29.6% lipids. Homemade breaded fried chicken, deep-fried tacos and cooked pork skin were an important source of PAHs/HCAs. Other foods such as grilled tomato sauce, toasted bread, grilled cactus and toasted tortilla were also consumed on daily basis. Women consumed more dietary PAH/HCAs from cooked cereals and vegetables than from meat sources.

Conclusions
Main foods contributing to PAH/HCA intake in a Mexican urban pregnant population were identified. This pattern of consumption reflects the frequent intake of low-cost homemade foods with high PAH/HCA content. No quantitative studies of PAHs/HCAs are available for Mexican foods. Future plans include determining the relative contributions of dietary PAHs/HCAs, air pollution, and tobacco smoke exposures to DNA damage during pregnancy by correlating these exposures to PAH/HCA DNA adducts in mother's and umbilical cord blood. We will also evaluate associations between DNA damage and pregnancy outcomes.

EXPOSURE TO PERFLUOROOCTANOIC ACID THROUGH CONSUMPTION OF OHIO RIVER WATER

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Background and Aims: Perfluorooctanoic acid (PFOA) is used in the production of stain and grease-resistant coatings; the human health effects of PFOA exposure are not well understood. An industrial plant in Parkersburg, WV discharged PFOA and other polyfluroalkyl compounds (PFCs) into the Ohio River from 1980 to 2004. Residents of communities near Parkersburg and girls living in the Greater Cincinnati area have serum PFOA concentrations higher than general population levels. This study examined PFOA exposure in communities along the Ohio River between Parkersburg and Cincinnati.
Methods: Participants recruited from Huntington, WV, Portsmouth, OH and Fort Thomas, KY in 2009 and 2010 provided 15-mL blood samples to measure PFC concentrations and clinical parameters and answered questions about water consumption, health effects, and residential history. Drinking water sources were identified for each community through records searches and meetings with utilities. Associations between serum PFOA concentration and recruitment site, cumulative years drinking Ohio River water, self-reported daily tap water consumption, age and gender were analyzed using ANCOVA.
Results: Serum has been analyzed for 193 participants from Huntington, WV (N=74), Portsmouth, OH (N=90), and Fort Thomas, KY (N=29); 61 additional samples are currently being analyzed. PFOA concentrations range from 0.4ng/mL to 62.7ng/mL (median 9.7ng/mL). Median serum PFOA concentrations for each site were greater than the 2007-2008 NHANES median (4.30 ng/mL). Preliminary analysis indicated a significant correlation between serum PFOA concentration and the cumulative number of years the participant used Ohio River water; residents with two or more years consuming Ohio River water had higher serum PFOA concentrations than residents who used other water sources.
Conclusions: These findings suggest that communities along the Ohio River between Parkersburg and Cincinnati are exposed to PFOA and the major source is drinking water drawn from the Ohio River.

The findings and conclusions in this poster have not been formally disseminated by the Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy.

EXPOSURE OF LAKE MÖHNE ANGLERS TO PERFLUORINATED COMPOUNDS - ONE YEAR FOLLOW UP

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Background and Aims: In 2008, a cross-sectional study was performed at Lake Möhne, Germany, to assess the PFC body burden of 105 anglers (Hölzer et al. 2008). The contamination of Lake Möhne fish occurred mainly by application of polluted soil conditioner on agricultural lands, which drained into tributaries of the river Möhne. North-Rhine-Westfalian Ministry for Environment recommended limiting fish consumption from Lake Möhne to three times a month at most. The fish advisory is based on a provisional tolerable daily intake of 100 ng PFOS/kg_{bw}. Here we report for the first time on the results of the follow up study, which was performed more than one year after the first study.
Methods: Lifestyle factors, fish and drinking water consumption habits were assessed by questionnaire and interview. Perfluorooctanoate (PFOA), perfluorooctanesulfonate (PFOS), perfluorohexanoate (PFHxA), perfluorohexanesulfonate (PFHxS), perfluoropentanoate (PFPA) and perfluorobutanesulfonate (PFBS) in blood plasma and PFOA/PFOS in fish and drinking water samples were measured by solid phase extraction, HPLC and MS/MS detection.
Results: PFOS concentrations in perches ranged between 22 and 160, in pikes between 15 and 73 ng/$g_{fresh\ weight}$. 84 anglers (80 %) participated in the follow up study. Median interval between the two blood samples was 420 days. 12 percent of all participants stopped angling and eating fish from Lake Möhne after the first study 2008. Among those anglers, who stopped angling and eating fish from Lake Möhne, PFOS-concentrations in blood plasma decreased by 4 and 33 % (geometric mean: 17 %).
Conclusions: The observed decline of PFOS-concentrations in anglers seems to reflect both the discontinued intake by the anglers and the decrease of PFOS in the general population.
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THE EFFECTS OF REGULAR PHYSICAL ACTIVITY ON ADULT-ONSET ASTHMA INCIDENCE IN WOMEN

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Background and Aims: Potential benefit of physical activity in asthma incidence is scarce and controversial. We aimed to assess the association between regular physical activity and adult-onset asthma.
Methods: We included 51,080 women from a French cohort study, and followed them from 1993 to 2003. Physical activity at baseline was defined as time spent in household and leisure time physical activity, converted to metabolic equivalents (METs), and categorised in tertiles. Adult-onset asthma during follow-up was defined according to the American Thoracic Society criteria.
Results: Mean age at baseline was 53 years, 13% of women were current smokers, 19% were overweight or obese, and 56% were postmenopausal; 512 (1%) developed asthma. No association was found between physical activity and asthma incidence in the crude or in the adjusted Cox regression model (adjusted HR 1.03 and 1.01 for the 2nd and 3rd tertiles compared to the 1st tertile, p-for-trend=0.979).
Conclusions: Physical activity is not related to adult-onset asthma in this cohort of French middle-aged women.

NOISE ASSESSMENT IN EPIDEMIOLOGICAL STUDIES

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Background and Aims: In studies on noise and health different exposure indicators are used varying from the presence of a noise source, measurements at specific locations and modelling of noise at different facades of home addresses. The use of different exposure assessment methods was explored.
Methods: The impact of road noise on use of antihypertensive drugs was studied in The Netherlands with registered data for about 1 million patients from pharmacies. The exposure was derived from noise maps and aggregated at postal code area, the level for which medication data was available. In a study among 1048 German children information on the road traffic exposure at home was collected in an interview (Babisch et al 2009). This was validated with short-term noise measurements. Blood pressure was measured at clinical study centres.
Results: In the Netherlands an association was observed between road traffic noise and antihypertensive use although there was substantial exposure misclassification. The RR per 5 dB was 1.17 [95% CI: 1.02-1.33] for a threshold of 60 dB and 1.03 [1.00-1.07] for a threshold of 50 dB. In Germany the lowest blood pressure was found among children whose room was facing a 'low traffic' street. The difference with children with a room facing a street with a 'high or extremely high traffic' volume was on average 1.8 mmHg for systolic blood pressure; 0.48 mmHg [0.15-0.81] per 5 dB.
Conclusions: The results indicate that different exposure assessment methods are capable of identifying risks of road traffic noise exposure in health studies. The pro and cons of different approaches will be discussed.
References:
Babisch W, Neuhauser H, Thamm M, Seiwert M. Blood pressure of 8-14 year old children in relation to traffic noise at home -- Results of the German Environmental Survey for Children (GerES IV). Science of The Total Environment. 2009;407:5839-43.

AUTOMATIC TIME-ACTIVITY CLASSIFICATION BASED ON GLOBAL POSITIONING DATA

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Background and Aims: Air pollution epidemiological studies are increasingly using global positioning system (GPS) to collect time-location data. However, remarkable uncertainties in GPS data create challenges for reliably characterizing time-activity patterns from the raw GPS data. We aimed to develop models to classify people's major time-activity patterns directly from the GPS tracking.

Methods: We collected 131 person-days of GPS time-activity data in 2008 for 47 residents in Southern California. Time-activity patterns were coded for each subject based on GPS recordings, time-activity diary logs, and follow-up interviews. Using similar methods, 7-day validation data were collected from three research staff in 2010. We developed, evaluated, and compared two models for extracting time-activity patterns (i.e. indoor static, outdoor static, outdoor walking, and in-vehicle travel) from the GPS data. A rule-based model developed user-defined rules based on time, speed, and spatial relationship of the GPS points, while a logistic model trees (LMT) model required minimal user-input by using existing software that combined a tree structure with logistic regression.

Results: Indoor static, outdoor static, outdoor walking and in-vehicle travel accounted for 82.7%, 6.1%, 3.2% and 7.2% of the points in the main dataset, respectively. Both the rule-based and the LMT models correctly classified more than 90% of reported indoor static points and more than 70% of reported in-vehicle travel points, with Type 1 error (over-estimation) and Type 2 error (underestimation) <9% for indoor static classification and <29% for in-vehicle travel classification. Both models performed the worst in identifying outdoor static points. The performance of the LMT model improved significantly when using training data from the 7-day validation dataset likely because of more accurate diary data.

Conclusion: Our models can successfully identify static and in-vehicle travel points from raw GPS data. It is more challenging to separate outdoor static from indoor static points.

Variation in Genes Regulating Male Reproductive Development In Relation to Anogenital Distance Measurements, Potential Markers of In Utero Androgenization

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Purpose: Single nucleotide polymorphisms (SNPs) in genes regulating male reproductive tract development have been associated with male genitourinary abnormalities, but no studies have examined the relationship between SNPs and novel anogenital measurements such as anogenital distance (AGD), anoscrotal distance (ASD), and penile width (PW).

Methods: We examined whether common variation in 34 SNPs within genes regulating male genital development (AR, ESR1, ESR2, CTGF, CYR61, INSL3, RXFP2, ATF3) is associated with AGD, ASD, and PW in 106 healthy male infants (ages 2-34 months) from the multi-center Study for Future Families. DNA was extracted from buccal smears, and we used linear regression models to assess the relationship between anogenital measurements and SNP genotypes with adjustment for covariates.

Results: We found that the rs2077647 G allele, located in a coding region of *ESR1*, was associated with a shorter AGD (-7.3mm, 95% CI -11.6 to -3.1). In addition, the rs10475 T allele, located in the 3' untranslated region of *ATF3*, was associated with a shorter ASD (-4.3mm, 95% CI -7.2, -1.4). We observed no association between PW and any SNPs examined.

Conclusions: We found that minor alleles for two SNPs within genes that are involved in estrogen mediated male genital development were associated with AGD and ASD. These results are preliminary but suggest that these measures may be intermediate phenotypes that form within the same developmental pathway as other abnormalities such as hypospadias and cryptorchidism. Future studies are needed to functionally validate that ESR1 and ATF3 are involved in the development of intermediate male phenotypes.

INTERACTION OF ENVIRONMENTAL FACTORS AND SEX ON THE PREVALENCE OF CONGENITAL ANOMALIES

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Background and Aims: The exact aetiology of many congenital anomalies (CA) is unclear. Genetic and environmental factors have been suggested. Using 10,311 cases notified to the Northern Congenital Abnormality Survey (1985-2003) we reported sex ratios for a range of CAs[1]. Here we explore interactions between environmental factors and sex ratio.
Methods:A range of environmental and socio-economic variables were extracted for the 10,311 CA records, including; landscape composition (land cover, road networks and topology), population density and measures from the Index of Multiple Deprivation 2004 (IMD). Specific CAs were selected (hydrocephalus, ventricular septal defect (VSD), oesophageal atresia, upper limb reduction, other trisomy and DiGeorge syndrome (DGS)), that had shown non-significant sex-bias to avoid analysing those CAs known to be prevalent in one sex. These data were analysed, with birth weight, gestation age and year of birth, where the response variable was sex, using a logistic model to test the null hypothesis that the proportion of males and females associated with a given CA was unaffected by environmental factors. Multi-model inference (MMI) was used to check the relative weighting of significant predictors.
Results: Hydrocephalus showed measures of landscape composition and abundance of motorway/primary roads as significant factors in the sex ratio of cases.
Upper limb reduction showed a significant effect of both IMD score and land cover. IMD shows a strong association (est=0.027; P=0.009), implying a bias towards male births with higher IMD scores (more deprived).
No variable in the analysis of VSD, oesophageal atresia or other trisomy and DGS was significant.
Conclusion: There is a variation between the results for these CAs. While not all displayed an association between environmental factors and the sex ratio, some showed a significant relationship. This study indicates a need for further investigation with more CAs and environmental variables with application of more sophisticated analysis.

References:

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ASSESSMENT OF RADON ASSOCIATED LIFETIME RISK IN SUPPORT TO RADIATION PROTECTION

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Background and aims: Quantification of radon associated lung cancer risk is a major public health issue. Many epidemiological studies provided results on the exposure-risk relationship in miners or in the general population. Nevertheless, due to variations in the study designs, in the characteristics of the studied populations and in factors that modify the exposure-risk relationship, it is difficult to verify the coherence of published results. We present here calculations of lifetime excess absolute risks (LEAR) to compare the results of models derived from different populations when applied to the same scenario of exposure.
Methods: Models derived from pooled miner studies and pooled indoor studies were applied. Background rates were those proposed by the International Commission for Radiation Protection (ICRP). Different scenarios of chronic low rate exposure were considered. A sensitivity analysis was performed to evaluate the impact of methodological choices (model, background rate, lifetime duration…).
Results: Based on the BEIR VI model and the Czech-French model, a LEAR of about 5 10^{-4} per Working Level Month (WLM) was derived. This estimate has to be compared with the value of 2.8 10^{-4} per WLM published in 1993 in the ICRP Publication 65. The sensitivity analysis showed that the estimated LEAR vary from 3 to 7 10^{-4} per WLM according to the model used. Calculations also illustrated the sensitivity of LEAR estimates to background rates. When applied to adapted scenarios, LEAR estimates obtained from miners and from indoor studies were different for less than 30%.
Conclusions: LEAR estimates based on recent models derived from pooled analyses of miner data are higher than the one previously considered by the ICRP. Calculations demonstrate a good consistency between lung cancer risk estimates obtained from miners or indoor studies. These results provide support to the elaboration of radiation protection measures regarding radon exposure.

SHORT HISTORY AND RATIONALE FOR REVISED ETHICS GUIDELINES

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In 1999, the International Society for Environmental Epidemiology (ISEE) adopted its Ethics Guidelines. Guidelines articulate our professional collective values and the principles according to which we are held both professionally and publicly accountable. They provide a basis for deciding actions in both our research and practice realms. Finally, they provide insight to students to help in their socialization as professional environmental epidemiologists.

Because social values, technological advancements, and legal contexts within which environmental epidemiologists work change over time, a subcommittee was formed at the 2009 annual ISEE conference to review and update our 1996 Guidelines. Its goals were, among others, to (a) include current ethical and philosophical challenges; (b) re-craft recommendations for professional conduct; and (c) provide case studies to enhance the relevance of the Guidelines and stimulate discussion about solutions.

The subcommittee has been working on the revision over the past two years. The process involved a core writing group which expanded halfway into the project. Once agreement was reached by the slightly enlarged writing group, the broader Ethics and Philosophy Committee was invited to provide critique.

The current draft is now being brought to all ISEE members to solicit feedback. In the process, we are expecting more environmental epidemiologists to become aware not only of the guidelines, but also of their content. Through the recent ISEE-member survey, many members are not aware of the Guidelines despite the critical need for principles to avoid unethical practice in our discipline.

The Guidelines apply to all conducting and applying environmental epidemiology research, including individual researchers, institutions, private sponsors, and governmental agencies. Through these guidelines, the ISEE seeks to ensure the highest possible standard of transparent and accountable ethical practice, not only for those environmental epidemiologists in research, but also for those in public health practice.

IMPACT OF AIR POLLUTION ON THE RESPIRATORY HEALTH OF CHILDREN WITH SICKLE CELL ANEMIA IN ATLANTA, GEORGIA USA

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Background and Aims: Children with sickle cell disease (SCD) comprise a potentially susceptible, yet largely unstudied, sub-group. SCD is an inherited, autosomal recessive blood disorder and is one of the most prevalent genetic disorders in the United States. The aim of this study is to determine if elevated concentrations of exposures to air pollutants are associated with adverse respiratory health effects in children with SCD. To our knowledge, this is the first U.S. study examining these potential associations in this population.
Methods: We conducted a panel study of seven homozygous children with SCD in Atlanta, GA from 2008–2009. Repeated measurements of 24-hour integrated personal exposures to fine particulate matter ($PM_{2.5}$) and nitrogen dioxide (NO_2) were collected for two seasons. Concurrent assessments of the children's pulmonary inflammatory response and lung function were also conducted. We used a linear mixed-effects model with random intercept to examine the relationship between the children's air pollution exposures and specific health outcomes.
Results: The children's mean age was nine years (range: 7–12 years). Preliminary 24h median personal $PM_{2.5}$ and NO_2 exposure concentrations were 11.3 ug/m^3 (range: 1.3-31.9 ug/m^3) and 15.0 ppb (range: 5.9 – 99.7 ppb), respectively. Exhaled nitric oxide (eNO) measurements for all children ranged from <5 to 57.5 ppb. The median percentage of predicted Forced Expiratory Volume at 1% (FEV_1) was 83.7% (range: 57.9%-99.4%) and FEV_{25-75} was 1.6% (range: 0.2%-4.1%). While not significant, a standard deviation increase in NO_2 was associated in a 0.54 ppb reduction in eNO after controlling for season, day of week, and demographic characteristics.
Conclusions: The initial findings were suggestive of an association between children's eNO levels and exposures to NO_2. Other markers of airway inflammation and lung function will also be presented to help elucidate the variability and strength of this association among the children.

ASSOCIATIONS OF PRENATAL EXPOSURE TO ORGANOHPOSPHATE PESTICIDES WITH BIRTHWEIGHT AND GESTATIONAL LENGTH, AND MODIFICATION BY *PON1* GENOYTPE

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Background and Aims: Prenatal exposure to organophosphate (OP) pesticides, a widely-used class of insecticides, may decrease birthweight and shorten gestational length. *PON1*, a gene coding for paraoxanase (PON), an OP-detoxifying enzyme, may mediate susceptibility. We examined relationships of prenatal OP exposure with birthweight and gestational length. We also assessed interactions by infant *PON1* genotype, using two previously-identified polymorphisms, $PON1_{192}$ and $PON1_{-108}$.
Methods: We collected two spot-urine samples around 16 and 26-weeks gestation from 334 pregnant mothers enrolled in the HOME Study, a prospective birth cohort study. We measured six dialkyl phosphate (DAP) metabolites of OP pesticides and used multivariable regression to examine relationships between DAP concentrations and birthweight and gestational length. We examined whether functional polymorphisms of $PON1_{192}$ and $PON1_{-108}$ mediated susceptibility.
Results: In multivariable analyses, each 10-fold increase in total DAP concentration was associated with a 0.5 week decrease in gestation (95% confidence interval [CI]: -0.8, -0.1), and a -151g decrease in birthweight (95% CI: -287, -16). Associations between birthweight and OP pesticides were primarily the result of shortened gestation. Race modified these associations; Black mothers showed a greater decrease in birthweight than White mothers (Black: β=-188g, 95% CI: -395, 19; White: β=-118g, 95% CI: -296, 60; p-value for interaction =0.46), but only White mothers showed an association between OP exposure and gestational length (Black: β=-0.1 weeks, 95% CI: -0.9, 0.6; White: β=-0.7 weeks, 95% CI: -1.1, -0.3; interaction p=0.10). In *PON1*-stratified models, associations with perinatal outcomes were strongest in infants who were heterozygous for $PON1_{192}$ and $PON1_{-108}$.
Conclusions: Prenatal OP exposure was associated with shortened gestation and reduced birthweight, but the effects differed by race. The *PON1* polymorphisms did not show the expected pattern, possibly due to differences in the underlying population substructure or in pesticide-specific exposures not captured by DAP metabolites.

GSTO AND AS3MT GENE POLYMORPHISMS AND DIFFERENCES IN URINARY ARSENIC CONCENTRATIONS AMONG RESIDENTS IN BANGLADESH

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Background and Aims: The main objective of this paper is to determine whether single nucleotide polymorphisms (SNPs) in the glutathione S-transferase omega (*GSTO*) and arsenic(III)methyltransferase (*AS3MT*) genes are associated with the concentrations of urinary arsenic among individuals without arsenic-induced skin lesions.

Methods: A case-control study (N=900 cases; 900 controls) was conducted in rural Bangladesh to investigate the environmental and genetic risk factors associated with skin lesions. This analysis was limited to the controls in order to eliminate any possible confounding by disease status. Water and urine samples were collected and analyzed for arsenic concentrations using inductively coupled plasma-mass spectrometry (ICP-MS), and the following SNPs were detected in DNA extracted from whole blood: *GSTO1* rs4925*, GSTO2* rs156697*, GSTO2* rs2297235, and *AS3MT* rs11191439. The arsenic species measured in urine included arsenite (As^{V}), arsenate (As^{III}), monomethylarsonic acid (MMA), and dimethylarsinic acid (DMA). We performed linear regression for each urinary metabolite using the dominant genetic model while controlling for water arsenic levels, age, sex, body mass index (BMI), education, and urinary creatinine levels. Additionally, a pathway analysis was used to simultaneously evaluate the associations among drinking water arsenic levels, urinary arsenic metabolites and SNPs in the *GSTO* and *AS3MT* genes using PROC CALIS in SAS.

Results: The variant genotype in the *GSTO* genes were associated with lower urinary arsenic concentrations, specifically MMA, DMA, and total As, indicating an overall decrease in urinary arsenic excretion. Conversely, the variant genotype, Met287Thr, in the *AS3MT* gene had higher urinary arsenic concentrations, specifically As^{III} and MMA, compared to the wild type.

Conclusions: Among healthy individuals, genetic polymorphisms in the glutathione-s transferase omega genes and arsenic methyltransferase genes potentially modify arsenic metabolism as evidenced by altered urinary arsenic excretion. The linear regression models and pathway analysis resulted in similar findings.

INDOOR AND OUTDOOR CONCENTRATION OF PARTICULATE MATTER, ELEMENTAL CARBON AND ORGANIC CARBON AT HOMES IN FRESNO (FACES STUDY).

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Background and aims
The Fresno Asthmatic Children's Environment Study (FACES) was an eight-year epidemiological study focused on the determination of the effects of air pollution on the natural history of asthma in children who reside in Fresno, California. The objective of this work is to describe the indoor and outdoor home concentrations of particulate matter (PM), elemental carbon (EC) and organic carbon (OC).

Methods
Between February 2002 and February 2003, a home-intensive exposure assessment was carried out at a subset of homes. 24-hr integrated samples of PM2.5, PM10, EC and OC were collected inside and outside 84 homes over 5 days during two weeks (28 homes were sampled twice). Variables related to activities at home such as candles burned or fireplace used were also recorded at the same period. A descriptive analysis including median, interquartile ranges and indoor/outdoor ratios was assessed. Correlation between indoor and outdoor concentration was assessed using Spearman's correlation.

Results
The number of indoor/outdoor paired samples included in the study were 502 for PM2.5, 507 for PM10, 243 for EC and 243 for OC. The indoor/outdoor median ratios in summer for PM2.5, PM10, EC and OC were 0.80, 0.72, 0.86 and 1.34 respectively. The indoor/outdoor median ratio in winter were 0.63, 0.91, 0.80 and 1.21 respectively. The correlation between indoor and outdoor concentration was positive and statistically significant for all the pollutants in both seasons. Higher concentration of different pollutants were found in homes with presence of some of the indoor activities studied.

Conclusions
The indoor/outdoor correlation found for all the pollutants studied suggests that ambient pollution is one of the main sources for these indoor pollutants. However, the differences found in indoor concentration according to the presence of indoor activities highlight the importance of other indoor potential sources of indoor pollution.

G-ESTIMATION USING A TRICHOTOMOUS EXPOSURE MEASURE

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Background and aims: The healthy worker survivor effect is a ubiquitous source of bias in occupational studies. Correcting for it requires causal methods, of which g-estimation is the best choice if follow-up is long and continues past the end of employment, when exposure can no longer occur. Previous applications of g-estimation have used a binary measure of exposure. Our ultimate aim is to apply g-estimation to a quantitative exposure measure; we begin by considering three categories instead of two.
Methods: We generalize a structural accelerated failure time model suitable for harmful exposures in order to examine the effect of exposure to oil-based metalworking fluids on survival time to heart disease death in a cohort of autoworkers. Confounding and censoring adjustments consider age, race, sex, plant, prior exposures to oil-based and other metalworking fluids, and temporary time off work. This last variable acts as a proxy for health status in order to prevent healthy worker survivor bias. G-estimation requires an exposure model; here we use linear regression. The observed distribution of annual exposure in this cohort is skewed: exposure is 0 for most of the observations, but some annual exposures exceed 9mg/m3. We define annual exposure in 3 categories (0, low, and high), with 0.1mg/m3 as the cutoff between low and high exposure, and assign the median within each category as the exposure.
Results: G-estimation produces an effect estimate of 1.038, representing the ratio of median survival time if no one were ever exposed to that under the observed exposures. (The ratio exceeds 1 because survival time is longer if unexposed.) This corresponds to a hazard ratio of 1.029 per mg/m3-year of exposure.
Conclusions: Methods that correct for the healthy worker survivor effect are more difficult to implement with a multi-level exposure measure, but success is critical for occupational epidemiology.

SERUM DDT IN MOTHERS AND EARLY MENOPAUSE IN DAUGHTERS : A FIFTY YEAR FOLLOW- UP OF THE CHILD HEALTH AND DEVELOPMENT STUDIES PREGNANCY COHORT

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Background and Aims: We report on the relation of DDT compounds measured in mothers' serum samples collected in the early postpartum to the menopause experience of 567 daughters an average of 43 years later.
Methods: Women were born between 1959 and 1967 near Oakland, California, USA, to mothers enrolled in the Child Health and Development Studies pregnancy cohort. Daughters completed an interview during 2005-2008 when they were ages 39-48 years (median age 43 years). We examined whether DDT exposure measured in serum samples collected from their mothers in the early postpartum predicted daughters' menopausal status at age 45 or younger, using a generalized linear model (logit link function), to account for siblings in the sample, adjusted for age at interview and birth year.
Results: Most women (73%) were pre-menopausal at the interview, 16% were peri-menopausal, 10% reported surgical menopause, 1% reported natural menopause, and 4% were unclassified. We observed higher risk of early menopause or peri-menopause in association with higher levels of *o, p'*-DDT in maternal serum (Relative Risk (RR) = 2.0, 95% Confidence Interval (CI)=1.3, 3.3, for 4th quartile vs. 1st quartile of maternal serum *o ,p'*-DDT). In contrast, *p, p'*-DDT was protective (RR=0.5, 95%CI=0.3, 0.9, for the 4th quartile vs. the 1st quartile of maternal serum *p, p'*-DDT). Linear trends for each compound were significant ($p<0.02$).
Conclusions: Findings suggest that intrauterine life is a window of susceptibility for environmental influences on ovarian aging in humans. *o, p'*-DDT may be a protective risk factor for breast cancer via early ovarian senescence and *p, p'*-DDT may be a deleterious risk factor via later age at menopause. Findings are consistent with breast cancer associations that we previously reported for DDT compounds and mothers' risk of breast cancer in this cohort (Cohn et. al. 2007).
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PRENATAL PHTHALATE EXPOSURE AND NEURODEVELOPMENT AT 3 YEARS OF AGE (PILOT STUDY)

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Background and Aims: Prenatal exposure to phthalates has been negatively associated with neurodevelopment in the limited studies conducted to date, possibly due to their connection with altered thyroid signaling or other mechanisms. Different associations have been reported between boys and girls. The aim of this pilot study is to investigate the relationship between maternal urinary phthalate concentrations during pregnancy and children's neurodevelopment at 36 months of age.
Methods: Urinary phthalate metabolites (MEHP, MBzP, MEP, MBP, MCPP, DEHP) and bisphenol a (BPA) were measured in 45 pregnant women at the third trimester of pregnancy; children's neurodevelopment was assessed using the mental development scores (MDI) from the Bayley Scales of Infant Development-II at 36 months of age (20 boys and 25 girls). The relationship between specific gravity-corrected prenatal phthalate concentrations and MDI was estimated using adjusted linear regression models stratified by sex.
Results: After the correction for urinary dilution and adjustment for potential confounders, an increase in $\log_e$ concentrations of MEHP and MBzP were associated with lower MDI scores in girls: MEHP: -5.53 (95%CI: -10.35, -0.71), MBzP:, -5.11 (95%CI: -9.38,-0.84). The remaining phthalate metabolites and BPA were inversely associated with MDI but not statistically significant. There were no statistically significant associations between MDI and prenatal phthalate concentrations among boys.
Conclusions: A differential effect of prenatal phthalates exposure by gender was documented in this study in relation to neurodevelopment. MEHP and MBzP, high-molecular weight phthalates, were associated with a lower MDI in girls at 36 months of life. Further studies are needed with larger sample sizes to confirm these results.

DAILY MORTALITY AND OFFICIAL THRESHODLS FOR HEAT WAVES IN SPAIN

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Background and Aims: After the 2003 heat wave the Spanish Ministry of Health developed a heat health watch warning systems based on simultaneous exceeding of city-specific thresholds for minimum and maximum daily temperatures. The aim of this study is to quantify the effects of heat waves, based on official thresholds, on total daily mortality.
Methods: Total daily mortality and minimum and maximum temperatures for the 51 capital cities were collected from June to September for the period 1995-2004. Data was analysed using GEE for Poisson regression. Relative Risk (RR) of total daily mortality was quantified for the current and previous day of official threshold exceeded.
Results: The number of days in which the thresholds were exceeded show great inconsistency, with provinces with great number of exceeded days adjacent to provinces that did not exceed or rarely exceeded. Highest effects of extreme hot days were more frequent in lag one than for the current day, ranging from 11 to 56%. Only in the largest cities like Madrid, Barcelona and Seville were short-term effects for both lags were also statistically significant.
Conclusions: Thresholds for the Spanish heat health watch warning system do not reflect well the impact of heat on mortality. Criterion for the choice of thresholds must be based on epidemiological instead of only on meteorological basis.

TWO-PHASE CASE-CONTROL STUDY DESIGN FOR BIOMARKER MEASUREMENTS IN GENE-ENVIRONMENT INTERACTIONS STUDIES

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Background and Aims: Two-phase case-control designs have emerged as a cost-efficient way of obtaining additional data by subsampling jointly on exposure and disease, combining the main and substudy data in the analysis. We consider the optimal design of studies of gene-environmental (GxE) interactions mediated through a latent biological process for which a surrogate biomarker is available. In the Southern California Children's Health Study (CHS), air pollution and maternal smoking have been shown to interact with genes in the nitrosative stress pathway (e.g., nitric oxide synthase, *NOS2A*), leading to inflammation and downstream sequellae like asthma. We have measured exhaled nitric oxide (eNO), a marker of the underlying inflammatory process, longitudinally on all CHS participants.
Methods: By theoretical calculations, we derived the optimal sampling fractions for biomarker measurements for a substudy stratified jointly by exposure, genotype, and disease status. For simple environment, genotype, and disease variables, the full likelihood can be used; more generally, semi-parametric maximum likelihood or Horwitz-Thompson estimating equations approaches are needed to avoid estimating many nuisance parameters. We illustrate the approach on CHS data by comparing the asymptotic relative cost-efficiency (ARCE) of analyses of the complete eNO data with those obtained by subsampling.
Results: The optimal design for estimating the GxE interaction term typically entails sampling all exposed carrier cases, some of the other cases, and only a few controls; when biomarker costs are 16x enrollment, exposure, and genotyping costs, the optimal choice yields a 4-fold ARCE compared to measuring all subjects. Similar comparisons for main effects, for continuous biomarker measurements, and a range of model parameters will be shown. For the CHS data, subsampling 37.5% of the subjects jointly on disease and exposure only increased the standard errors by 33%.
Conclusions: Two-phase designs can potentially greatly improve the cost-efficiency of GxE studies involving biomarker measurements.

SPATIO-TEMPORAL MODELING OF AIR POLLUTION INCORPORATING TIME-VARYING METEOROLOGY

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Background and Aims: In the Southern California Children's Health Study (CHS), we have measured ozone and oxides of nitrogen in 942 locations in 12 communities in two seasons for two weeks each, and particulate elemental and organic carbon at 217 locations for two 4-week periods in 8 of these communities. These measurements have been used in combination with various traffic-related predictors to build spatial models for pollution concentrations for all CHS subjects. However, wind patterns and regional pollution levels vary considerably over time and should be taken into account when assigning annual-average exposure levels.

Methods: A theoretical form of the covariance in exposures at different locations as a function of spatial separation and wind can be derived by partial differential equations. We developed a statistical spatio-temporal modeling framework that incorporates the distribution of wind speeds and directions over time and estimates the exposure at unmeasured locations over time, based on concurrent measurements at other locations, the central site measurements, and a line source dispersion model for traffic (CALINE). These estimates are then integrated over time to obtain annual average exposures.

Results: A model that included traffic-related covariates achieved cross-validated R^2s of 0.60–0.79 for nitrogen oxides, with the major contributor being CALINE; incorporation of residual spatial correlation structure significantly improved model fit. Predictions of particulate EC were much poorer, (R^2 < 0.3), indicating that traffic predictors alone are not suitable for all pollutants. Associations with lung function were significantly stronger for spatially modeled NO_x pollution (p<.005) than with CALINE predictions or other traffic variables.

Conclusions: Meteorological information, particularly wind speed and direction, improve the predictions of air pollution exposures. Novel ways of incorporating the functional form of winds into the spatial covariance structure of our prediction model are presented.

A STATISTICAL FRAMEWORK FOR ENVIRONMENTAL EPIGENETICS

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Background and Aims: Several lines of evidence—experimental and environmental—suggest that epigenetic mechanisms such as DNA methylation may play a role in mediating exposure-response relationships, including possible transgenerational effects. For example, in the Southern California Children's Health Study (CHS), we have previously reported an effect of grandmaternal smoking during pregnancy on asthma risk in the second generation, which could be mediated epigenetically.
Methods: We propose a latent variable modeling framework for investigating such phenomena, fitted using Markov chain Monte Carlo methods. The model is specified in terms of components for (1) the risk of disease given exposure, genotype, and methylation, (2) the level of acquired methylation given exposure and inherited methylation, (3) the inherited methylation given parental methylation, and (4) the error structure of methylation measurements.
Results: In simulation studies, we have shown that all parameters of the model are estimable, provided the model is correctly specified. In a sample size of 1000 3-generation pedigrees, a RR of 3.2 for the mediating effect of methylation on exposure-response relationships is detectable with 90% power (comparing 0 vs. 100% methylation; estimated mean differences in methylation were 24% by subjects' own exposure, 12% per exposed parent, and 7% per exposed grandparent). Coefficients of variation for other parameter estimates were 1.8% for the exposure effect and 3.2% for the methylation effect in submodel (2), and 6.7% for the transmission effect in submodel (3).
Conclusions: We have previously shown associations of PM and ozone with DNA methylation of inducible nitric oxide synthase (iNOS), modified by a common promoter haplotype in the gene *NOS2A*, and a 3-way interaction between PM exposure, *NOS2A*, and iNOS methylation on exhaled NO measurements. This presentation will provide a unifying framework for synthesizing such observations.

Title: DEVELOPMENT OF AN ONLINE DATABASE OF LABORATORIES FOR MEASUREMENT OF EXPOSURE BIOMARKERS (MEB-Lab)

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Background and Objective: Environmental epidemiology is a rapidly expanding field, fostered by the ever-increasing capacity to measure internal exposure to environmental chemicals. Researchers are often frustrated in their search for the best laboratory for their analyses of these chemicals in blood or urine. We have developed a Web-based database of laboratories capable of measuring exposure biomarkers (MEB-Lab database) and offer it as a resource to the community of environmental scientists.

Methods: Information for the database was initially gathered from the websites and other printed materials of relevant laboratories across the USA. To augment this information, we contacted these laboratories asking for additional details. Data elements requested include the laboratory location, contact information, website url, chemical biomarkers measured, analytic technique, limits of detection specific to the biologic media, and laboratory publications.

The backend of the system was developed using a MySQL platform, and the frontend interface was developed using HTML, Javascript and Perl. After an iterative process of user needs assessment by local experts, we designed the web interface to enable users of the system to invoke simple standard queries. Queries generate information about laboratories capable of measuring a specified environmental biomarker or class of biomarkers, or information about the biomarkers measured by a specified laboratory.

Results: The MEB-Lab database currently contains detailed information from 42 laboratories, each linked to 154 environmental biomarkers within 13 chemical classes. Initial testing indicates that the system functions as intended. The database can be accessed through the University of Cincinnati Center for Environmental Genetics website http://www.eh.uc.edu/ceg/.

Conclusions: The MEB-Labs online database is a first-of-its kind, openly accessible resource that addresses a need of the environmental epidemiology community. Ongoing work includes continued communication with laboratories and the addition of an online evaluation module that prompts users to provide feedback to improve future versions of the system.

Support for this project provided by the National Institute of Environmental Health Sciences to the University of Cincinnati Center for Environmental Genetics (P30-ES06096).

MATERNAL AND FETAL DIFFERENCES IN BISPHENOL A EXPOSURE DURING PREGNANCY-REVIEWING THE EVIDENCE

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Background and Aims: Bisphenol A (BPA) is widely used products including: plastic bottles, food can linings and carbonless paper receipts is found in over 95% of the US general population and pregnant women, and is of concern for potential developmental effects. The fetus has less capacity to conjugate BPA, thus potentially leading to higher exposures of unconjugated BPA, the more biologically active compound, potentially leading to greater risks. We compare maternal and fetal levels of BPA using maternal serum and amniotic fluid from 2nd trimester pregnant women and discuss how it compares to existing data.

Methods: We are collecting maternal serum and amniotic fluids from 100 2nd trimester pregnant women undergoing elective pregnancy terminations at San Francisco General Hospital. Women are interviewed about dietary intake of potentially BPA contaminated foods and beverages. Samples are collected in BPA-free containers and stored at -70C. We have conducted preliminary analysis on 26 samples for unconjugated, conjugated, and total BPA using high performance liquid chromatography with an ESA CoulArray 5600 detector (limit of detection 0.25 ng/mL).

Results: Preliminary results indicate 93% of participants eat food from metal cans; 42% regularly touch receipts; and 22% drink water from, hard plastic bottle. All women had detectable levels of BPA, similar to findings among the US population. Among the 26 paired samples, median levels of total BPA in amniotic fluid was 7.9 ng/mL compared to 1.2 ng/mL in maternal serum. Higher levels of unconjugated BPA compared to conjugated BPA was also found in amniotic fluid (median (IQR) ratio 2.8 (1.0-7.2)). Further results from the study population will be presented at the symposium and compared to other similar studies.

Conclusions: Data suggest greater fetal exposure to total and unconjugated BPA, consistent with studies suggesting the fetus has decreased capacity to metabolize BPA and may be at higher risk from BPA.

RISK ASSESSMENT AROUND THE LANDFILL OF CUAUTLA MORELOS MEXICO. SITE CHARACTERIZATION

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Background and Aims: In Mexico only 58% of generated solid waste is deposited in landfills. Information on improper waste handling and its possible health risk is limited. The main aim is to characterize biological agents and chemical concentrations in air, water, soil and leachate from the landfill as possible pathways to human exposure, "La Perseverancia" in the State of Morelos.
Methods: The characterization was developed in two stages: 1) an exploratory sampling at the landfill in order to detect microbiological and chemical pollution indicators. Airborne viable particles and nonviable (PM_{10}) were sampled, metals in air were analysed by X ray fluorescence. In soil samplings, physicochemical parameters were measured: pH, electrical conductivity and metal concentrations (Fe, Cu, Mn, Zn, Pb, Ni, Cr, Cd). Microbiological indicators of fecal contamination were quantified in groundwater and leachate sampling 2) For the selection of sampling sites, a geographic information system was developed and a meteorological station was installed; we selected 2 areas for aerobiological sampling into the closest neighborhood as well as 23 extraction wells and 16 points along 2 rivers for sampling groundwater and surface water.
Results: Preliminary mean PM_{10} concentration was 68.6 $\mu g/m^3$ (rain season 33.1 and dry season 99.0 $\mu g/m^3$); 39% of particles were metals in a subsample (n=11), Mn and Ni exceed the recommended inhalation reference dose. Mean electrical conductivity values in leachate samples were 21.81 mS/cm. *Pseudomonas stutzeri and Proteus* sp. were isolated for viable particles and *Pseudomonas*, *Proteus* and *Escherichia coli* were the mainly genera identified for leachate sampling. With the results obtained of electrical conductivity, 5 of the 23 extraction wells were selected to monitor for the next 8 months.
Conclusions: Water seems to be a possible media for biological contamination while particle contain both biological and metal concentrations relevant for people living close to the landfill.

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SYMPOSIUM LEAD INTRODUCTION PAPER

TITLE:

UBIQUITOUS SENSING FOR EXPOSURE ASSESSMENT IN ENVIRONMENTAL EPIDEMIOLOGY

Background and Aims

Exposure assessment has and continues to be a major weakness in Environmental Epidemiology. Due to the financial and logistical cost of personal monitoring, most epidemiologic studies have relied on surrogate estimates of exposure, usually assigned to the home location of study subjects. The errors in these exposure assignments probably bias results toward the null. This paper aims to supply a commentary and conjecture on the impact that ubiquitous sensing will have on exposure assessment in Environmental Epidemiology.

Methods

I rely on reviews of the literature undertaken from 2007 to the present. Specifically, I review novel developments in ubiquitous sensing that will lead to much greater ability to estimate the dose, rather than just the proxies for exposure to environmental contaminants or hazards.

Results

Many of the important opportunities that will guide exposure assessment for Environmental Epidemiology in the 21st century arise from innovations in related science and technology. Cell-phone technologies increasingly contribute to improving diagnostics and patient care through telemedicine. The major societal investments occurring in telemedicine will have beneficial spin offs for exposure assessment in epidemiological studies. Innovations from telemedicine are now spurring fields known as "ubiquitous", "embedded" and "participatory" sensing. Working prototypes based on cell-phone technologies have already demonstrated capacity to measure physical activity, geographic position, lung function, and pollution exposures. Such technologies can also be woven into social networking systems to voluntarily capture and share data on environmental conditions and the human response while in the exposure field.

Discussion

Ubiquitous sensing offers tremendous promise for improved exposure assessment. Protection of personal privacy, analysis of the voluminous data generated by the sensors, and integration with other emerging methods from molecular epidemiology represent critical areas for research and development.

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THE ADDED HEAT WAVE EFFECT IN THE ASSOCIATION BETWEEN TEMPERATURE AND HOSPITAL ADMISSIONS AMONG THE ELDERLY IN 129 U.S. CITIES

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Background and Aims: With climate change, heat waves will become more severe, and understanding the association between heat waves (HWs) and morbidity outcomes in vulnerable populations can inform heat adaptation strategies. We aimed to determine the association between heat waves and hospital admissions controlling for daily temperature.
Methods: We used a case-crossover analysis to evaluate associations between elderly (Medicare-covered) hospital admissions, regional airport weather data and ozone data (1992-2006) for 129 U.S. cities. HWs were defined as daily mean, minimum or maximum apparent temperatures (ATs) above the 90^{th}, 95^{th} or 99^{th} percentile of summer (May-September) temperatures for at least two days. Admissions by primary discharge diagnoses were regressed on the day in the HW using a time-stratified case-crossover design, stratified by month, controlling for AT and ozone averaged over lags 0-1, and an AT moving average for lags 2-5. Results were pooled by climate region (based on cooling- and heating-degree-days).
Results: The added HW effect depended on the region, the hospital discharge diagnosis and the definition of the HW. At a higher percentile threshold, the magnitude of the association was greater but the 95% confidence interval wider. An added HW effect was seen in colder regions but not warmer regions (e.g., in the coldest region, all-cause admissions increased by 5.9% (0.50%, 12%) on days the mean AT was above the 99^{th} percentile for at least 2 days). An added HW effect was seen for respiratory, renal and heat-related discharge diagnoses. HWs were inversely associated with cardiovascular admissions.
Conclusions: Consistent with other studies of the association between HWs and mortality, results vary by climate, outcome and HW definition. Nevertheless, a small added HW effect was observed in colder climates. Future research will address comorbidities, effect modification by ozone and individual characteristics, and explanations for the regional differences.

LAND USE REGRESSION METHOD TO EVALUATE THE ASSOCIATION BETWEEN PRENATAL EXPOSURE TO PARTICULATE MATTER AND NEONATAL NEUROBEHAVIORAL PERFORMANCE

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Background and Aims: Traffic-related air pollutants, such as PAH, PM_{10}, and NO_2, have been reported to cause adverse effects on children's neurobehavioral functions. However, little is known about the effect of prenatal exposure to these pollutants on subsequent neonatal neurobehavioral development. This study aimed at using land-use regression (LUR) model to evaluate residential PM_{10} exposure levels during different trimesters of each pregnant woman, and investigate its association with neonatal neurobehavioral performances.

Methods: The study subjects were selected from the Taiwan Birth Panel Study which enrolled 442 infant-mother pairs between May 2004 and February 2005. Basic characteristics and living environmental factors were retrieved by professional interviewers using structured questionnaires within 3 days of infant delivery. In the meantime, the physiotherapist evaluated the neonatal neurobehavioral performances using the Chinese-version of Neonatal Neurobehavioral Examination (NNE). Monthly mean PM_{10} data were retrieved from 17 Air Quality Monitoring Stations and residential PM_{10} concentrations were predicted using LUR model. Candidate predicting variables for LUR model included local land use, population density, road type, and road length. The association between prenatal PM_{10} exposure and NNE was evaluated using multiple linear regression model.

Results: A total of 141 infants have completed the NNE. The mean (SD) score for tone and motor patterns was 23.16 (1.71), primitive reflexes was 22.31 (1.76), behavioral responses was 24.67 (1.73), and total NNE was 70.17 (3.30). The predicted median (IQR) PM_{10} concentration during first, second, and third trimester were 56.35 (13.7), 46.36 (18.9), and 53.43 (8.5) $\mu g/m^3$, respectively. The results showed significant negative association between PM_{10} levels at third trimester and primitive reflexes score (β= -0.089, 95%CI= -0.123 ~ -0.055) and total NNE score (β= -0.132, 95%CI= -0.198 ~ -0.066).

Conclusions: Our study provides the first epidemiological data supporting the adverse effect of gestational PM_{10} exposure on neonatal neurobehavioral development.

$PM_{2.5}$ COMPONENTS EXPOSURES AND CARDIAC AUTONOMIC FUNCTION: A PANEL STUDY OF TAXI DRIVERS

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Background and Aims: Carbonaceous and metallic components of particles have been shown to play a role in particles' effects on cardiac autonomic function as measured by heart rate variability (HRV). We previously reported the association of HRV with marked changes in traffic-related particulate air pollution around the Beijing 2008 Olympic Games in a panel of taxi drivers (Wu et al., 2010). We further investigated the relationship between exposures to the carbonaceous and metallic components of traffic-related particles and HRV in the same population.

Methods: Repeated measurements of in-car exposures to particulate matter ⩽2.5 μm in aerodynamic diameter ($PM_{2.5}$) and carbon monoxide were conducted in a group of 14 taxi drivers for one work shift in four study periods around the Beijing 2008 Olympics. The quantities of organic/elemental carbons and 27 elements of the traffic-related $PM_{2.5}$ mass were determined laboratorially. Linear mixed-effects models were used to evaluate the impact of exposures to different $PM_{2.5}$ components on HRV while controlling for potential confounders.

Results: Taxi drivers' exposures to traffic-related $PM_{2.5}$ components showed dramatic changes across the four study periods around the Beijing 2008 Olympics. Differences in associations of traffic-related $PM_{2.5}$ components with HRV were found. An interquartile range (IQR: 917.9 ng/m3) increase in calcium was associated with a 5.48 milliseconds [95% confidence interval (CI): 0.71, 10.24] increase in standard deviations of normal-to-normal (SDNN) intervals, whereas an IQR (4.1 ng/m3) increase in nickel was associated with a 1.53 milliseconds (95% CI: 0.14, 2.92) increase in SDNN index. Additionally, a decline of 8.11 milliseconds (95% CI: -15.26, -0.97) in SDNN per IQR (481.4 ng/m3) increase in iron was also found.

Conclusions: Our results support associations of $PM_{2.5}$ metallic components with cardiac autonomic function in the study population. Future studies are needed to clarify the interaction among different $PM_{2.5}$ components or the role of $PM_{2.5}$ mixtures.

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A CASE-CROSSOVER ANALYSIS EXAMINING TEMPERATURE AND EMERGENCY ROOM VISITS IN CALIFORNIA

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Background and Aims: The association between temperature and mortality has been widely researched over the past decade. Temperature and morbidity outcomes, however, have been far less studied. We examined the association between mean daily apparent temperature and emergency room (ER) visits in California.
Methods: We used a time-stratified case-crossover design for data analysis during the warm season of May through September 2005 to 2008 in all 16 climate zones in California. The study population included only cases residing within 10 kilometers of meteorologic monitors. Conditional logistic regression models with apparent temperature were applied by climate zone, and these estimates were combined in meta-analyses to create overall estimates. Our analyses considered the effects of various disease subgroups, race/ethnic groups, and age groups, and air pollutants (nitrogen dioxide, ozone, carbon monoxide, and sulfur dioxide). The California Irrigation Management System and U.S. Environmental Protection Agency provided the meteorologic and air pollution data, while the California Office of Statewide Health Planning and Development supplied the ER data.
Results: Our study population included nearly one million ER visits. Significant ($p < 0.05$) positive associations were found for same-day apparent temperature and ischemic heart disease (excess risk per 10F = 1.7%), ischemic stroke (2.8%), cardiac dysrhythmia (2.8%), hypotension (12.7%), diabetes (4.3%), intestinal infection (6.1%), dehydration (25.6%), acute renal failure (15.9%), and heat stroke (393.3%). Hemorrhagic stroke and hypertension had significant negative associations. These estimates remained robust to the adjustment for air pollutants. Hispanics exhibited greater risks than Whites for many outcomes, including ischemic stroke, ischemic heart disease, diabetes, and dehydration. Risks were generally higher among the elderly. Some outcomes had strong disparities between coastal and non-coastal regions.
Conclusions: To prevent heat-related ER visits, persons with pre-existing CVD disease, the elderly, and racial minorities should be targeted. Mitigation strategies should be region-specific, and require an immediate response.

RISKS ASSOCIATED WITH ACTIVE TRAVEL IN PARK-ADJACENT NEIGHBORHOODS IN LOS ANGELES, USA

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Background and Aims: Poor and minority neighborhoods have limited access to parks, open space and recreational programming. This lack of access is associated with reduced physical activity and with increased risk of obesity. The access may be even worse if the environments people must travel through to parks are unsafe. In this research, we investigated whether active transportation to parks was more dangerous as a result of increased risk of traffic crashes and higher air pollution exposure for persons living in socially disadvantaged neighborhoods.
Methods: The study was conducted in the Green Visions Plan area in Southern California, an area over 5.5 million acres (>22,000 km^2) spanning four municipalities in Los Angeles. A quarter-mile (~0.4 km) buffer distance to public parks was used to define park-adjacent neighborhoods. Socioeconomic and racial-ethnic characteristics in park-adjacent neighborhoods were estimated using a proportion algorithm by intersecting the corresponding year 2010 U.S. Census tract level statistics. The Southern California travel survey data were used to derive active mode split estimates and then used to impute to all park-adjacent neighborhoods. Data on traffic crashes were acquired from the Statewide Integrated Traffic Records System (SWITRS) for 1999 – 2008. The total number of traffic crashes within each park-adjacent neighborhood was summed. The socioeconomic and racial-ethnic characteristics were modeled against traffic crashes, traffic-related air pollution and their cumulative impacts.
Results: We identified that higher proportions of African Americans, Latinos, families in poverty, and areas of low education were significantly correlated to higher rates of active travel. Those disadvantaged groups also experienced greater air pollution, higher rates of traffic crashes and larger cumulative impacts.
Conclusions: Active transportation to parks is more dangerous for persons living in neighborhoods with high proportions of socially disadvantaged people. Traffic safety and air quality improvements in disadvantaged neighborhoods will enhance access to parks in neighborhoods where residents are at high risk.

INEQUALITIES IN ENVIRONMENTAL BURDENS ACROSS THREE MAJOR METROPOLITAN AREAS IN CALIFORNIA

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Background and Aims: Communities of color and low income are affected by multiple environmental hazards that can magnify risks to human health. In earlier research we developed an index of inequalities in environmental hazards to assess the cumulative impacts from air pollution. Here we extended the this index to compare inequalities to air pollution and heat stress for groups of different socioeconomic composition and racial-ethnic status among three large metropolitan areas in California: Alameda County (San Francisco East Bay Area), San Diego and Los Angeles.
Methods: The index used the cumulative proportion of the population — ranked by area-based racial-ethnic composition or socioeconomic strata, starting from the most disadvantaged — against metrics that represented cumulative environmental hazards. Two main cumulative inequality indices were investigated: one with the cumulative impacts from nitrogen dioxide (NO_2), fine particulate ($PM_{2.5}$) and diesel PM, and another with the cumulative impacts from air pollution and heat stress.
Results: Results indicate that, for the three air pollutants, the inequality was greatest for diesel particulate matter, followed by NO_2 and $PM_{2.5}$. Inequalities for the cumulative burden of these three air pollutants were greater than those for single pollutants. Though inequalities differed significantly for exposure to most of the three environmental hazards within and between regions, their cumulative inequalities did not differ between any two regions. Inequalities in heat stress showed that communities with greater proportions of whites had greater impact from heat for Alameda and San Diego, but the relationship was reversed for Los Angeles with minority population having higher impact. Adding heat stress worsened the cumulative impacts from air pollution for Los Angeles, but decreased the inequalities for Alameda and San Diego.
Conclusions: The results provide a useful policy tool to address inequalities between regions and within a region between various environmental factors.

THE CASUALTIES OF EXCESSIVE SPEED: INNOVATION AND RESEARCH QUALITY ARE VICTIMS OF SHORT-TERM FUNDING OF RESEARCH

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Background and Aims: Assessing the impact of environmental exposures on human health is a long and complex pluridisciplinary task. Between population recruitment and the first statistical analyses, 3 to 5 years can typically elapse, sometimes many more for cohort studies. This is hardly compatible with funding bodies limiting research projects to 3-4 years in some countries. In addition, evaluation of researchers' work relies a lot on measures more related to publications quantity than quality. Our aim is here to discuss the consequences of this time pressure and to discuss the interest of developing a concept of *slow science* in environmental epidemiology, inspired from the *slow food* movement initiated in gastronomy in reaction to the fast-food culture.

Results: Consequences of short-term funding and of focusing evaluations on publications quantity include researchers slicing research projects into small pieces, spending too little time on crucial steps of projects such as statistical analysis and too much on administrative issues…Suggestions to develop a *slow science* approach in epidemiology might imply giving more support for feasibility studies; making it clear that statistical analysis is not a brief and minor task (by formalizing quality controls steps, having detailed analysis plans being defined prior to analysis…); and encouraging institutions to offer a palette of funding proposals of various durations and to promote research quality rather than quantity, as stated e.g. by DFG, the German Research Foundation (by making the evaluation of research groups relying more on an in-depth analysis of a few key publications than on a superficial automated summing of the impact factors of *all* publications).

Conclusions: Moving towards *slow science* should not be seen as implying less science but more sound results and increased innovation, efficiency and diversity in our research field. Achieving this requires increased dialogue between researchers and the 'consumers' of epidemiological science.

RESULTS OF MONITORING CAMPAIGN ABOUT THE IMPACT OF NO-TRAFFIC SUNDAYS ON ATHMOSPHERIC POLLUTION: A SCIENTIFIC BREAKING NEWS FOR THE CITY OF MILAN

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Background and Aims: To evaluate the efficacy in atmospheric pollution reduction during Sunday traffic limitation within the Milan City Municipality borders measuring the Black Carbon (BC) content in Particulate Matter (PM).
Methods: Analyzers: One precalibrated analysers (Aerocet 531, MetOne) were used to record mass of PM_{10} and BC with one micro Aethalometers AE51 (Magee). **Procedure:** everyday in a selected high traffic street of Milan and from Friday 4th until Sunday 6th February the instruments measured the PM and BC at the same hours. During the Sunday they also measured the concentration before and after the cessation of the traffic restrictions. Traffic density was also measured.

Results: From Friday to Sunday the mean (SD) concentrations of PM_{10} were 89.8(10.6), 78.3(15.9) and 120.6(42.23) ⌠g/m^3 and of BC were 9.5(3.0), 11.4(3.7) and **8.1(1.8)** respectively. The percent of BC in PM_{10} was 10.6, 14.6 and **6.6** percent respectively. Traffic density was 1,600/2,000 vehicles per hour (including motorcycles and buses) during no restrictions time and 350/400 on Sunday. The BC in PM_{10} percent increased from 6.6 to 12.4 one hour after the cessation of traffic restrictions on Sunday.
Conclusions: Despite the considerable increase in PM_{10} on Sunday as compared with Saturday, probably due to meteorological changes, the BC concentrations were lower both in absolute values and in percent in PM_{10} indicating a lower toxicity. No-traffic Sunday's bring immediate benefits in air quality regardless the absolute values of PM concentrations but only within the interested area and the benefits disappears after less than one hour after traffic start.

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THE ETHICAL DIMENSIONS OF A CHANGING CLIMATE

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Global warming is causing more frequent and severe extremes in weather. Sea-levels are rising with island states poised to vanish. Over time, these trends are expected to worsen. If some predictions materialize, a sixth major extinction awaits us. What could be more important for environmental epidemiologists than to help inform policies that might avert such catastrophic harms? *En route* to possible extinction, as global average heating continues, local habitats will change thereby exposing local populations to environmental harms through exposure to challenges not before seen in such communities. Studying potential harms is prerequisite to health planning. Despite the ethical imperative to pursue research to help with adaptation, access to funds for research is less likely in a context of ideologically driven policy that denies climate change. Countries contributing both to denial and to greenhouse gas emissions are the more affluent in the world where wealth allows them a buffer against extremes in weather. Meanwhile, the poorer countries, not contributing to the accumulation of emissions, do not have buffering capacity and are suffering the greatest negative impacts from weather changes. These phenomena are leading to a widening of the 90:10 gap where 90% of the world's research funding goes into the study of problems affecting only 10% of the global population. This session will reflect on the Polluter Pays and the Post-Cautionary Principles. The hardships resulting in the countries where land is being bought by rich countries with the sole ambition of feeding their local populations will also be addressed. The presentation aims to engage the audience and provide the opportunity for discussion by identifying, among others, the principles noted above in each of this session's presented papers.

DETECTION AND ATTRIBUTION OF HEALTH EFFECTS TO GLOBAL CLIMATE CHANGE

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Background and Aims: There are frequent claims that climate change is already affecting human health. Attribution of health effects to environmental exposures is a standard part of environmental epidemiology. With respect to global climate change, the IPCC defines attribution as the evaluation of the relative contribution of causes to a change in a system affected by climate. We describe robust criteria for the attribution of health effects to observed climate change.
Methods: Published peer reviewed studies that claimed to quantify current health effects attributable to observed climate change were identified and reviewed. Studies were classified according to categories described in the IPCC Guidance Paper on Detection and Attribution and whether they met our criteria.
Results: Very few of the published studies met our criteria. Due to the complexity of the causation of disease patterns over time, it is unlikely that climate change attribution can be made with high confidence in the near term. Special caution should be made for claims regarding the health effects of individual extreme events.
Conclusions: At present, the attribution of changes in population health to observed climate change is dependent on the validity of two or three step attribution along a complex causal chain. Human forcing of the climate is only detectable on large spatial and temporal scales (at least 30 years) for which datasets on disease distribution are often not available, and the comparison of multiple studies (as has been done in the biological sciences) is not possible for health. However, we argue that robust associations between health and climate factors can be used to indirectly estimate the current attributable burden of observed global climate change.

ENVIRONMENTAL LEAD EXPOSURE AND ODDS OF EARLIER PUBERTAL ONSET

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Background and Aims: Evidence for associations between lead (Pb) and late onset of puberty have come primarily from cross-sectional studies. Earlylife exposure to lead may be important for puberty onset because of the long-term effects of lead on the endocrine system. We examined the association of maternal bone Pb, a marker of cumulative prenatal Pb exposure, with odds of earlier pubertal onset.
Methods: Maternal bone Pb was assessed at 1-month postpartum using in vivo K-X-ray fluorescence (K-XRF). Multivariable logistic regression was used to investigate the association of prenatal Pb levels with onset of puberty as assessed by self-reported Tanner stage greater or equal than 2 for genitalia (G2 among boys), breast (B2 among girls) and pubic hair development (P2 for each sex), adjusting for child's age and maternal education.
Results: There were 69 girls and 59 boys aged 6 to 15 years with Tanner staging and prenatal Pb measures. Among girls, mean age at study visit was 8.9 years (SD= 2.1); 39% were at stage B2 or above and 16% at stage P2 or above. Mean age at menarche was 10.6 years (SD= 1.7). Among boys, mean age was 9.1 years (SD= 2.2); 66% were at stage G2 or above, and 17% at stage P2 or above. Associations were primarily null between maternal bone Pb and odds for earlier or later onset of puberty, though slightly higher odds for later puberty onset with increased Pb levels was detected (for example for boy's pubic hair OR=1.09, 95% CI= 0.94 to 1.27).
Conclusion: These results suggest that prenatal Pb levels are not associated with odds of earlier or later pubertal onset in a longitudinal cohort study in Mexico, but interpretation is limited by small sample size. Investigation of this association in a larger study sample is warranted.

ENVIROGENOMARKERS: A EUROPEAN MOLECULAR EPIDEMIOLOGY PROJECT ON THE DEVELOPMENT OF BIOMARKERS OF ENVIRONMENTAL HEALTH BY *-OMICS.

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Background and Aims: EnviroGenomarkers is a project aiming at the development of a new generation of biomarkers to study the role of environmental agents in human disease through the large-scale application of a range of –omics technologies (*-OMICS). Breast cancer and lymphoma related biomarkers will be developed using a case-control design nested within two prospective adult cohorts. Biomarkers of neurodevelopmental effects during early childhood will be studied within a prospective child cohort.
Methods: Prospectively collected biosamples are being analysed with high-density screens, including plasma metabonomics using HPLC/MS/MS, epigenomics using CpG island microarrays, gene expression using whole-genome microarrays and targeted proteomics using multi-analyte profiling arrays, in combination with advanced bioinformatics. Exposures of interest (PCBs, PAHs, cadmium, phthalates and brominated flame retardants - PBDEs) are evaluated using validated biomarkers of exposure.
Results: Methodological studies were performed to mimic the range of conditions likely to have been encountered during the processing and storage of the biobank samples. These studies showed an effect of prolonged bench time > 8hrs on all OMIC platforms. Furthermore, an effect of anticoagulants was found for several OMIC-technologies. Using only samples from the biobanks with a bench time less than 8hrs indeed showed that high quality data could be obtained from stored biobank samples for 80-100% of the samples depending on the technology applied.
Conclusions: It is concluded that samples from long-term storage in existing biobanks can be successfully analysed using omics technologies provided they are selected to satisfy identified criteria regarding their handling history. Based on this, the project has recently moved on to its next phase involving the application of the high-density technologies on biobank samples from the study cohorts to identify markers of environmental risk factors of breast cancer and lymphoma.
Acknowledgement: EnviroGenomarkers is funded by the European Union (Grant Agreement No. 226756)

DO STATINS MITIGATE THE EFFECTS OF PM_{10}? A CASE-ONLY ANALYSIS ON HOSPITAL ADMISSIONS FROM REGIONAL GOVERNMENT ADMINISTRATIVE DATABASES

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Background and Aims: While particles are associated with hospital admissions for heart disease, there is little evidence about the role of pre-admission medication. Our aim was to investigate how pre-admission cardiovascular treatment modifies the effect of PM_{10} on hospitalization for cardiovascular diseases.
Methods: We examined cardiovascular hospital admissions (ICD-9-CM 410 – 429) occurred during 2005 in the residents of six cities of Lombardy (Northern Italy), accounting for roughly 500.000 inhabitants. For each inpatient we obtained his/her pre-hospitalization medical prescriptions of cardiovascular drugs. Daily average concentration of PM_{10} and temperature were provided by the Regional Agency for Environmental Protection of Lombardy. The modification of the effect of PM_{10} exposure on hospital admissions for cardiovascular diseases due to medical treatment was assessed through a case-only approach. We fitted separate models for statins, antiarrythimcs, and all other cardiovascular drugs, accounting for the simultaneous presence of more than one among the three aforementioned classes of drug, long and short term confounding, heterogeneity among cities and effect of temperature.
Results: During the study, 8,527 hospital admissions with cardiovascular diagnosis occurred to 6,467 subjects. Cardiovascular prescriptions related to patients hospitalized for cardiovascular causes were 52,205. 76.83% of the admitted patients had a pre-hospitalization cardiovascular therapy. The results of case-only analyses showed a significant modification of PM_{10} effect for all the examined active agents. The strongest effect modification was due to pre-admission treatment with lipid modifying agents (OR treated vs non treated, related to a 10 $\mu g/m^3$ increment in PM_{10} concentration: 0.967, 95% CI, 0.945 – 0.989). The trend observed for the whole year was confirmed both in warm and cold season, though the results were not statistically significant after stratification for season.
Conclusions: Our study gives some interesting indications of cardiovascular treatments, and in particular statins, having a protective effect against the negative consequences of exposure to PM_{10}.

CASE-ONLY ANALYSIS OF INTERACTION BETWEEN PRE-HOSPITALIZATION RESPIRATORY TREATMENTS AND PM_{10} EXPOSURE. RESULTS FROM ADMINISTRATIVE DATABASES

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Background and Aims: While many studies have reported associations of air pollution with hospital admissions, little is known about whether pre-event medical treatments modify those associations. Our study analyzed how pre-admission respiratory pharmacological treatments affect the relationship between PM_{10} and hospitalizations for respiratory diseases.
Methods: Hospital admissions for respiratory causes (ICD-9-CM 460-466, 480-487, 491, 493, 5130 and 5188) during 2005 in the residents of six cities of Lombardy (Northern Italy), accounting for roughly 500.000 inhabitants, were selected. For each hospitalized subject we determined which respiratory treatment he/she was undergoing, using record linkage with pre-hospitalization medical prescriptions for respiratory drugs. Daily average concentration of PM_{10} and temperature were provided by the Regional Agency for Environmental Protection of Lombardy. We used a case-only approach to analyze the modification of the effect of PM_{10} on respiratory hospital admissions due to medical treatments. Separate models were fitted for systemic glucocorticoids, inhaled adrenergics, inhaled glucocorticoids, inhaled anticholinergics and theophylline. The models accounted for the simultaneous presence of different classes of respiratory treatments, long and short term confounding, heterogeneity among cities and effect of temperature.
Results: We selected 4,248 hospital admissions with a respiratory diagnosis and 7,717 respiratory prescriptions, related to 3,604 subjects. Pre-admission respiratory therapy was present in 39% of the admissions. The observed modification of the effect of PM_{10} on respiratory hospitalizations was modest for all of the examined treatments. We observed a significant effect modification (results shown for a 10 • g/m^3 increment in PM_{10} concentration) associated with the use of systemic glucocorticoids before the hospitalization (OR=0.929, 95% CI, 0.892 – 0.967), which persists during the cold season (OR=0.927, CI 95% 0.881 – 0.976).
Conclusions: This pilot study, conducted on a reduced sample of the Northern Italian population, shows interesting evidences of a potential protective effect of systemic glucocorticoids against adverse respiratory consequences of exposure to PM_{10}.

THE INFLUENCE OF INDOOR TEMPERATURE AND RELATIVE HUMIDITY ON BUILDING-RELATED SYMPTOMS AMONG NON-SMOKING OFFICE EMPLOYEES

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Background and Aims: Building-related symptoms and complaints experienced in non-industrial buildings remain important issues. This study investigated whether indoor temperature and relative humidity (RH) was associated with risk of building-related symptoms among non-smoking office employees.

Methods: We performed on-site measurements of indoor air temperature and RH during working hours for 87 office units of 8 randomly selected government agencies and commercial organizations. All of these offices located in high-rise buildings with heating, ventilation and air condition (HVAC) in the Taipei city, Taiwan. With informed consents, 417 healthy subjects worked at these office units completed the self-reported questionnaires for measures of the presence of building-related symptoms experienced at work within a month.

Results: The prevalence rates of building-related syndromes are 22.5% for eye, 15.3% for upper respiratory, 6.5% for lower respiratory, 1.9% for skin dryness and 22.4% for non-specific syndromes. The Multivariable generalized estimating equations logistic regression analyses showed that the adjusted odds ratios per increase of 1 □ of indoor temperature was statistically significant for Sneezing (1.51), difficulty in breathing (2.09) and dizziness (1.69).The adjusted odds ratios per 1% increases in RH was statistically significant for runny nose (1.30), sneezing (1.19), Tiredness (1.07), difficulty concentrating (1.07) and skin dryness (0.81).

Conclusions: Elevated indoor temperature and RH correlate to increased risks of some symptoms among upper respiratory, lower respiratory, and non-specific syndromes, while increased indoor RH tends to protect non-smoking office employees from suffering eye dryness in this study.

TRANSPLACENTAL TRANFER OF PERSISTENT ORGANIC POLLUTANTS IN HUMANS

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Background and Aims: Transplacental transport of Organohalogen Compounds (OHs) from mother to fetus occurs during pregnancy. Fetuses are more sensitive to environmental pollutants than adults and early exposure may lead to severe repercussions for the newborn health. However, the mechanisms of OHs transference are still not well understood.
Methods: The present study included 477 mother-infant pairs from a population-based cohort in Valencia, Spain, as part of the INMA (Environment and Childhood) project. We measured levels of organochlorine pesticides (OCPs) polychlorinated biphenyls (PCBs) and polybromodiphenyl ethers (PBDEs) in maternal and cord serum samples collected during 2004-2006.
Results: OHs profiles showed very similar distributions in maternal and cord serum. Concentration ratios of OHs between paired samples varied between 0.40 and 0.94 on fresh weight and between 0.89 and 1.86 on lipid basis. In general, fresh weight cord concentrations of OHs were lower than in maternal serum, but when adjusted on lipid-basis cord concentrations were similar or even slightly higher than in mothers. Spearman correlations between mother-cord paired serum samples ranged from very weakly negative to strongly positive (Spearman rho= -0.01 to 0.71), we observed positive and significant correlations for concentrations of PCBs and OCPs while BDE congeners were not correlated.
Conclusions: Differences in lipid content between maternal and cord serum seem to be affecting the distribution of OHs; the lipid content of fetal cord blood is low, thus its potential to accumulate OHs is also limited. When concentrations are lipid adjusted, they are about the same in the maternal-fetal system and so the placenta barrier does not prevent OH exchange. The variations observed in concentration ratios of the different OHs analyzed are likely due to dissimilar metabolism rates in mother than fetus.

TRAFFIC POLLUTION AND BIOMARKERS OF PULMONARY OXIDATIVE STRESS IN HEALTHY HUMANS

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Background. Traffic-related air pollution is associated with increased cardiopulmonary morbidity and mortality. Evidence suggests that oxidative stress may mediate these adverse effects. We hypothesized that passenger vehicle rides simulating a rush-hour commute would cause measurable acute changes in biomarkers of airway oxidative stress among healthy volunteers.
Methods. Twenty nonsmoking subjects aged 18-45 were passengers in a Ford Taurus sedan for two 2-hr car rides. The route was primarily on a major highway with heavy diesel truck traffic with the car's external air intake open. Subjects wore a powered air-purifying respirator (PAPR) ('Air-Mate,' 3M) during all car rides. In randomized order at least one week apart, each subject had one ride with, and one ride without, a HEPA filter in place in the PAPR. Subjects were blinded to the presence of the filter. In-vehicle measurements included total particle count, $PM_{2.5}$, nitrogen dioxide, and carbon monoxide. We collected exhaled breath condensate (EBC) with an Ecoscreen® device before and 0, 6 and 24 hr after each ride. We measured the concentration of EBC nitrite and nitrite + nitrate, markers of nitrosative stress, using chemiluminescence detection, and EBC malondialdehyde (MDA), a marker of oxidative stress, using HPLC with fluorescence detection. To date, 12 subjects have completed the protocol with samples analyzed.
Results The filter reduced particle counts by >99%. We found a significant 2-fold increase in mean nitrite+nitrate in EBC collected immediately following the car rides without HEPA filtration compared to the rides with HEPA filtration, as well as non-significant increases in nitrite and MDA. The increases did not persist at 6 hr and 24 hr after the car ride.
Conclusions These results suggest that the PM exposure during car rides in heavy diesel truck traffic causes acute increases in oxidative/nitrosative stress in the respiratory tract.

PHTHALATE EXPOSURE AND BREAST-CANCER RISK ACCORDING TO *PPARγ* AND *PPARGC1B* GENOTYPES

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Background and Aims: Some phthalic acid diesters (phthalates) have recently been associated with breast cancer (BC). In this study we evaluated if that association is modified according to *PPARγ* and *PPARGC1B* genotypes.
Methods: 208 BC cases were age-matched with 220 population controls from the north of Mexico. Urine concentrations of nine phthalate metabolites were determined by isotope dilution/high-performance liquid chromatography and mass spectrometry. Genotyping of variant *Pro12Ala* (rs1801281) of the *PPARγ* gene and variants *Ala203Pro* (rs7732671) and *Val279Ile* (rs17572019) of the *PPARGC1B* gene were carried out by traditional PCR with TaqMan probes.
Results: The three polymorphisms under study were in Hardy-Weinberg equilibrium, with a minor allele frequency of 0.11*,* 0.14, and 0.14 for the *Pro12Ala*, *Ala203Pro*, and *Val279Ile* variants respectively. Only the association between the higher levels of urinary mono-(2-ethylhexyl) phthalate (MEHP) concentration with BC was modified after the stratification by the *PPARγ* gene *Pro12Ala* polymorphism alleles (for G carriers: OR=0.59 CI95%=0.25-1.39; for C carriers: OR=1.50 CI95%=1.08-2.08); and the association between the mono-iso-butyl phthalate (MiBP) with BC in women with higher urinary concentrations was modified after the stratification by the *PPARGC1B* gene *Ala203Pro* polymorphism alleles (for C carriers OR=1.12 CI95%=0.55-2.27; for G carriers OR=0.67 CI95%=0.44-1.01).
Conclusions: Our results suggest the presence of a gene-environment interaction influencing BC risk that could be determined by the magnitude of exposure.
Keywords: breast cancer, phthalates, urinary metabolites, PPARγ*, PPARGC1B*, gene-environment interaction.

AN ALTERNATIVE METHOD FOR ESTMATING A THRESHOLD POINT OF TEMPERATURE IN A PEICEWISE LIENAR REGRESSION MODEL USING KOREAN DATA

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Background and Aims: Due to U-, V-, or J-shaped pattern of temperatre effects, a threshold effect on mortality has been researched using a piecewise linear regression model (PLRM) by fitting left and right slopes based on the smallest Akaike information criterion (AIC). However, in Korean data, the estimated threshold was higher than a point shown on a smoothing spline plot. We experimentally applied an alternative method to find better estimate of a threshold.
Methods: We evaluated meteorological and mortality data from 6 metropolitan areas in Korea from 1992 to 2009. Smoothing spline plots were drawn using a generalized additive model (GAM). We applied PLRM for quantifying the estimated threshold point of temperature on mortality. In GAM and PLRM, relative humidity, air pressure, day of the week, and seasonal and long-term trends were controlled for. Instead of using the AIC, we selected a threshold point based on the smallest left slope estimate (LSE) of the nonlinear associations.
Results: The threshold based on the LSE was lower than the one using the AIC. In Seoul, the threshold temperature was 26°C and 28.4°C, in Incheon; 25.2°C and 28°C, in Daegu; 27°C and 28.6°C, and in Gwangju; 23.4°C and 25°C based on the LSE and the AIC, respectively. Two other cities (Daejeon and Busan) showed diverged estimates of the threshold based on the AIC. Consequently, the threshold based on the LSE showed closer to the point on the smoothing spline plot.
Conclusions: The study demonstrated that the estimated threshold based on the LSE was closer to the smoothing spline plot and was lower than the one based on the AIC. However, the experimental study may need to be elaborated in mathematical logic.

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PREGNANCY, EXPOSURE TO PESTICIDES AND INFANT LEUKEMIA IN BRAZIL

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Background and Aims: Infant leukemia (IL) is a rare hematological neoplasm associated with *MLL* gene rearrangements. Maternal exposures during pregnancy to pesticides, hormones, dipyrone, and topoisomerase-II DNA inhibitors and high birth weight were associated risk factors.
Methods: This is a hospital-based multicenter case-control study. Mothers of 252 IL cases and 423 controls were interviewed and data were obtained regarding environmental maternal exposure during periconceptional, pregnancy and breast-feeding periods, including exposure to pesticides. Unconditional logistic regression was performed and odds ratios (OR) on the association between maternal pesticides exposure and IL, including their 95% confidence intervals (CI), were ascertained after adjustment to hormonal intake during pregnancy, mother's age, mother's level of education, birth weight and infant's skin color.
Results: An adjusted OR, 2.39, 95% CI, 1.63-3.51 was observed for the association between IL and maternal exposure to pesticides during pregnancy, being higher for acute myeloid leukemia (adjusted OR 3.50, 95% CI, 2.01-6.11). The use of pyrethroids during pregnancy revealed an OR 2.18 (95% CI, 1.44-3.29), while the use of other pesticides showed an OR 3.61 (95% CI, 1.69-7.73). The reported household use of pesticides revealed an adjusted OR 2.25 (95% CI, 1.48-3.43), and agriculture exposure showed an adjusted OR 9.26, (95% CI, 2.82-30.4). According to frequency of exposure, an adjusted OR, 2.48 (95% CI, 1.50 - 4.00) was seem among those reporting up to 1 contact weekly, and an adjusted OR 2.34 (95% CI, 1.30–4.21) among those with > 1 contact (p-trend < 0.0001). Mixed exposure to different pesticides showed an adjusted OR, 3.83 (95% CI, 1.33-11.0) and the exposure to different chemical classes revealed an adjusted OR, 8.87 (95% CI, 1.55-50.6).
Conclusions: The observed results seem to support the hypothesis that mothers' household use of pesticides and other contaminants may be involved in the etiology of infant leukemia.

THE INTERACTION BETWEEN SOCIAL DISADVANTAGE AND ENVIRONMENTAL HEALTH: SES, LEAD, AND BLOOD PRESSURE

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Background and Aims: Some studies suggest that social disadvantage may potentiate the effects of environmental exposures. In this study, we test the hypothesis that socioeconomic status (SES) and race may moderate the relationship between blood lead and increased blood pressure (BP).
Methods: Data come from the National Health and Nutrition Examination Survey (2001-2008). OLS regression is used to test three-way interactions between race, SES (education and poverty), and lead, adjusting for age and hypertension risk factors.
Results: Blood lead was related to higher blood pressure, but only for Blacks. Among Blacks, the association was stronger for lower SES than higher SES groups. For example, Black men without a high school (HS) education show a 5.6mmHg increase in SBP (se=1.3, $p<0.001$) for each doubling of BL while Black men with a HS education show a 1.8mmHg increase (se=0.8, $p<0.05$). Similar effects are seen for Black women. No associations between blood lead and blood pressure were found for White men and women regardless of SES.
Conclusions:
The relationship between blood lead and high blood pressure appears to vary by race and SES. These findings are consistent with theories suggesting that social disadvantage may moderate the association between some environmental exposures and health.

ENVIRONMENTAL EXPOSURES AND CHILDHOOD LEUKEMIA: AN EXPLORATORY ANALYSIS IN BRAZIL

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Background and Aims: Childhood leukemia is a rare hematological neoplasm and several factors related to environmental exposures and individual characteristics existing in our environment may have on the process of leukemogenesis.
Methods: This investigation is part of a national multicenter study that included 292 cases of leukemia in children aged 0-12 years and 541 controls of similar age, centers of origin of cases and hospitalized for non-neoplastic causes. The information of selected environmental exposures was obtained through interviews with mothers of cases and controls tied to a standardized questionnaire from a database of clinical and epidemiological case-control study of hospital based on risk factors for childhood leukemia.
Results: The principal component analysis and factor analysis identified factors associated with leukemogenesis. Further, an unconditional logistic regression was carried out aiming to ascertain the magnitude of association between the selected factors, and their composing variables, with childhood leukemia. The model displaying the highest power explained 52% of the total variance, including 3 factors, each one of the showing factors loadings higher than 0.6: “conditions related to chemical exposure during pregnancy”, which explained 20% of the variance; “ lifestyle exposures”, such as smoking and hair dyes and hair cosmetics use during pregnancy, explaining 17% of the total variance; and “consumption of health services during pregnancy”, such as X rays and delivery type (cesarean or vaginal delivery), explaining 15% of the total variance. Logistic modeling revealed statistically significant association between childhood leukemia and chemical exposure during pregnancy (OR=1.36; 95% IC=1.16-1.59), and also with consumption of health services during pregnancy (OR=1.27; 95%IC =1.08-1.49).
Conclusions: The observed results are suggestive of the contribution of environmental exposures to childhood leukemia development, not just individually, which has been supported by the literature according to carcinogenesis and leukemogenesis as resulting from several mutations triggered by joint environmental exposures.

EPIGENETIC IMPACT OF COMMUTING TO WORK BY CAR OR USING PUBLIC TRANSPORTATION: A CASE-CONTROL STUDY

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Background and Aims: Using public transportation (PT) entails more physical activity and energy expenditure during the commute than driving cars. We assessed here whether these two types of commuters have different levels of inflammatory response, and eventually different cardiovascular and cancer risks.
Methods: We compared adults commuting to Queens College, New York, whose normal commute was either by car (n=79) or using PT (n=101). To maximize differences, the two groups were randomly sampled without attempt to match on socio-demographical factors. Besides questionnaires about their diet, physical activity and perceived stress and measured weight and height, we measured white blood cell (WBC) counts, C reactive protein (CRP) and DNA global Line-1 methylation.
Results: Preliminary results show that, as expected, the two commuter types vary greatly by age, BMI, physical activity, ethnicity and diet. There are however no differences in median WBC, (car=6700 cells/mm3; PT=6400, p=0.30) in CRP, (car=1.18 mg/dl; PT=1.26, p=0.65) and in Line-1 DNA methylation, (car=78.2%; PT=78.3%, p=0.73).
Conclusions: Levels of inflammatory response and DNA methylation do not appear to differ according to commute modes even when conditions are set to maximize the observed differences if any.
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HIGH CHEMICAL TOXICANT LEVELS AMONG URBAN POPULATION WITH HISTORY OF LIVING IN AGRICULTURAL AREAS OR USE OF PESTICIDES

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Background and aims: there are many chemical toxicants in the environment capable of producing adverse health effects. Surveillance systems using bio-markers are a tool to identify potentially exposed populations and sources of exposure. A study was conducted to assess the feasibility of implementing such a system in Brazil using multiple biologic matrices.
Methods: blood and hair samples were obtained from blood donors attending 10 donation centers in the metropolitan region of Sao Paulo. Hair and blood levels of metals (Hg, As, Cd, Co, Cu, Mn, Pb, Se, Tl, U, Zn, Pt, and Sb) were determined by ICP-MS. Serum levels of organochlorines were determined by gas chromatography. A detailed questionnaire was also applied to each participant.
Results: 547 blood donors aged 18-65 year old (mean 34.8) were included in the study (64.7% male). Levels of most metals were similar to those reported in other surveys except for mercury in blood with 3 individuals with levels greater than 15 µg/L. Lead and cadmium in blood, but not in hair, were significantly higher among smokers and mercury among those with higher fish consumption. Arsenic levels in hair were significantly higher among those who lived in agricultural areas (0.025 x 0.018 µg/g) or with history of dealing with pesticides in the past (0.037 x 0.019 µg/g), while blood levels of this metal were higher for those that reported eating home grown vegetables. Levels of β-HCH, pp´DDE, cobalt, lead and thallium were also higher among those with possible pesticide exposure in the past. Correlations between hair and blood measurements were low with the highest correlation for mercury ($r=0.45$ $p<0.001$).
Conclusion: Methodologies tested in this study will help the implementation of a monitoring system in Brazil. Results evidenced possible sources of contamination such as pesticides or fertilizers used in the past that must be further investigated.

THE MODIFYING EFFECT OF SOCIOECONOMIC POSITION IN THE AIR POLLUTION - MORTALITY ASSOCIATION: THE ESCALA PROJECT

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Background and aims: Socioeconomic position (SEP) has been identified as a factor that can modify the effects of air pollution on health, although few studies have examined this in detail. We examined this hypothesis in 4 Latin American Cities (São Paulo, Rio, Santiago and Mexico City) which were part of the ESCALA project.
Methods: We developed a common area-based SEP index using variables related to education, income and housing conditions. Each area was ranked according to the SEP index using principal component analysis. The final scores were grouped into tertiles. Deaths were assigned to their respective areas according to the residential address. For Mexico City we assigned the level of air pollution registered in the monitoring station of each area, while for the other cities we averaged air pollution levels across all monitoring stations. Generalized Linear Models in Poisson regression was used to fit the time-series data for PM_{10} and O_3.
Results: In Mexico, a gradient was observed for respiratory mortality with RR% = 1.46 (95%CI 0.76 to 2.16)) in the low, RR% = 0.81 (0.20 to 1.43) medium and RR% = -0.8 (-1.46 to -0.22) in the high SEP, while cardiovascular and cerebrovascular mortality were higher in the medium and high SEP. In Brazilian cities we observed an opposite trend for respiratory mortality with higher effects in the high SEP and no trends for cardiovascular and cerebrovascular mortality. In Santiago, COPD and cardiovascular mortality were significantly increased in the low SEP but no clear gradient could be observed. Results were more consistent for PM_{10} than for O_3 in all cities.
Conclusion: Our data suggest that SEP may play a role in the susceptibility to air pollution, especially for respiratory mortality. However results are inconsistent with regards to the more susceptible subgroups to respiratory mortality and other causes of mortality.

DELIVERY TYPE NOT ASSOCIATED WITH DIFFERENTIAL METHYLATION AT BIRTH

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Background: Birth by Cesarean section is associated with adverse health outcomes later in life, including diabetes and allergies. Epigenetic mechanisms are one way early life exposures can affect later health outcomes. Differences in global methylation by type of birth have been described, but the sample sizes have been small. We measured global methylation in a large, ongoing birth cohort to identify epigenetic changes that may cause predisposition to disease in later life due to delivery type.
Methods: DNA was obtained from umbilical cord blood collected immediately after term deliveries from the University of Michigan Hospital (n=417). Global methylation levels were assessed via the Luminometric Methylation Assay (LUMA), and DNA methylation at four CpG sites in LINE-1 repetitive elements was assessed via bisulfite pyrosequencing. Samples were run in duplicate and averaged for analyses. Nonparametric analyses tested the association between type of birth, vaginal delivery (VD) or Cesarean section (CS), gender and measures of global methylation.
Results: LUMA data were available from 301 births (53% male; 61% CS) and LINE-1 methylation was available for 212 births (50% male; 67% CS). There were 154 samples with both LUMA and LINE-1, and the measurements were negatively correlated (Spearman's r = -0.22, p = 0.006). Global methylation values were not significantly different by gender. Type of birth was not associated with global methylation as measured by LUMA (mean CS = 73.66, mean VD = 74.98, p-value = 0.12) or by LINE-1 (mean CS = 81.19, mean VD = 81.05, p-value = 0.31). These results did not change when stratifying by gender.
Conclusion: Type of delivery was not associated with global methylation in our population regardless of infant gender. While type of birth may be associated with later health outcomes, our data suggest that it does not do so through changes in global genomic methylation.
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TRAFFIC POLLUTION AND COGNITIVE FUNCTION IN COMMUNITY-DWELLING SENIORS: THE MOBILIZE BOSTON STUDY

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Background and Aims: A small number of epidemiologic studies report an association between long-term exposure to traffic pollution and decreased cognitive function, but additional studies are needed. Accordingly, we evaluated the association between long-term exposure to black carbon (a marker of traffic pollution) and cognitive function in a population-based cohort of community-dwelling seniors.
Methods: Between 2005 and 2008, we evaluated cognitive function among 765 elderly participants from the MOBILIZE Boston Study (64% female, aged 64-97 years). Neurocognative assessments included the Mini Mental State Exam (MMSE) and a battery of five tests designed to evaluate verbal memory and executive function. Subjects with moderate or severe cognitive impairment, as determined by an MMSE< 18 were excluded. We geocoded participants' residential addresses and assessed average long-term exposure to traffic pollution in the 12 months prior to neurocognitive assessment using a validated spatiotemporal land-use regression model for black carbon. We used generalized linear models to evaluate the association with an interquartile range increase (IQR: 0.1 $\mu g/m^3$) in predicted black carbon levels.
Results: Adjusting for age, sex, race, history of stroke, and education, an interquartile range increase in predicted residential exposure to black carbon was associated with a 19% (95% Confidence Interval [CI]: 1%, 39%; p=0.032) increase in risk of having an MMSE score in the lowest quartile (MMSE≤25). Further adjustment for household income, smoking history, body mass index, season, and census level covariates attenuated the results slightly (excess relative risk: 17%; 95% CI: -1%, 40%; p=0.060). Among the other tests, only verbal memory functioning was associated with black carbon (p= 0.056).
Conclusions: In this population-based cohort of elderly subjects, long-term residential exposure to traffic pollution was associated with decreased cognitive function. The increasing prevalence of cognitive impairment expected with the aging population underscores the need for additional studies in this area.

COMPARING PARTICULATE MATTER AND OZONE EXPOSURE METRICS FOR PERINATAL EPIDEMIOLOGY IN MEXICO CITY, MEXICO

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Background and Aims: Emerging evidence suggests a relationship between air pollution and adverse birth outcomes, but many studies consider only temporal variation in exposure. We compare spatial methods for assessing exposure to outdoor air pollutants in Mexico City with citywide averages.

Methods: Three metrics of daily exposures to PM_{10}, $PM_{2.5}$, and ozone were calculated for a simulated population (n=1,000) in Mexico City during 2008: the citywide average (CWA) (same for all women), and metrics unique to each of the 1,000 hypothetical residential locations: nearest monitor (NM) and inverse distance weighting (IDW). Correlations, mean differences, and their variances were calculated for each pollutant across all three methods, using citywide averages as the reference.

Results: Ozone was moderately correlated with PM_{10} (r=0.54) and $PM_{2.5}$ (0.65) using CWA. Correlations were lower for IDW (r=0.49 for ozone vs. $PM_{2.5}$; and r=0.42 for ozone vs. PM_{10}) and NM (r= 0.32 for ozone vs. PM_{10}; and r=0.48 for ozone vs. $PM_{2.5}$). In southern zones of the city (low PM_{10}), CWA overestimated PM_{10} by 10.6 and 14.7 $\mu g/m^3$, when compared to NM and IDW, respectively. In the north, CWA underestimated the exposure by 8.3 and 2.4 $\mu g/m^3$ when compared to NM and IDW, respectively. For $PM_{2.5}$ estimated metrics were relatively similar across methods. In southern zones (high ozone), CWA underestimated the ozone exposure by 5.1 ppb compared to NM, and overestimated (2.4ppb) compared to IDW. In the north (low ozone), the CWA overestimates the exposure when compared to NM and IDW (5.2 and 5.1 ppb, respectively).

Conclusions: Depending on residence location, the citywide average could over/under estimate exposure to air pollutants. These differences could bias epidemiological associations if other risk factors for adverse birth outcomes are associated with residence in a particular zone. Future analyses in Mexico City will evaluate kriging, other air pollutants, and implications of seasonal variation for exposure assessment.

EXPOSURE TO AMBIENT FINE PARTICULATE MATTER ALTERS CEREBRAL BLOOD FLOW IN THE ELDERLY: THE MOBILIZE BOSTON STUDY

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Background and Aims: Previous studies suggest that short-term elevations in ambient fine particulate matter ($PM_{2.5}$) may increase arterial blood pressure. However, the consequences of these systemic effects on the tightly-regulated cerebral circulation have not been examined. Accordingly, we evaluated the association between $PM_{2.5}$ and cerebral hemodynamics in a cohort of community-dwelling seniors.
Methods: We repeatedly assessed cerebral hemodynamics at rest and in response to blood pressure changes associated with standing from a seated position according to a standardized protocol in 424 participants (757 measurements) from the MOBILIZE Boston Study. We measured blood flow velocity in the middle cerebral artery using transcranial Doppler ultrasound and mean arterial blood pressure (MAP) non-invasively with a Finapres device. We calculated cerebral vascular resistance as the ratio of MAP to blood flow velocity. $PM_{2.5}$ levels were measured at a nearby monitoring site. We used linear mixed effects models with random subject intercepts to evaluate the association between hemodynamic parameters and mean $PM_{2.5}$ levels 1 to 28 days earlier adjusting for age, race, medical history, meteorologic covariates, day of week, temporal trends, and season.
Results: An interquartile range increase (3.0 $\mu g/m^3$) in mean $PM_{2.5}$ levels over the previous 28 days was associated with a 6.9% (95% confidence interval [CI]: 2.3%, 11.8%; p=0.003) higher cerebral vascular resistance and a 6.7% (95% CI: 3.4%, 9.9%; p<0.001) lower cerebral vascular blood flow at rest. Results at shorter $PM_{2.5}$ averaging times were qualitatively similar but weaker. Upon standing from a seated position MAP, cerebral vascular blood flow and resistance decreased, as expected. These responses were not associated with $PM_{2.5}$ levels.
Conclusions: In this cohort of community-dwelling seniors, exposure to $PM_{2.5}$ was associated with alterations in cerebral blood flow. If replicated, these novel findings suggest a mechanism by which ambient air pollution might increase the risk of acute cerebrovascular events.

ASSOCIATION OF RESIDENTIAL UVR EXPOSURE WITH CHILDHOOD BLOOD PRESSURE AND CAROTID INTIMA- MEDIA THICKNESS

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Background and Aims: Emerging data suggest that serum vitamin D level is inversely associated with carotid intima-media thickness (CIMT) and blood pressure. Because sun exposure (Ultra violet radiation, UVR) is a major determinant of serum vitamin D level, we hypothesized that residential UVR level is also associated with CIMT and blood pressure.
Methods: We investigated our hypotheses in 738 children (mean age=11.3 years, standard deviation (SD) = 0.63) of the Children's Health study on whom we measured CIMT, systolic (SBP) and diastolic (DBP) blood pressure. UVR estimates were obtained from an ANUSPLIN model for the year of study participation based on the latitude and longitude of participant residences. We derived one-square-kilometer ground surface level UVR values using spatial smoothing techniques for data from UVR measurement stations throughout the United States, adjusted for local climate and terrain features. All association analysis utilized multivariate linear regression models with adjustment for age, sex, race, family income, and town of residence. Models for UVR and CIMT were additionally adjusted for blood pressure.
Results*:* The residential UVR level ranged from 4980 to 5361 Watt-hour (WH)/m^2 with a SD of 81 WH/m^2. The mean (SD) of CIMT, SBP and DBP in these children were 56.6 µm(4.4), 104 mm Hg(8.5) and 57 mm Hg (6.2), respectively. Residential UVR level was an independent determinant of CIMT and diastolic blood pressure. Each 162 WH/m^2 (2 SD) increase of UVR exposure was associated with 3.6 (95% confidence interval (CI) 0.04, 7.23) µm decrease in CIMT and 5 (95%CI 0.04, 9.7) mm Hg decrease in diastolic blood pressure. No significant association was observed between UVR level and SBP.
Conclusion*:* Residential UVR level is inversely associated with CIMT and DBP in children which might be important for their cardiovascular health.

THE PREVALENCE OF BREAST CANCER IN SLOVAKIA

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Background: Breast cancer is one of the most serious diseases in terms of epidemiological indicators on the whole world. In the last fifty years the incidence of disease has increased continuously. Currently such disease threatens every tenth woman and in this way it also endangers the lives of thousands. One of the reasons of high mortality is late diagnosis of the disease. Prevention is the most essential. Mammography screening for breast cancer presents the most effective method. By systematic mammography screening it is possible to reduce mortality up to 30%, mainly in the age group 50-69.
Material and methods: In the work we focused on the statistics of mammography screening in the Slovak republic. The analysis compares mammography, examinations provided and estimation of the required number of preventive mammography examinations.
Results: The largest number of mammography examinations is provided in Bratislava (23.95%), Košice (16.41%) and the region of Banska Bystrica (14.57%), the least in the region of Trnava (5.63%). Women from the age 40 are invited to a regular preventive mammogram every two years. This group becomes greater from year to year (by 1.78%). Evaluating the calculations according to individual regions it may be concluded that the number of conducted examinations are below the claimed number of preventive - the required examinations.
Conclusion: Improving the availability of mammography screening in SR depends not only on increasing the state of medical instrumentation techniques, but also on the organization of work, eddification, information about the claims for preventive examinations and limition of the performance by health insurance organizations.
Acknowledgement:This work was supported by the Agency of the Ministry of Education, Science, Research and Sport SR for EU Structural funds projects: ITMS 26220120023, ITMS 26220120041.

CALCIUM IN POSTMENOPAUSAL WOMEN PREŠOV (SLOVAKIA)

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Background: Nutrition is one of many factors that affect bone quality. Dietary intake of mineral elements plays an significantly role in maintaining homeostasis of soft tissue, in protection of the skeleton, etc. Calcium is an essential nutrient for healthy bones, is needed for the heart, muscles, nerves, blood clotting, participate in processes inside cells. It is lost every day in the organism by sweating, urine, faeces, therefore, is necessary to monitor the balance between his intake and spending for healthy bones.
Material and Methods: In this study, we focused on the monitoring of calcium (Ca^{2+}) and calcium loses in the urine in 150 postmenopausal women, regardless of the diagnosis of thyroid.
Results: In this group, we found that the average value of calcium in the urine was 3.033 mmol/l (minimum value 0.45 mmol/l, the maximum value 9.23 mmol/l). The average value lost calcium in the urine was 0.168 mmol/l higher than the average value of calcium (Ca^{2+}).
Conclusion: Biochemical indicators provide primary information on the rate of bone remodeling, the functional state of bone metabolism and they are necessary for differential diagnosis of osteoporosis. Through them, we can estimate the risk of fractures in the future.

SELECTED CHEMICAL AND PHYSICAL PROPERTIES OF MINERAL SPRING FROM LOCATIONS OF CENTRAL SPIŠ (HORNÁDSKA BASIN)

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Background: Water is an essential condition of life on earth. Mineral and medicinal properties of water has great medical, economic and social importance.
Material and methods: In our work we focused on the determination of selected physical properties (temperature) and chemical composition (pH, hardness, ammonia concentration) of mineral water springs St. Kríž, St. Ondrej on the Siva Brada and the source Deák in Baldovce, which are located in the eastern part of Hornádska basin.
To determine the characteristics we used a compact laboratory Aquamerck ® 11151 for analysis of water by MERCK. On the sampling site was determined temperature from physical characteristics and pH from chemical indicators.
Results: The water temperature was lowest in Baldovce - spring Deák 11.4 °C, spring St. Kríž - 13.8 °C and spring St. Ondrej - 13.1 °C. pH values was measured from 6.8 to 6.9, so we can classified as a mineral water – acidulous water. The content of ammonia ($NH4^+$) was the same in the source of St. Kríž and Ondrej (1.29 mg/ l) in the source of Deák in Baldovce - 0.32 mg/ l. Hardness value was in all the sources above 6.25 mmol/ l.
Conclusion: The Regional Public Health Authority in Poprad (Slovakia), the quality of mineral springs St. Kríž and Ondrej is unstable. This is reflected by higher occasional incidence of ammonium ions, and rarely by microbiological harm, it can be a result of poor care of clean environment of those springs, possibly due to human activity.

Background. Bakery and hairdressing rank high among occupations at risk of asthma. We explored the early incidence of occupational asthma (OA) along the first years of activity among young workers.
Methods. Subjects who graduated between 2001 and 2006 underwent telephone interviews on the occurrence of respiratory symptoms. Workers in occupations not exposed to known airways irritants or allergens were also included. Subjects who had asthma when starting apprenticeship were excluded. Those who declared work-related respiratory or ENT symptoms and a sample of asymptomatic subjects were proposed a medical visit (spirometry tests, exhaled NO measurements, daily surveillance of peak flow values, blood sample for assessment of common allergens and work-specific IgE). Diagnosis of OA was established by expert judgment and the sensitivity and specificity of symptoms declared during the telephone interviews were assessed.
Results. 866 subjects were interviewed (mean age: 25.3 years), among which 282 underwent a medical visit. The cumulative incidence of 'probable' OA among bakers was high in the first quartile of exposure duration (median value=3.0 years; risk = 15.8 % [95%CI=10.0–21.8]); several had to quit this activity because of this condition. It was reduced to 11.9 % [6.3–17.6] in the second exposure duration quartile (5.3 years) and increased regularly across the third (7.4) and fourth (9.5) quartiles, with 14.1 % [7.3–21.0]) and 16.5 % [8.1–24.8]), respectively. The corresponding figures among hairdressers are 5.3 % [0.0–11.5]), 4.6 % [0.2–9.3], 2.0 % [0.0–7.5] and 3.7 % [0.0–7.5]. Atopy is highly associated with incidence of probable OA among bakers (RR= 10.0 [2.8-35.4]), and, to a lesser extent, among hairdresser (RR= 3.9 [0.7-20.9]). OA is very rare in the reference group (risk = 1.2 % for the longer exposure quartile).
Conclusion. Incidence of OA starts soon after engaging in bakery and hairdressing, activities that entail exposure to low or high molecular weight agents.

SIMULTANEOUS DETERMINATION OF PERFLUORINATED COMPOUNDS, OXIDIZED PHTHALATE METABOLITES, BIS-PHENOL A AND COTININE IN SMALL VOLUMES FROM SERUM BANKS FOR USE IN EPIDEMIOLOGICAL STUDIES

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Background and Aims: Perfluorinated compounds (PFCs), phthalates and bis-phenol A are suspected endocrine disrupters and may therefore induce health effects such developmental and neurobehavioral disorders, obesity, diabetes, asthma etc. Moreover, smoking is often an important confounder in studies of these diseases. There is often a large lag between the exposure and the development of the disease. Furthermore, for many diseases it is believed that it is the exposure of the mother during pregnancy that is of importance. It is therefore desirable to measure exposure back in time. There are many samples stored in freezers in serum banks which may be used for this purpose. However, the stored volumes are often very limited. Methods for analysis of these samples should therefore preferably use only a small volume as well as being possible to be applied for many different compounds of interest. The aim of this study was to develop such a method for simultaneous analysis of a number of different suspected endocrine disrupters as well as the tobacco smoke indicator cotinine.
Methods: For the analysis of perfluorinated compounds, oxidized phthalate metabolites, bisphenol A and cotinine aliquots of 100 µl serum were added with glucoronidase, ammonium acetate buffer and a water:acetonitrile (50:50) solution containing ^{2}H-^{13}C- or ^{18}O-labeled internal standards for all evaluated compounds. The samples were then digested at 37°C for 90 min. The proteins were precipitated with 175 µl acetonitrile and vigorously shaking for 30 min. The samples were thereafter centrifuged and 3 µl of the supernatant was injected on a triple quadrupole linear ion trap mass spectrometry equipped with a TurbolonSpray source (Sciex QTRAP 5500).
Results: The method developed is easy and fast to perform. The precisions were better than 10% for most analyzed compounds and the detection limits were sufficiently low to be able to detect most of the analyzed compounds in a majority of the samples from the general populations, at least in Sweden, Ukraine, Poland and on Greenland. For the compound where it was possible the method was applied in inter-laboratory control programs with results within the tolerance limits.
Conclusions: The developed method may be valuable in epidemiological studies on associations between exposure to PFCs, phthalates and bis-phenol A and health effects.

Risk of acute kidney injury after exposure to gadolinium-based contrast in patients with renal impairment

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Background and Aims: Gadolinium-based contrast media (Gd-CM) are reported to induce acute kidney injury (AKI) in a high-risk population group at the usual dose for magnetic resonance imaging (MRI) and magnetic resonance angiography (MRA) examinations. We assessed gadolinium-induced nephropathy in patients with renal impairment who underwent MRI or MRA examinations, and evaluate the risk factors.
Methods: In this retrospective study, 238 patients with baseline renal impairment, who received MRI or MRA examinations with Gd-CM, were recruited.
Results: After all other AKI causes—liver decompensation, severe heart failure, all kinds of shock, and severe sepsis—and patients on dialysis were excluded, 158 patients were enrolled. AKI was defined as a decrease in GFR > 10% of baseline data within 3 days after Gd-CM administration. Regression analysis was used to find independent risk factors for gadolinium-induced ARF (Gd-AKI). Twenty-six of the 158 patients (16.5%) developed Gd-ARF. There were no significant differences in gender, age, or baseline eGFR between those who did and who did not develop AKI. Co-morbid coronary artery disease, liver cirrhosis, diabetic mellitus, and hypertension were not significantly associated with the development of Gd-ARF. However, sepsis was an independent risk factor for Gd-AKI after multivariate regression analysis (adjusted odds ratio: 4.417; 95% confidence interval: 1.671, 11.676, P =.03).
Conclusions: Sepsis was an independent risk factor for Gd-CM nephropathy at the usual dose for MRI and MRA examinations. It is important to identify high-risk patients and closely monitor renal function after Gd-CM administration.

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UPDATED HEALTH IMPACT ASSESSMENT (HIA) OF URBAN AIR POLLUTION IN SEVERAL SPANISH CITIES. APHEKOM PROJECT.

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Background: Great efforts have been invested worldwide to better understand and mitigate the impact of air pollution on human health. However, the debate about safe standards is still open. This study aims to describe the health benefits that would be achieved by meeting the World Health Organization air quality guidelines (WHO-AQG) for PM_{10}, $PM_{2.5}$ and ozone in the Spanish cities of Barcelona, Bilbao, Granada, Malaga, Seville and Valencia.

Methodology: Traditional standard procedure for HIA of urban air pollution updated under the EU-sponsored APHEKOM project was applied in each city. Short-term impacts of ozone and PM_{10} on mortality and morbidity, as well as the long-term of $PM_{2.5}$ on mortality, life expectancy (LE) and monetary health benefits were quantified based in published concentration-response functions and economic values. Pollutants and health outcome data were recorded for the period 2004-2006. Results were referred to population 30 years of age and older.

Results: Although annual mean of PM_{10} for the study period did not exceed the legislative limit value in Europe (40 $\mu g/m^3$) in any of the cities, our findings show that compliance with WHO-AQG of 20 $\mu g/m^3$ would prevent each year more than 313 deaths, and between 284 and 658 hospital admissions for cardiovascular and respiratory diseases, respectively, in the six cities. Larger health benefits were recorded when considering a decrease in $PM_{2.5}$ concentrations at the long-term. The compliance with WHO-AQG of 10 $\mu g/m^3$ in annual mean would avoid more than 2732 deaths for the six cities each year, accounting for a monetary health benefit of more than 4,500 millions Euros. This decrease would result in a LE gain that would range between 13.8 and 2.3 months.

Conclusions: Ours findings support the need to revise current air quality legislative limit values, especially in the case of fine particles $PM_{2.5}$

THE EFFECT OF PRENATAL AND POST NATAL EXPOSURE TO SECOND HAND SMOKE ON THE DEVELOPMENT OF WHEEZING BEFORE THE AGE OF 2: A EUROPEAN STUDY

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Background-Aim. It has been estimated that at least 700 million children worldwide breathe air polluted by second hand smoke (SHS) at home. We assessed the independent and combined role of prenatal and postnatal exposure to SHS on the development of wheeze in infants before age 2.

Methods. We examined pooled data for 49415 mother-child pairs from 19 birth cohorts in 9 countries participating in the EU funded ENRIECO project (ALSPAC, AMICS-Barcelona, AMICS-Menorca, BAMSE, CONER, DARC, EDEN, Generation R, GINI, INMA Guipuzkoa, INMA Sabadell, INMA Valencia, KOALA, Leicester, LISA, MAS, NINFEA, PIAMA-NHS, and RHEA). Information on prenatal exposure to maternal active smoking, prenatal exposure to SHS (paternal or others smoking in the mother's environment) and postnatal SHS exposure (parents or others smoking in the child's environment) was collected. We used multilevel mixed-effects logistic regression. Complete information on wheeze, active and passive smoking and covariates used in adjusted models was available for 25727 children.

Results. Among non-smoking mothers an increased risk towards the development of wheeze during the first 2 years of life was associated with any exposure to SHS as a fetus and/or during infancy in both the pooled (OR=1.18, 95%CI 1.10-1.27) and in the meta-analysis (OR = 1.16, 1.06-1.26). Increased risks were observed for fetal exposure to SHS only during pregnancy (OR= 1.14, 1.05-1.24) and to children exposed to SHS during both pregnancy and infancy (OR=1.29, 1.18-1.42). Combined active maternal smoking during pregnancy and SHS exposure during infancy led to the highest risks observed (OR=1.76, 1.60-1.93). Approximately 8% of wheeze during the first 2 years in children of non-smoking mothers could be attributed to SHS.

Conclusions. SHS exposure during pregnancy and infancy was associated both mutually and independently with the development of wheeze before the age of 2 indicating the importance of adopting smoke free homes and environments.

PREVENTING COLD-RELATED MORBIDITY AND MORTALITY IN A CHANGING CLIMATE

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Background and Aims: Overall, higher death rates are observed in winter months compared to summer months. General circulation models used in climate change research indicate a trend towards more intense winter storms occurring in the Northern Hemisphere, particularly between northwestern Europe and the Upper Midwest and Northeast of the United States. To understand current efforts to reduce risk during cold weather, epidemiological, and adaptive behaviour research is compiled and presented.
Methods: We critically reviewed evidence relating temperature variability, health outcomes, and adaptation strategies to cold weather. Health outcomes included cardiovascular-, respiratory-, cerebrovascular-, and all-cause morbidity and mortality. Population and geographic-specific studies were assessed to highlight associations between individual- and neighborhood-level characteristics that contribute to one's vulnerability to cold weather. Adaptation strategies were evaluated at personal-, building-, and neighborhood scales.
Results: Cardiovascular-cause mortality was the most commonly identified health outcome associated with cold weather. Vulnerable populations include the elderly, populations living in typically mild winter climates, and rural populations. Successful adaptation to cold weather was found mostly at the personal level, yet building modifications such as insulation greatly improve thermal comfort of building inhabitants, suggesting that dwelling modifications could protect human health from cold weather.
Conclusions:
Evidence suggests that variability in climate contributes to morbidity and mortality during winter. Results from this research justify the need for (i) immediate actions to promote an awareness among homeowners, property managers, and housing authorities of the importance of building integrity in protecting human health (ii) an allotment of resources for weatherization efforts and (iii) focused research to evaluate the impact of infrastructure-level adaptation to protect human health. We propose that future climate change adaptation research couple building energy and thermal comfort models with epidemiological data as a novel approach to evaluate and quantify the impacts of adaptation strategies.

PRELIMINARY CHARACTERIZATION OF REAL TIME PM MASS AND COMPOSITION PROFILE IN SMOKES FROM DIFFERENT SOURCES: CIGARETTE, INCENSE STICKS, POTATO FRYING AND URBAN POLLUTION

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Background and Aims: airborne nicotine is the only specific marker of ETS, but real time analysis is not possible. Aim of study is to explore the existence of a specific mass and composition profile of ETS originated Particulate Matter (PM) whose measure could identify the presence and amount of ETS in real time with quick and reliable ETS monitoring.
Methods: Analyzers: Aerocet 531, (MetOne) to record mass of PM_{1}, $PM_{2.5}$ PM_{10} and Aethalometers AE51 (Magee) for Elemental Carbon (BC) and Organic Carbon (OC).
Procedure: Instruments operated in 40 m^3 room with 0.3/0.6 ach and adequate mixing factor measuring urban pollution, cigarette smoke and incense stick burning. Background and cooking combustion pollution was measured in a kitchen of 35 m^3 frying two portions of potatoes.
Results: Ratios of the means of peak concentrations of different pollutant in different types of smokes

	BC/OC	BC/PM1	BC/PM2.5	BC/PM1	OC/PM1	OC/PM2.5	OC/PM10	PM1/PM2.5	PM1/PM10	PM2.5/PM10
Urb.bckg	0.35	0.24	0.21	0.15	0.69	0.61	0.43	0.88	0.63	0.71
Pot.frying	0.33	0.02	0.01	0.01	0.06	0.04	0.03	0.72	0.57	0.80
ETS	**0.11**	**0.06**	**0.05**	**0.04**	**0.55**	**0.44**	**0.42**	**0.80**	**0.76**	**0.96**
Inc. stick	0.04	0.01	0.01	0.01	0.15	0.14	0.14	0.91	0.91	1.00

BC/OC and BC/PM ratios were lower in ETS as compared to urban background, while OC/PM were similar. In contrast, OC/PM was remarkably higher in ETS vs potato frying and incense sticks. Ratios between PM of different size did not show relevant differences.
Conclusions: Differences in mass profile of different parameters are promising about possibility to identify a real time "fingerprint" of ETS presence in the environment. Further studies are necessary to confirm these preliminary results extending to other categories of indoor confounders, and to evaluate the suitability of this approach to ETS monitoring in public places.
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Environmental lead exposure, Catechol-*O*-methyltransferase (COMT) Gene, and Systolic Blood Pressure in Children.

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Objective: Environmental lead exposure and a COMT polymorphic variant, Val108/158Met (rs4680), have both been shown to be associated with increased risks of hypertension in adults. We hypothesized that low-level lead exposure influences blood pressure in children and that the COMT mutation modifies this effect. We tested these hypotheses in 309 children at 7–15 years of age from a sub-study of the Early Life Exposures in Mexico to Environmental Toxicants (ELEMENT) project, an environmental birth cohort study.

Materials and Methods:

We used a mercury sphygmomanometer with appropriate-size cuffs to measure systolic and diastolic blood pressure (SBP and DBP), and Inductively coupled plasma mass spectrometry (ICPMS) to measure blood lead levels (BLLs); all measurements were taken concurrently. Multiple linear regression models were used to estimate the association between blood pressure and BLL, and effect modification by COMT genotype.

Results: Of the 309 children, 126 (42.4%), 136 (45.8%) and 35 (11.8%) were COMT Val/Val, Val/Met and Met/Met genotype, respectively. The median [interquartile-range (IQR)] concurrent BLL was 3.4 (1.83) μg/dl. After adjusting for child's age, height, body mass index, gestational age, weight at birth, and maternal education blood pressure, smoking during pregnancy, an interquartile range increase in BLL (1.83 μg/dl) was associated with 2.98 mm Hg (95% CI 0.42-5.54 mm Hg) increase in SBP among Val/Val wild-type children, while no significant effects were found for DBP. Compared with children having Val/Met or Met/Met genotype, BLL was significantly associated with steeper increases in SBP in children having Val/Val wild-type (p for interaction = 0.02).

Conclusion: These results indicate that concurrent low environmental lead exposure (less than 10 μg/dl) was associated with increased SBP in children, and that genetic polymorphisms in COMT may modify lead's toxicity, suggesting a gene-environment interaction.

GENOMIC METHYLATION OF PERIPHERAL BLOOD LEUKOCYTES AMONG ARSENIC-EXPOSED MATERNAL-NEWBORN PAIRS

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Background and Aims: An emerging body of evidence indicates that early-life arsenic (As) exposure may influence the trajectory of health outcomes later in life; however, the mechanisms underlying these observations are unknown. Our previous work indicates that chronic As exposure causes epigenetic dysregulation, including increases in DNA methylation in adults. The objective of this study was to investigate the influence of prenatal As exposure on genomic methylation of cord blood DNA in a study of mother/newborn pairs in Bangladesh.
Methods: Maternal and cord blood DNA was available from a convenience sample of 101 mother/newborn pairs. Measures of As exposure included maternal urinary As (uAs), maternal blood As (mbAs) and cord blood As (cbAs). Several measures of genomic DNA methylation were assessed, including the [3H]-methyl-incorporation assay and three Pyrosequencing assays; Alu, LINE-1 and LUMA.
Results: After adjustment for covariates, increasing quartiles of maternal uAs were positively associated with cord blood genomic DNA methylation as measured by the [3H]-methyl-incorporation assay ($p_{trend} < 0.05$), and LINE-1 methylation (Q1 vs. Q3; p=0.03), indicating that newborn DNA methylation increased with maternal As exposure. The effects appear to be gender specific: among male newborns (N=58), mbAs was associated with increased DNA methylation as measured by Alu (r=0.28; p=0.03), LINE-1 (r=0.23; p<0.1) and [3H]-methyl-incorporation (r=-0.22; p<0.1). Among female newborns (N=42), the correlations between maternal uAs and cbAs and Alu and Line-1, while not significant, were negative (r=-0.24; p=0.12) and (r=-0.18; p=0.24), respectively.
Conclusions: Consistent with our previous studies in adults, these results suggests that prenatal As exposure is associated with increases in genomic DNA methylation in newborn cord blood DNA. Although the sample size is small, the data suggest that this may occur in a gender-specific manner. Arsenic-induced epigenetic modifications *in utero* may potentially influence disease outcomes later in life.

PRENATAL EXPOSURE TO PBDE'S AND CHILD BEHAVIOR AT 3-5 YEARS

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Background and Aims: Polybrominated diphenyl ethers (PBDEs) are widely used flame retardant compounds that are persistent and bioaccumulative. Exposures are relatively low in the EU but ubiquitous in the U.S. We have previously shown adverse associations between prenatal PBDE and child neurodevelopmental outcomes. Here we evaluate effects of prenatal exposure to PBDEs on child behavior at 3 and 5 years (Herbstman et al 2010).
Methods: This study was conducted within a longitudinal cohort study initiated to examine the impact of prenatal exposures to toxicants, including PBDEs, which may have been emitted from the World Trade Center (WTC) buildings in New York City following the 9/11/2001 attack. PBDE levels were measured in cord blood collected from 210 non-smoking women delivering at hospitals near the WTC site between 12/2001-6/2002. Child behavioral problems were measured by maternal report using the Child Behavior Check List (CBCL) for ages 1.5 to 5 years on 143 children who also had cord PBDE measurements. Multiple variable Poisson regression analyses assessed associations between concentrations of PBDE congeners 47, 99, 100, and 153 and various indices of child behavior.
Results: Among girls, one or more PBDE congeners were significantly ($p<0.05$) inversely associated with Emotionally Reactive, Withdrawn and Internalizing behaviors. Among boys, one or more congeners were significantly inversely associated with Sleep problems. We observed child sex-by-PBDE interactions for a number of Syndrome scales.
Conclusions: The PBDE congeners were inversely associated with several Syndrome scales but results differed significantly by child sex. Few prior studies have examined this association; confirmation is needed in additional larger studies.
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AIR TRANSPORTATION AND FLIGHT ATTENDANT HEALTH

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Background and Aims: Few studies about the health consequences of flight attendant work exist, even though attending and safeguarding passengers is demanding work, usually involving circadian rhythm disruption and hazardous aircraft cabin exposures i.e. flame retardants, pesticides, jet fuel by-products, ozone, cosmic radiation, infectious diseases, and hypoxia. To understand the impact of these hazards, we conducted the largest survey of flight attendant general health to date. Importantly, flight attendant health provides a window into the healthiness of air travel for the flying public.
Methods: Flight attendants from two major US airlines were surveyed; by mail or in person (n=4011). We analyzed reported symptoms, health conditions, personal and job characteristics using Deletion/Substitution/Addition algorithm (DSA) in R statistical package.
Results: Respondents were 80% female with a mean age of 47; 87% were non-smokers; 41% had ≥ 20 years experience as a flight attendant. Health complaints reported as lasting >4 of the past 7 days included sleep problems (35%), all types of musculoskeletal pain (between 23-28%), sinus congestion (28%), fatigue (26%), anxiety/stress (20%) and bloating (20%). The most common conditions associated with seeking medical care in the past year included respiratory (55%), fatigue (37%), diffuse joint pain (33%) and neurological (17-19%). The most prevalent diagnoses included low back pain (52.6%), allergies (39%) depression/anxiety (36%), and sleep disturbances (34%); approximately 1/5 of respondents who reported these conditions were receiving treatment for these problems. Regression analysis of prevalent conditions showed that fatigue, musculoskeletal problems, neurological and psychological problems are significantly associated with greater flight hours.
Conclusions: Several health problems affected a significant portion of the flight attendants. These conditions may affect the safe performance of the work, representing further risk to both crew and passengers. More research on the association between workplace exposures and crew health must be undertaken.

INTERACTION EFFECTS BETWEEN MATERNAL PRENATAL VITAMIN INTAKE AND PYRETHROID PESTICIDE EXPOSURE IN RELATION TO AUTISM SPECTRUM DISORDERS IN THE CHARGE CASE-CONTROL STUDY

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Background and Aims: Autism spectrum disorder (ASD) is an increasingly prevalent neurodevelopmental disorder affecting 1:110 children in the United States (CDC, 2009). Evidence supports large heritable contributions to the etiology of ASD, though environmental factors are likely to modify both the development and the course of ASD. Prenatal nutrient-environment interactions are unstudied in relation to autism etiology and risk. The objective of this study is to examine interaction effects between maternal supplemental nutrient intake and pyrethroid pesticides in relation to ASD.
Methods: Northern California families were enrolled from 2003-2009 in the population-based case-control CHARGE (Childhood Autism Risks from Genetics and the Environment) Study. Children aged 24-60 months were evaluated and confirmed to have autism (n=288), autism spectrum disorder (n=141), or typical development (n=278) at the M.I.N.D. Institute using standardized clinical assessments. Maternal prenatal vitamin intake before and during pregnancy and use of products containing pyrethroid pesticides were retrospectively collected through telephone interviews. Adjusted odds ratios (OR) were estimated for associations between ASD and combinations of prenatal vitamin and pyrethroid pesticide exposure.
Results: Estimated risk for having a child with autism when mothers did not take a prenatal vitamin and were exposed to pyrethroid pesticides during pregnancy (OR=5.4, 95% CI: 2.4-11.9) was over twice what was expected for that combination by either an additive (OR=2.2) or multiplicative model (OR=2.6). Though still significantly elevated, the observed risk for having a child with ASD associated with pyrethroid exposure during pregnancy was much lower if the mother reported taking a prenatal vitamin during the period around conception (OR=1.7, 95% CI: 1.0-2.8).
Conclusions: These findings suggest that vitamin supplements taken before or early in pregnancy could potentially reduce the risk of ASD associated with pyrethroid pesticides. Further studies are warranted.
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POSTNATAL MERCURY AND LEAD EFFECTS UPON VISUAL-MOTOR DEVELOPMENT IN MEXICAN ADOLESCENTS

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Background and Aims: Mercury and lead, two established neurodevelopmental toxicants, comprise two of the top three chemicals of concern on the EPA/ATSDR Priority List of Hazardous Substances. Yet, there is limited epidemiological data regarding the relationship, including potential interactions, between mercury and lead exposure upon neurodevelopmental outcomes in children. The objectives of this study were to determine the associations between biomarkers of postnatal mercury and lead exposure and visual-motor development in adolescents aged 13-15 years living in Mexico City.

Methods: The Wechsler Abbreviated Scale of Intelligence and the Wide Range Assessment of Visual Motor Activity (WRAVMA) were used to assess children's cognitive and visual-motor development. Biomarker levels for lead and mercury were collected via ICP-MS and DMA-80. Data were analyzed using generalized linear models adjusting for maternal age, maternal IQ, child's IQ, sex, and child's age.

Results: In the 135 eligible adolescents, aged 13-15 years, mean levels of total mercury in blood, hair, and urine were:1.43 µg/L, 0.39 µg/g, and 0.60 µg/L; and whole blood lead levels were 3.21 µg/dL, respectively. A one-log increase in concurrent blood lead and mercury levels resulted in a -4.08 (95%CI -7.58, -0.59) and -2.86 (95%CI -5.85, 0.13) decrease in the WRAVMA composite score, respectively. Inclusion of hair mercury levels, instead of blood mercury, resulted in a stronger, more significant adverse relationship with the WRAVMA composite score. While no significant interactions between blood lead and mercury were detected with the WRAVMA, there was a significant positive interaction term (p-value=0.04) between hair mercury and blood lead levels.

Conclusions: Our study demonstrates adverse relationship between concurrent biomarkers of methylmercury exposure, blood lead, and adolescence's visual motor development.

ETHICAL CONCERNS IN USING PUBLIC DATA SOURCES: ISSUES IN ACCESS AND LINKAGE

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Background and Aims: Public health research and practice often have been facilitated through the evaluation and study of population-based data collected by local, state and federal governments. However, recent concerns about identify theft, confidentiality, and patient privacy have led to increasingly restrictive policies on data access, often preventing researchers from using these valuable data. We believe that these restrictions, and the research impeded or precluded by their implementation and enforcement, have had a significant negative impact on important public health research. Further, the details of the regulations vary greatly across the administrative jurisdictions that control access and manage the data. We present a case study.
Methods: We requested individual level birth certificate data from several states for use in a series of analyses investigating the possible association between environmental exposures and birth outcomes using public data. We also explored some strategies to overcome some of the access obstacles without violating the regulations.
Results: Some states provided exact maternal residential locations and residential histories, enabling us to conduct the planned analyses, while others would not release precise maternal residence location, limiting our ability to link birth outcomes to local neighborhood and environmental quality data. We developed data linkage approaches with some states that enabled us to obtain the desired results without complete individual level data records.
Conclusions: Limited access to routinely collected health related data limited our ability to conduct studies assessing the effects of environmental exposures. In some instances, but not all, we were able to achieve our goals with particularly cooperative health departments. We welcome input on the experiences of others and ideas for overcoming these barriers. This session will be a moderated open forum to discuss the ethical dilemmas around using public data sources with a focus on identifying emerging priorities from the papers presented in this session.

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ACUTE EFFECTS OF OZONE AND PM_{10} ON PEAK EXPIRATORY FLOW: A PANEL STUDY OF SCHOOLCHILDREN IN THE WESTERN BRAZILIAN AMAZON

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Background and Aims: Epidemiological studies suggest significant effects on health caused by exposure to air pollutants. The purpose of this study was to evaluate the acute effects of exposure to O_3 and to PM_{10} in the peak expiratory flow (PEF) of schoolchildren, in the western Brazilian Amazon.

Methods: Panel study with a sample of 279 schoolchildren from 6 to 15 years old. Repeated measures of PEF were carried out during 97 days, in the dry season. Daily measurements of O_3, PM_{10}, temperature, humidity as well as respiratory symptoms were recorded. Other individual characteristics, such as weight, height, and spirometry were measured. Further, a questionnaire was answered by child's responsible. The analysis was based on mixed effects models. The effects of pollutants were evaluated considering levels on the current day, 1 to 3 days lag and cumulative effects of 2 and 3-days. The variance function of random error was estimated.

Results: The overall average of the PEF was 276.53 l/min. Averages of PM_{10} ranged from 6.1 to 108.6 $\mu g/m^3$ and averages of O_3 varied from 0.25 to 57.25 $\mu g/m^3$. The estimated models consisted of: i) temporal trends, temperature and humidity lagged by 2-days, fitted via quadratic parametric splines with random coefficients; ii) respiratory symptoms with random coefficients; iii) individual characteristics such as height, weight, gender, asthma diagnosis (ISAAC), and the ratio FEV1/FVC. Adjusted models revealed significant effects of the exposure to PM_{10} and O_3. For each increase of $10\mu g/m^3$, there was a reduction in the PEF average ranging from 0.72 to 0.83 l/min for PM_{10} on the 3 days lag. For an increase of $10\mu g/m^3$ of O3, the PEF average decrease varied between 2.28 to 4.26 l/min for all exposure evaluated, except for the current day levels.

Conclusions: We observed a significant association between PEF and levels of air pollutants.

Cancer mortality among Brazilian soybean agricultural workers

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Background and Aims: Currently, Brazil is the largest consumer of pesticides in the world, and soybean crops are the main destination of this very intensive consumption of pesticides. In addition, Brazil is the second largest producer of soybean in the world. Although soybean production has been increasing over decades and is a major target of pesticide use in Brazil, few studies were devoted to investigate the health of Brazilian soybean agricultural workers.
Methods: Therefore, this study was designed to compare cancer mortality among agricultural workers living in regions of intensive production of soybean with that experienced by three reference populations: residents of the same area, but not agricultural workers; agricultural workers of regions not producing soybeans; and non-agricultural workers of areas not producing soybeans. To do so, mortality odds ratios (MOR) were calculated, stratified by sex and age, for several types of cancer, according to the Chapter II of International Classification of Diseases, 10th edition.
Results: Female agricultural workers living in regions of intensive production of soybeans had a higher risk to die by melanoma (MOR: 2.99, 95% CI 1.72 to 4.58) and esophageal cancer (MOR: 2.11 , 95% CI 1.58 to 2.66), when compared to non-agricultural population of areas not producing soybeans. In addition, male agricultural workers were at higher risk to die by melanoma (MOR: 4.10 95% CI: 3.32 to 5.08) and bladder cancer (MOR: 2.23, 95% CI: 1.88 - 2.64), if compared with agricultural workers of areas not producing soybeans.
Conclusions: Results of the present study suggest that agricultural workers from regions of intensive production of soybean in Brazil maybe be at higher risk to die by specific cancers. It also indicates that this possible association should be further investigated.

PROXIMITY TO INDUSTRIAL PLANTS, NEIGHBOURHOOD SOCIO-ECONOMIC CHARACTERISTICS AND THE RISK OF INFANT MORTALITY – A BAYESIAN ANALYSIS IN LYON, FRANCE

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Background: Exposure to environmental nuisances is suspected to explain a part of social health inequalities. Recent literature data suggest that perinatal health might be affected by air pollution and industrial emissions.
Objective:To investigate the association between infant mortality and proximity to polluting industries and to explore the role of socio-economic characteristics in this relation.
Methods: An ecological study was conducted in Lyon (1,260,348 inhabitants, France). Location of industry plants was drawn from the French database of the European-Pollutants-Emission-Registry. A proximity index was constructed using the buffer method. We used census data to characterize neighborhood socioeconomic status. Mortality information is collected at the French-census block level (n=510). A Bayesian approach was applied to consider spatial dependence and the high mortality rates variability; a Poisson model was accommodated to test the association between infant mortality and proximity to industries.
Results:There were 714 infant death cases in Lyon between 2000 and 2009 (average rate of 4.1 per 1000 live births). A significant interaction was found between the proportion of single-parent families and the proximity to industries using a buffer of 500 meters. The risk of infant mortality is significantly greater among census blocks with at least one industry compared to where is no local industry, but only when the proportion of single families in the census block population is “high” (greater then 15,9%): RR=1.32 (p-interaction=0.036). No significant association was shown with the level of unemployment or of education.
Conclusion: This observation may result from a greater exposure to industrial pollution due to a higher number of industries in the deprived census blocks. It could also stem from a vulnerability phenomenon whereby residents might be more sensitive to the effect of exposure because of a poorer health status and/or lower access to appropriate care. More refined analyses are underway to identify the most plausible explanations.

AIR QUALITY IMPLICATIONS OF ALTERNATIVE FUELS: A SPATIALLY AND TEMPORALLY EXPLICIT LIFECYCLE MODELING APPROACH

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Background and Aims: The current US Renewable Fuel Standard (RFS2) requires increasing amounts of biofuel production through 2022. We use lifecycle assessment, air dispersion modeling, and health risk assessment to estimate air pollution-related health impacts of an additional 7.5 billion gallons of corn grain ethanol and 5 billion gallons of cellulosic ethanol from corn stover.
Methods: *Emissions* – Process-specific emissions for the lifecycle of fuel production and use were extracted from the GREET lifecycle model and allocated to a 12km grid over the continental US, in one hour time steps, during a 1-year model simulation. The lifecycle analysis included feedstock production (mining, farming, or harvesting), conversion to fuel, distribution, and combustion in vehicles, plus the necessary inputs, such as fossil fuels, electricity, and fertilizer, for each step. *Air dispersion* – A state-of-the-science photochemical air dispersion model (CAMx) predicts the fate and transport of emissions, estimating marginal pollution changes attributable to RFS2. We focus here on $PM_{2.5}$ and ozone. *Health risk assessment* – Our mortality estimates employ concentration-response functions from Pope et al. (2002) for $PM_{2.5}$ and from Bell et al. (2004) for ozone, using EPA's BENMAP model.
Results: Preliminary results suggest that the RFS2 ethanol scenario will annually yield 23 more deaths due to ozone, and 112 more deaths due to $PM_{2.5}$, relative to an energy equivalent amount of gasoline. This is equivalent to a value of statistical life (VSL) based increase in public health burden of 0.09 USD per gasoline equivalent gallon (0.02 USD/liter).
Conclusions: Preliminary results suggest that the RFS2 will worsen air-quality and related mortality in the US. However, transportation fuel choice impacts society in many ways, and it is important to quantify and compare all impacts when considering changes in fuels.
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CARDIOPULMONARY EMERGENCY HOSPITAL VISITS WERE ASSOCIATED WITH NO_2, PM_{10} AND H_2S LEVELS IN ICELAND'S CAPITAL AREA DURING 2006-2010

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Background and Aims: Air quality in Iceland's capital region is generally good, but following the spring 2010 volcanic eruption of Eyjafjallajökull natural particle matter (PM) storms reaching Reykjavik have increased in severity. Another pollution concern is hydrogen sulfide (H_2S) emitted from geothermal harnessing plants located east of Reykjavik. The aim of this time series study was to analyse the association between daily air pollution levels and emergency room (ER) visit rates and determine if volcanic dust modified that association.

Methods: The daily number of all ER visits to Landspítali University Hospital for the period 1st of January 2003 to 31st December 2010 for cardiovascular, pulmonary and cerebrovascular diseases in adults (≥18 years old) was extracted from the patients file register. Pollution and weather data were provided by local authorities. Regression analysis was performed with a multipollutant generalized additive model (GAM) using Poisson distribution. Individual lags were included for each pollutant for same day (lag0), lag1 and lag2. Results were adjusted for traffic pollutants nitrogen dioxide (NO_2) and ozone (O_3), influenza epidemics, weather variables and time trends.

Results: During the study period, there were 17700 ER visits (53% males), median number of ER visits per day was 5 (Quartile (Q)1-Q3: 3-8). The most common diagnosis category was Cardiac (53%), followed by Pulmonary (31%) and Stroke (17%). A positive association was found between ER visit rates and NO_2 levels on the same day, RR 1.04 (95% CI 1.01 1.07) per 10 $\mu g/m^3$ increase; and PM_{10} and H_2S levels two days before, RR 1.01 (95% CI 1.00 1.02) and RR 1.04 (95% CI 1.01 1.07) per 10 $\mu g/m^3$ respectively.

Conclusion: In this preliminary analysis, significant associations between ER visits for cardiovascular, pulmonary, cerebrovascular diagnoses and NO_2, PM_{10} and H_2S levels were found. Immediately, no effect modification was seen during the Eyjafjallajökull volcanic eruption.

PREDICTING AIR EXCHANGE RATES AND PARTICLE LOSSES INSIDE VEHICLES

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Background and Aims: Ultrafine particle (UFP) losses inside vehicles are strongly negatively correlated with air exchange rate (AER), but the literature only reports AER measurements for 16 vehicles total during real-world driving. UFP losses cannot be predicted without knowing AER, but AER is a complicated function of vehicle characteristics and speed. We used improved AER measurement methods to test a much larger, representative sample, from which we developed predictive models of AER and UFP losses.
Methods: A 60-vehicle sample was selected to be representative of the California fleet in terms of age, mileage, and model. We measured CO_2 build-up rates from vehicle occupants and then calculated AER from equilibrium CO_2 concentrations (where occupant CO_2 production balanced CO_2 removal rates due to AER). AER was then correlated with particle loss fractions for a subset of 90 AER measurements. Predictive models for both AER and particle loss fraction were developed.
Results: A predictive model for AER using only vehicle age, mileage, speed, and manufacturer (all easily ascertained information) could account for 70% of the variation in AER in the low AER recirculation (RC) conditions. Across all AER conditions (RC or outside air [OA]), nearly 90% of AER variation was explained. AERs ranged from ~0 to 145 hr^{-1}, and UFP losses correspondingly ranged from nearly 100% to 40%. Using only the ventilation setting (OA or RC), relative fan setting (for OA), speed (for RC), and vehicle age, 87% of the variability in particle loss was explained.
Conclusions: Our models successfully predict AER and expected UFP concentrations as functions of easily-obtained vehicle characteristics, thus are useful for epidemiological studies. Variables include occupant choice of ventilation setting (OA or RC), vehicle age and mileage, speed, and fan setting. These models will be used in an upcoming cohort of Los Angeles commuters to predict UFP exposure.

LUNG FUNCTION, RESPIRATORY AND MENTAL SYMPTOMS AMONG INHABITANTS EXPOSED TO VOLCANIC ASH FROM THE EYJAFJALLAJÖKULL ERUPTION, ICELAND

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Background and aims: The explosive eruption of the Eyjafjallajökull volcano, 14 April to 20 May 2010, produced abundant fine-grained ash, some estimate 8 million tons of particles 2.8-28 µm in diameter. Residents of the rural region near the volcano were heavily exposed to volcanic ash, of which possible health risks are little known. This study aimed to estimate effects of exposure to ash from Eyjafjallajökull to near-by residents' health.
Methods: After ashfall ceased, all residents in the most affected areas were invited for a medical examination, spirometry and questionnaires about mental and physical health and use of protective equipment. Parents reported symptoms in their children. The study was conducted in the affected area from 31 May to 11 June 2010.
Results: Altogether 167 adults (83 men, 84 women), and 40 children (<18 years) participated. According to local health officials, most residents of the area participated. In questionnaires, 46% of adults reported irritation symptoms from nose and throat, 27% eye irritation, when exposed to ash. Less common were shortness of breath (23%) and nausea (7%). In children, throat irritation was most common (28%). Less than 10% reported symptoms of stress, anxiety or depression in the previous week. Almost all (98%) had used outdoor protective equipment during ash fall. Altogether 18% showed abnormal results when lung function was tested (both pre- and porstbronchodilator testing) according to a standardized protocol (www.boldstudy.org). Spirometry results are being compared to an age- and gender matched general population sample. According to physician's reports, those with preexistions conditions, respiratory or mental, were prone to experiencing adverse symptoms following the eruption.
Conclusions: No severe immediate health effects (hospitalizations or fatalities) could be attributed to ash exposure. Individuals with history of respiratory or mental disease were more likely to experience adverse symptoms.
References: Burden of Lung Disease (BOLD). www.boldstudy.org. 2011.

VALIDITY OF INSTRUMENTS TO MEASURE PHYSICAL ACTIVITY MAY BE QUESTIONABLE DUE TO A LACK OF CONCEPTUAL FRAMEWORKS: A SYSTEMATIC REVIEW

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Background and Aims: Regulators' guidance documents for the development and validation of patient reported outcomes (PROs) advise the use of conceptual frameworks, which outline the structure of the concept that a PRO aims to measure. It is unknown if currently available PROs are based on conceptual frameworks. This study, limited to a specific case, aimed (i) to identify conceptual frameworks of physical activity in chronic respiratory patients or similar populations (chronic heart disease patients or the elderly), and (ii) to assess if the development and validation of PROs to measure physical activity in these populations were based on a conceptual framework of physical activity.
Methods: Two systematic reviews were conducted through search in Medline, Embase, Psychinfo, and Cinahl databases up to January 2010.
Results: In the first review only 2 references, identified from 581 references about physical activity in the defined populations, provided a conceptual framework of physical activity in COPD patients. In the second review, out of 103 studies developing PROs to measure physical activity or related constructs, none of them was based on a conceptual framework of physical activity.
Conclusions: These findings raise concerns about how the large body of evidence from studies that use physical activity PRO instruments should be evaluated by health care providers, guideline developers, and regulatory bodies.

This work was conducted within the PROactive project which is funded by the Innovative Medicines Initiative Joint Undertaking [IMI JU # 115011]. Judith Garcia-Aymerich has a researcher contract from the Instituto de Salud Carlos III (CP05/00118), Ministry of Health, Spain. CIBERESP is funded by the Instituto de Salud Carlos III, Ministry of Health, Spain.

ASSESSING REAL-TIME RELATIONSHIPS AMONG PHYSICAL ACTIVITY, GREEN SPACE, AND COMMUNITY DESIGN IN CHILDREN

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BACKGROUND AND AIMS: Community design to promote active living may increase physical activity and reduce obesity. The mechanisms, however, by which the built environment affects behavior are not well understood. Through the Healthy PLACES study near Chino, California, we collected objective mobility and activity data with global positioning system (GPS) and accelerometer units to study cross-sectional and longitudinal associations among community design, micro-environments, and physical activity. This 4-year, quasi-randomized, natural experiment monitors personal behavior in free-living settings for 800 participants who either recently moved to a newly developed smart-growth community or reside in nearby conventional communities. Continuous personal monitoring presents new challenges for data processing. We highlight key methods from the literature and our own experience for processing biomonitoring data. We also present results associating a remotely-sensed indicator of green space, the Normalized Difference Vegetation Index (NDVI), with physical activity
METHODS: We analyzed GPS and accelerometer measures of neighborhood activity for 208 children (30-second epochs, 7 days). Geovisualizations including kernel density surfaces of moderate-vigorous physical activity (MVPA) were generated to detect spatial patterns. We tested the effect of green space (measured by NDVI) on the within-person variation of physical activity based on 30-second epoch data in a multilevel model clustered on the individual. We included a moving average term on MVPA to address lack of independence among momentary measures.
RESULTS: Geovisualization showed MVPA patterns in proximity to neighborhood green spaces. In modeling, we found NDVI positively associated with MVPA on a momentary basis (p-value < 0.001). For greener locations the odds of MVPA increased by 35% over the 10-90th percentile increment of exposure. We found a significant interaction with the smart-growth design, with effects of green space being larger there.
CONCLUSION: Using objectively-measured physical activity and locational data we demonstrated a strong association between elevated physical activity and green space.

ASSESSING THE ASSOCIATION BETWEEN AIR POLLUTION FROM INDUSTRIAL CHEMICAL COMPLEX "RANAT HOVAV", ADULT MORBIDITY AND MORTALITY IN SOUTHERN ISRAEL USING AN INTEGRATED COMPUTERIZES INFORMATION SYSTEM

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Background: The existence of causal associations between levels of industrial air pollutants, morbidity and mortality is well established. This study evaluated the feasibility of establishing and maintaining an ongoing integrated computerized information system (ICIS) to estimate and monitor association between mortality rates among Jewish and Bedouin adult population of the Negev, and environmental air pollution by about 100 chemicals, from air monitoring stations of the industrial complex Ramat Hovav (RH).

Methods: We intend to develop the ICIS system for monitoring chronic diseases morbidity and all-causes and cause-specific mortality in the Negev region, for adult Jews and Bedouins in the Negev based on the linkage of several data sources in an ongoing manner. These are; a) Beer-Sheva regional office of Ministry of Health (MOH) computerized mortality database (mortality causes, socio-demographic details, place of residence since 2004 and occupation from personal interview); b) A sample of the Health maintenance Organization's Negev population; c) Soroka Hospital hospitalizations records; d) Data of air pollutants emissions from RH by date.

Results: The current analysis was based on data for sample of 100,000 health insured Jewish and Bedouin patients (the settlements served as a statistical unit), mortality data from MOH and air pollutant concentrations, as recorded by monitoring stations of RH for 2007-2010. The overall and cause-specific mortality rates were calculated, continuous air pollution values were cut off by national "Almog" and international Texas reference. Data was linked to measurements of air pollutants from the air dispersion AERMOD models using GIS.

Conclusions: Low rates of excess pollutant levels were shown. Since the long-term exposure to low doses environmental hazards have important impact on human health we intend to use the air pollutants concentration in their original continuous scale in future work and meteorological data will also be taken into account.

LUNG FUNCTION AND AIR POLLUTION IN AUSTRALIAN SCHOOL-CHILDREN

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Background and Aims: Motivated by the review of Australian air quality standards, we aimed to quantify the effect of air pollution on lung function in a national sample of Australian school-children.
Methods: Nationally monitored data was assembled for a recent five-year period, and 30 sites chosen to maximise variation in exposure to 'criteria' pollutants. Two schools were chosen from each site, within 2.5 km of monitoring site. We recruited 50-60 children per school and obtained a sample of 3,200 children. Children had to live and go to school within a 2.5 km radius of the air monitoring stations. GEE models were used to examine associations after adjustment for design factors and covariates. Multi-pollutant models were examined.
Results: Lung function was significantly adversely affected by NO2 with declines in pre-bronchodilator FEV1, post-bronchodilator FEV1, and FVC of 26.2 ml/s (95% CI 10.1-42.2) , 25.9 ml/s (10.4, 41.4) and 25.3ml (10.0-40.6), respectively, per IQR of mean NO2 over the last 12 months. Results were similar for mean lifetime exposure, and when other pollutants were adjusted for. SO2 showed adverse effects in atopic children and in males. Mean lifetime NO2 levels were 9.3 ppb (range 2.8 – 18.3 ppb).
(Need to add something re particle results – weak associations for limited outcomes as this something that they will be interested in).
Conclusion: Long-term exposure to NO2 reduces lung function in Australian school-children at levels below current air quality standards.

PRENATAL MERCURY EXPOSURE AND ANTHROPOMETRIC MEASURES AT BIRTH

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Background and Aims: Prenatal exposure to high levels of mercury has been associated with adverse reproductive outcomes. However, results are inconsistent regarding if moderate chronic exposure, mainly due to elevated fish consumption, has an effect on newborn anthropometry. To assess the association between prenatal mercury exposure and anthropometric measures at birth in a multicenter population based birth cohort.
Methods: Between 2004 and 2008, 2506 mothers gave a live birth in the context of a mother and child cohort study (INMA) in four Spanish areas (Valencia, Sabadell, Asturias, and Gipuzkoa). The study population included 1886 children with available T-Hg determination in cord blood samples. Maternal characteristics and estimated fish intake were obtained through questionnaires. Birth weight, length and head circumference were standardized for gestational age by sex. The association between T-Hg and anthropometry was ascertained using linear and logistic regression and meta-analysis.
Results: Overall, T-Hg (geometric mean 8.2 µg/L) was not significantly associated with birth outcomes; however, all models showed negative patterns and adjustment for fish intake groups decreased the coefficients in all of them. The effect of T-Hg on birth weight was heterogeneous between cohorts (I^2>50%): higher T-Hg levels were significantly associated with lower birth weight in the Mediterranean areas (Valencia and Sabadell), but not in the Atlantic ones (Asturias and Gipuzkoa). Higher T-Hg was also related with lower birth length in Sabadell. When T-Hg was categorized in quartiles, the main differences were found between the first (<5 µg/L) and the fourth quartile (≥15 µg/L).
Conclusions: Prenatal exposure to Hg may be related with restricted size at birth. Heterogeneity in the relation between mercury exposure and birth weight deserves further investigation.
Funding sources: Instituto de Salud Carlos III, Spanish Ministry of Science and Innovation, Generalitat Valenciana, Generalitat de Catalunya, Gobierno Vasco and Fundacio Roger Torné.

Background . Perchlorate is a w idely occurring contaminant. At sufficiently high doses, perchlorate competitively inhibits iodide uptake and thus thyroid hormone production. The health effects of chronic low dose perchlorate exposure on healthy individuals are largely unknown.

Objectives. We undertook a community-based epidemiologic study to compare thyroid function and disease in women w ith differing likelihoods of prior and current perchlorate exposure.

M ethods. Residential blocks were randomly selected from areas: 1) in the drinking water plume with potential perchlorate exposure; 2) with potential exposure to airborne environmental contaminants; and 3) neighboring but without such know n exposures. Eligible w omen had lived in the area for ≥6 months and were aged 20-50 years during 1988-1996 (during documented drinking w ater well contamination). We interview ed 814 w omen and collected blood samples (assayed for thyroid stimulating hormone [TSH] and free thyroxine [fT4]) from 431 interview ed w omen. Daily urine samples were collected, pooled, and assayed for perchlorate and iodide for 178 interview ed premenopausal w omen w ho provided blood samples. We performed multivariate regression analyses comparing thyroid function and disease by residential area and modeled urinary perchlorate dose in relation to TSH, fT4, and thyroid disease adjusted for urinary iodide levels.

Results. Residential location and computed current perchlorate dose were not associated with thyroid function or thyroid disease. Computed perchlorate dose did not exceed reference dose in any participants.

Conclusions. No persistent effect of perchlorate on thyroid function or disease w as found several years after contaminated w ells w ere capped.

AIR POLLUTION FROM INDUSTRIAL SWINE OPERATIONS AND BLOOD PRESSURE IN NEIGHBORING RESIDENTS

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Background and Aims: Industrial swine operations emit odorant chemicals including ammonia, hydrogen sulfide, and volatile organic compounds. Malodor and pollutant concentrations have been related to self-reported stress and altered mood in prior studies. Because blood pressure responds to environmental stressors, we conducted a longitudinal study of hog odor, pollutant levels, and blood pressure of swine operation neighbors.
Methods: For approximately two weeks, 101 non-smoking adult volunteers living near industrial swine operations in 16 neighborhoods in eastern North Carolina, USA, sat outdoors for 10 minutes twice daily at pre-selected times. Afterwards, they reported levels of hog odor on a 9-point scale and measured their blood pressure twice using an oscillometric, automated device. Simultaneously, we measured ambient levels of hydrogen sulfide (H_2S), particulate matter (PM_{10}), and semi-volatile PM_{10} ($SVPM_{10}$) at a central location in each neighborhood. Relationships between systolic and diastolic blood pressure (SBP, DBP) and pollutant measures were assessed using fixed effects (conditional) linear regression with adjustment for time-of-day.
Results: Hog odor during the 10 minutes outside was reported present on 59.4% of study days; hourly H_2S varied from 0 to 90 ppb. On average, DBP (±standard error) increased 0.23±0.08 mmHg/unit of reported hog odor during the 10 minutes outdoors and 1.16±0.77 mmHg for every 10 ppb increase of H_2S concentration in the same hour; it was not associated with hourly PM_{10} or $SVPM_{10}$. SBP increased 2.88±1.18 mmHg per 10 ppb increase of H_2S in the same hour, while it was not associated with odor reported during the 10 minutes outdoors nor with hourly PM_{10} or $SVPM_{10}$.
Conclusions: Like noise and other environmental stressors, malodor may be associated with repeated acute blood pressure increases that could contribute to development of chronic hypertension. We will discuss the modifying influences of antihypertensive medication use and coping style.

A COMPREHENSIVE ANALYSIS OF DNA METHYLATION IN HEAD AND NECK SQUAMOUS CELL CARCINOMA INDICATES DIFFERENCES BETWEEN VIRAL AND CHEMICAL INDUCED CARCINOGENESIS

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Background: Head and neck squamous cell carcinomas (HNSCC) are the eighth most commonly diagnosed cancers in the U.S population. The risk of developing HNSCC is increased with exposure to tobacco, alcohol and infection with human papilloma virus (HPV). HPV-induced cancers have a distinct risk profile as well as improved prognosis compared to chemically induced cancers associated with tobacco exposure and alcohol use. Epigenetic changes are an important mechanism in carcinogenic progression, but how these changes differ between viral- and chemical-induced head and neck cancers remains unknown.

Methods: We quantified CpG methylation at 1505 CpG sites across 807 genes in 70 well-annotated HNSCC tumor samples from the University of Michigan Head and Neck SPORE patient population using the Illumina Goldengate Methylation Cancer Panel. CpG methylation levels at each locus were normalized based on probe length and guanine-cytosine content.

Results: Unsupervised hierarchical clustering based on methylation values identified 3 distinct tumor clusters, which were found to significantly differ by age and smoking status. HPV status did not differ between clusters, indicating some common shared epigenetically-regulated pathways between chemically- and HPV-induced tumors. Weighted linear modeling was used to identify differentially methylated genes based on epidemiological characteristics. Consistent with previous *in vitro* findings by our group, methylation of sites in the *CCNA1* promoter region was found to be significantly higher in HPV+ tumors. After adjusting for cancer site, stage, age, gender, alcohol consumption, and smoking status, HPV status was found to be a statistically significant predictor for DNA methylation at an additional 11 genes, including *CASP8* and *SYBL1*.

Conclusions: Findings from this study provide insight into the epigenetic regulation of viral vs. chemical carcinogenesis and could provide novel targets for development of individualized therapeutic regimens based on environmental exposures.

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TRANSPORTATION, AIR POLLUTION AND PHYSICAL ACTIVITIES (TAPAS): GENERAL DESCRIPTION OF THE 6-CITY ACTIVE TRAVEL POLICY INTEGRATED HEALTH RISK ASSESSMENT PROGAM

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on behalf of the TAPAS consortium.*

Background: Active travel policies can address some of the greatest global public health challenges - physical inactivity and urban air pollution - while generating multiple co-benefits. Risks may also arise for some who shift to active travel and increase air pollution inhalation and traffic hazard exposure. TAPAS aims at assessing health impacts of such policies in an integrated framework in 6 case-study cities: Barcelona, Basel, Copenhagen, Paris, Prague, and Warsaw.
Methods: TAPAS operates at the interface of policy and scientific research. Program steps include: 1) development of a conceptual framework linking active travel policies to health, 2) expert international workshop assessing conceptual framework and state-of-the art knowledge on relevant exposure-response functions; 3) criteria development for identifying policies of interest in case-study cities; 4) local stakeholder involvement to confront potential choice of policies with local needs and interest; 5) identification of commonalities across case study policies for comparable assessments; 6) identification of local data sources for model inputs; 7) quantitative model development. Also, TAPAS case-study city partners develop specific research projects to provide new knowledge filling research gaps in the current framework.
Results: Steps 1-2 have been reported (de Nazelle et al. 2011). Candidate policies were classified in terms of a) known or quantifiable effectiveness, b) local and international interest, and transferability to other cities; c) time and scale of implementation. TAPAS partners identified policies of greatest interest (see accompanying posters), from which the most common themes were selected for preliminary assessments: Bike -lane network; Bike parking; inter-modality; traffic-calming; pricing (parking/congestion); bike sharing systems. A preliminary quantitative model was built and will be populated with local data.
Conclusion: TAPAS is viewed as a useful framework by stakeholders. It will provide an evidence-base for designing policies that encourage a shift to active transportation providing physical activity and other health benefits and mitigate risks.

*Others include: Hala Nassif, David Rojas-Rueda, Charlotte Braun-Fahrländer, Jaume Matamala, Geoffroy Berthelot, Corinne Praznoczy, Michelle Mendez, Josep Maria Anto.

Stress and Menstrual Cycle Characteristics

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Background:

Menstrual cycle patterns are often used as indicators of endocrine function. There is increasing interest in the relationship between the impact of stress on fecundity within the context of environmental stressors. This analysis addressed the effect of stress on the menstrual cycle characteristics.

Objectives: To prospectively assess the relationship between salivary stress biomarkers (cortisol and alpha-amylase) and menstrual cycle characteristics in a cohort of women attempting conception.

Methods: Three hundred and seventy women contributed 1088 cycles for analysis; all provided basal saliva samples for the measurement of cortisol (mg/dL) and alpha-amylase (U/ml) on day 6 of each cycle and completed daily diaries on menstruation until either a human chorionic gonadotropin confirmed pregnancy or the women completed 6 menstrual cycles without conception. A linear regression model with a mixture distribution was used to identify the association between stress levels and variations in menstrual cycle: follicular and luteal phase lengths after adjusting for age (years) at menarche and at enrollment and body mass index.

Results: A 2-day increase in menstrual cycle length for 1 mg/dL increase in cortisol level was estimated for women [$\beta = 1.93$; 95% CI (0.21, 3.66)]. Also, a 3-day increase in luteal phase length was estimated for 1 mg/dL increase in salivary cortisol level in women [$\beta = 2.94$; (95% CI 0.63, 5.24)]; no significant association was observed for follicular phase length, nor any significant associations were observed for alpha-amylase.

Conclusion(s): Stress as measured by cortisol significantly increased cycle length, especially during the luteal phase. Understanding the nature of association between stress and menstrual variability will enable improved understanding of the causes of reproductive problems, such as infertility.

PRENATAL MOLYBDENUM EXPOSURE AND INFANT NEURODEVELOPMENT IN MEXICO

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Background and Aims: Molybdenum (Mo) is a naturally occurring element, considered an essential dietary nutrient in humans and animals. Information about its possible adverse health effects is scarce. Our aim was evaluate the association between prenatal Mo exposure and neurodevelopment of Mexican children, during the first 30 months of age.
Methods: In 2000-2009 we carried out a cohort study in the state of Morelos, Mexico with the objective to evaluate prenatal organochlorine exposure and child neurodevelopment. During pregnancy, each mother was monitored and interviewed about diet and health aspects related with her pregnancy evolution; from each we obtained a spot urine sample at least in one trimester. We evaluated Mental and Psychomotor indexes of the Bayley Scales for Infant Development from 1 to 30 months of age of children without perinatal complications. For this report, maternal Mo urine concentrations were determined by electrothermal atomic absorption spectrometry in a random subset (n=106). As potential confounders, we considered quality of the home environment, maternal IQ, birth weight, sex of child, and maternal lead levels. Separate generalized mixed effects models were used to estimate the effect of Mo exposure on mental and psychomotor neurodevelopment.
Results: Mo Geometrics mean ranged from 32.0 to 52.9 μg/L; significant higher levels were observed during the second trimester in comparison to first and third trimester ($p<0.05$). Doubling the Mo concentration during the 3rd trimester was associated with a significant reduction ($\beta=-0.73$) in mental development. A similar change of Mo levels at 1st trimester was associated with significant decrease in psychomotor development ($\beta=-0.85$).
Conclusions: This is the first report suggesting a negative association between prenatal Mo exposure and infant neurodevelopment. Mo levels observed are similar to those reported by CDC and a recent study with Mexican children. Further and larger studies are needed to confirm these findings.

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DECIDUOUS TOOTH DENTINE AS A BIOMARKER OF PRENATAL MANGANESE EXPOSURE

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Background: Absence of a suitable biomarker of prenatal Mn exposure remains a major obstacle for epidemiologic studies.

Methods: Data are presented from two long-term cohorts. The Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS) study based in California, USA, recruited pregnant women before 20 weeks gestation and collected environmental and biological matrices, including shed deciduous teeth, prospectively over a period of ~8 years to evaluate environmental Mn exposures from agricultural use of Maneb and Mancozeb fungicides. In Italy, a group of children aged 11-14 years were recruited from Valcamonica, where Mn exposure from ferroalloy plants occurred until 2001, and from a reference area. Using laser ablation-ICPMS, tooth Mn (as $^{55}Mn:^{43}Ca$) was measured in pre- and postnatally formed regions of 31 deciduous teeth from the CHAMACOS study and compared with concentrations and loading in house dust collected at the 26th gestational week as well as cord blood, and maternal and child blood and urine. Analyses of >300 teeth are underway. In the Italian study, 11 of >50 teeth have been analyzed and tooth Mn levels compared with concentrations in soil.

Results: In the CHAMACOS cohort, Mn levels in prenatally formed dentine were significantly associated with Mn loading in house dust ($\mu g\ Mn/m^2$ floor area) (Spearman's $\rho_{prenatal}$=0.53, p=0.002, n=31). This association was stronger when we restricted analyses to Mn levels in dentine formed in second trimester, when housedust was collected ($\rho_{prenatal}$=0.60, p=0.0006, n=29). Concentrations in cord blood were significantly associated with Mn levels in dentine adjacent to the neonatal line corresponding to the perinatal period ($p<0.05$), but not with Mn levels in other parts of teeth. In the Italian study, Mn levels in dentine showed a positive correlation with soil Mn (Spearman's $\rho_{prenatal}$=0.46, n=11, p=0.16).

Conclusions: Deciduous tooth dentine is a potentially useful biomarker of prenatal Mn exposure.

CLIMATE CHANGE AND DENGUE: ANALYSIS OF HISTORICAL HEALTH AND ENVIRONMENT DATA FOR PERU

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Background and Aims:
Dengue, a mosquito-borne virual infection that is the most common cause of hemorrhagic fever globally, is rapidly spreading worldwide. An estimated 40% of the world's population is at risk for this disease that is transmitted by *Aedes sp*. mosquitos (WHO 2009). The *Aedes* mosquito-Dengue virus lifecycle varies with temperature, and climate change may increase the risk of Dengue epidemics in the future (Watts et al. 1987). We examined whether changes in sea surface temperature (SST) along the Peruvian coast were associated with dengue incidence from 2002-2010. In Peru the effects of the El Niño cycle on weather conditions are pronounced, providing an ideal place to study fluctuations in climate and dengue incidence.
Methods:
We used negative binomial models (Hilbe 2007) to examine the relationship between Dengue cases and changes in SST across regions of Peru. Spearman's rank test was used to determine the lagged SST term that was most correlated with Dengue incidence in each region. The negative binomial models included terms for tthe optimum lagged SST and a term for the trend of increasing Dengue incidence over the study period.
Results:
The magnitude and sign of the correlation coefficient of dengue and SST varied between the 15 regions of Peru with Dengue cases. 9 provinces had positive correlations between the two while 6 had negative correlations. The optimum lag ranged from 0 months to 6 months. In all of the regions but 1 lagged SST was a significant predictor of Dengue cases in the negative binomial model.
Conclusions:
The relationship between dengue and sea surface temperature in Peru appears to be significant across the country. Given the varied nature of the relationship between regions it is not possible to make accurate generalisations about this relationship in Peru. Accounting for additional climatic variables such as precipitation may help in improving the predictive model.

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BRONCHIOLITIS DIAGNOSED BEFORE 2 YEARS OF AGE AND LOWER INCOME FAMILIES CAN BE AN IMPORTANT RISK FACTOR OF BRONCHIAL HYPERSENSITIVITY

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Background & Aims: The prevalence of asthma has increased in recent decades globally. The objective of our study is to identify important risk factors of bronchial hyperreactivity (BHR) in school children.
Method: We studied 522 children age 13~14 years attending schools in rural and urban areas to investigate the risk factors for BHR, defined as a provocation concentration of methacholine that causes a decrease of 20% (PC20)in forced expiratory volume within 1 second. Clinical examination, skin prick test, spirometry, and methacholine challenge were performed on all patients. We used logistic regression to investigate the risk factors for BHR.
Results: Forty-six (10.3%) positive BHR cases were identified. From the multivariable logistic analysis, as independent predictors of BHR, the odds ratio of bronchiolitis diagnosed before 2 years is 4.12 (95% CI: 1.21 □14.04), the odds ratio of female children is 2.30 (95% CI: 1.01 □5.28), the odds ratio of low family income is 2.21 (95% CI: 1.03 □4.76), the odds ratio of positive skin prick test is 2.19 (95% CI: 1.05 □4.57), and the odds ratio of residential environment is 4.14 (95% CI: 1.62 □10.60).
Conclusions: This study shows that sensitization to allergens and bronchiolitis diagnosed before 2 years in lower income families may respectively be considered as risk factors of bronchial hypersensitivity. Avoidance of allergens and prevention of acute respiratory infection in early childhood are important to prevent BHR as a precursor of asthma.
Key Words: Children, BHR, bronchiolitis, asthma, skin prick test.

EXPOSURE TO POLYCYCLIC AROMATIC HYDROCARBONS AFFECTS SPERM QUALITY

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Background and Aims: The objective of this study was to explore whether exposure to polycyclic aromatic hydrocarbons (PAHs) contribute to the alteration of male sperm quality. Our specific aims were to 1) assess sperm quality of coke-oven workers; 2) determine the correlation between PAH biomarkers and sperm DNA integrity; 3) determine sperm oxidative damage by identifying specific DNA lesions; and 4) determine specific gene polymorphisms modifying PAH biotransformation related to sperm DNA integrity.
Methods: A longitudinal study included repeated measurements to account for PAH exposure as it relates to toxic effects on sperms during spermatogenesis. Personal breathing-zone air samples and urine samples were collected to determine PAH external and internal exposure levels, respectively. Semen was collected to assess sperm quality, DNA adducts, and oxidative damage. Blood samples were collected for genotyping. Features of this design include efficient control for confounding factors, accurate exposure ascertainment, and sufficient power to detect exposure related changes in sperm quality.
Results: The high exposed group had a significantly lower percentage of mobile, viable and normal morphological sperms as compared to the control. The concentration of 1-OHP levels negatively correlated with normal sperm morphology, motility and viability. The PAH exposed group experienced higher DNA fragmentation percentages, 8-oxodG concentrations, bulky DNA adducts, and BaP like DNA adducts. GSTM1 null and CYP1A1 MsP1 men had higher sperm DNA fragmentation and 8-oxodG concentration.
Conclusions: Exposure to PAHs decreased sperm quality and increased oxidative DNA damage. Genetic polymorphisms influence the susceptibility of men to sperm DNA damage related to exposure to PAHs. Research results laid a foundation for future study related to the effects of PAHs on reproductive health. Also, the results are useful for reforming best management practices and policies, thus protecting the reproductive health of individuals and/or workers exposed to PAHs.

EXPLORING A NEW GENERATION OF ENIVIRONMENTAL HEALTH OUTCOME INDICATORS FOR ASTHMA

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Background and Aims: In response to the call for a new generation of outcome-based environmental health indicators for asthma, we investigated the feasibility of combining existing environmental monitoring and state-wide health survey data (California Health Interview Survey (CHIS)) to develop a comprehensive set of health outcome indicators, such as asthma-related emergency department (ED) visits, absences from school/work, medication use, and frequency of asthma symptoms for those with asthma. The current U.S. EPA outcome-based indicators for asthma are limited to prevalence of asthma and asthma attack.
Methods: Linking 2003 CHIS respondents' residential address with ambient air pollution monitoring data within 5-miles, we assessed whether health outcome indicators (e.g., ED visits) are associated with annual average air pollution exposures for criteria air pollutants for CHIS 2003 adults using logistic regression. The analyses were adjusted for age, sex, race/ethnicity, and poverty level.
Results: Higher exposures to O3, PM10, and PM2.5 were associated with taking daily asthma medication (O3: OR, 1.27, 95% CI, 1.04-1.43; PM10: OR, 1.12, 95% CI, 1.01-1.24; PM2.5: OR, 1.263, 95% CI, 1.045-1.52) and ED visits for asthma (O3: OR, 1.19, 95% CI, 0.96-1.47; PM10: OR, 1.20, 95% CI, 1.00-1.43; PM2.5: OR, 1.22, 95% CI, 0.96-1.56). An association was also observed for missed work days due to asthma and PM10, as well as frequent asthma symptoms (daily or weekly symptoms) and PM2.5.
Conclusions: Taking daily asthma medication and ED visits due to asthma may be new health outcome indicators for ozone and particulate matter exposures. Further investigation is needed to see whether missed work days due to asthma or frequency of asthma symptoms could serve as useful indicators.

IS NON-HODGKIN'S LYMPHOMA MORTALITY ASSOCIATED TO PESTICIDE USE IN BRAZIL?

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Background and aims: Brazil has been among the main world pesticides consumers. The continued use of pesticides may be associated with the etiology of cancer, such as the non-Hodgkin's lymphoma (NHL). Estimate the correlation between per capita pesticides sales in 1985 and NHL mortality rates between 1996-2005, by Brazilian micro-regions.
Methodology: This is an ecological study where pesticides per capita consumption in 1985 was taken as a population exposure proxy to these chemicals in Brazil. There was studied all the NHL deaths among subjects between 20 and 69 years old, of both sexes, that occurred in the 446 Brazilian regions, out of the urban area, accordingly to the Geography and Statistical Brazilian Institute. These micro-regions were categorized into low, medium, high and very high pesticides consumption, according with per capita consumption quartiles. NHL mortality rates and the rate ratios for each quartile were obtained using the lowest quartile as reference. Spearman correlation were estimated between pesticide exposure and NHL mortality.
Results: A moderate correlation between per capita pesticides consumption and standardized mortality rate for NHL were found (r = 0,597). Employing the micro-regions with low per capita consumption of pesticides as a reference, were observed a gradual increase in NHL risk death according to the consumption quartile of these substance: men - (second quartile – MRR= 1.69, CI 95% 1.68-1.84; third quartile - MRR=2.41, CI 95% 2.27-2.57; fourth quartile - MRR = 2.92, CI 95% 2.74-3.11) and females (second quartile – MRR= 1.87, CI 95% 1.69-2.06; third quartile - MRR=2.28, IC 95% 2.10-2.47; fourth quartile - MRR = 3.20; CI 95% 2.98-3.43).
Conclusion: These results suggest that Brazilian population exposure to pesticides in regions outside the urban areas in eighties may be associated with NHL mortality observed between 1996 and 2005.

BRAZILIAN AGRICULTURAL WORKERS AND NON-HODGKIN'S LYMPHOMA: A DEATH CERTIFICATE CASE-CONTROL STUDY

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Background and aims: The use of pesticides in Brazil has been high compared to others countries of the world, and it is important assess the risk of diseases related to the use of this substance, particularly non-Hodgkin lymphoma (NHL) cancer, that has been closely associated with farm work. The aim of this study was to estimate the NHL mortality risk among agricultural workers between 1996 to 2005, in Brazilian southern states.
Methodology: Cases (n=1317) were the NHL deaths occurred between 1996 to 2005, for both men and women, which cause of death were obtained from the Brazilian Mortality Information System (SIM/SUS), classified according to ICD-10 aged between 20 to 69 years old, living in the states of Parana, Santa Catarina and Rio Grande do Sul, in non-urban municipalities (classified according to the IBGE - Brazilian Institute of Geography and Statistics). Controls (n = 2634) were paired by sex, age, year of death and residence state, which the underlying cause of death had not included cancer (ICD10 - C00 - D48) or hematologic disease (ICD10 D 50 -- D89). Occupational data were obtained from the SIM/SUS.
Results: An increased NHL death risk was observed among the agricultural workers aged 20 to 39 years (OR = 1.55 CI95%: 1.10-1.87) compared to non-agricultural workers. In adjusted analysis, there was observed an increased NHL death risk among agricultural workers aged 20 to 39 years (OR =2.06 CI95%: 1.20 – 3.14) compared to non-agricultural workers. Stratification by sex showed that magnitude of non-Hodgkin lymphoma mortality risk was higher for male agricultural workers (OR: 1.31 CI95%: 1.10-1.92) than for female ones (OR: 1.17 CI95%: 1.12-1.80).
Conclusion: Our results suggest that the agricultural workers residents in the South are more likely to die by NHL compared to non-agricultural workers.

IS LOW BIRTH WEIGHT RELATED TO PESTICIDES EXPOSURE IN BRAZIL?

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Background and Aims: Brazil has been one of the biggest global pesticides consumer, and exposure to these substances can affect fetal growth and pregnancy outcomes. The objective is to estimate the correlation of pesticides per capita sales in 1996 with prevalence of low birth weight from 1996 to 1998, among Brazilian micro-regions.
Methodology: This was an ecological study that employed secondary data, aggregated at the micro-regions level (defined by the Brazilian Institute of Geography and Statistics – IBGE). The prevalence of low birth weight in 1996, 1997 and 1998 was obtained from the National Databank System (DATASUS). The per capita pesticides sale in 1996 was analyzed as an indirect measure of population exposure to these chemicals. We estimated the degree of Spearman correlation for the total population, and Prevalence Ratio by quartile of consumption, correlating pesticides exposure and the prevalence of low birth weight.
Results: A total of 452 non urban and 106 urban micro regions clusters was analyzed. Pesticides per-capita consumption in non-urban microregions was directly associated with greater prevalence of children born with low birth weight ($r = 0.403$; $p < 0.001$), with birth weight between 1500 and 2500 grams ($r = 0.366$; $p < 0.001$) and with very low birth weight at birth ($r = 0.476$; $p < 0.001$). In urban areas there was no significant correlation . There was a gradual, and statistically significant, increase in the prevalence ratio of low birth weight as the quartiles of pesticides consumption increases.
Conclusions: The pesticides per capita consumption may affect the prevalence of low birth weight among the non-urban microregions of Brazil, indicating the need to strengthen policies and actions for protecting the health of populations exposed to pesticides, as well as review its use of these substances.

EFFECTS OF PRENATAL AND POSTNATAL EXPOSURE TO CHLORDECONE ON INFANT NEURODEVELOPMENT

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Background and Aims: The estrogenic insecticide chlordecone was extensively used from 1973 to 1993 in the French West Indies, to control banana root borer. Its persistence in soils has led to the widespread pollution of the environment including tap water sources and crops. Chlordecone was shown to have neurological effects in humans such as tremor, ataxia, oculomotor dysfunctions and memory loss. Thus, the aim of the study was to evaluate the impact of prenatal and postnatal exposure to chlordecone on the neurodevelopment of 7-month-old infants from Guadeloupe.

Methods: Umbilical cord blood samples (n=169) were collected from newborns and analyzed for chlordecone concentrations (mean = 0.58 ng/L). Infants were tested at 7 months. Visual recognition memory and speed of processing visual information into memory were assessed with the Fagan Tests of Infant Intelligence (FTII), visual acuity with the Teller Acuity Card test and fine motor development with the Brunet Lezine. A maternal interview was conducted to document infant health, diet and family situation. Chlordecone concentrations were quantified in breast milk. Postnatal exposure was determined through frequency of contaminated food consumption by the infants.

Results: In adjusted models, cord chlordecone concentrations in tertile were associated with reduced novelty preference on the FTII in the highly exposed group (β=-0.22, p=0.005), as was consumption of contaminated food (β=-0.15, p=0.038). Postnatal exposure through contaminated food consumption was also related to longer time to process visual information (β=0.18, p=0.045). Detectable levels of chlordecone in cord blood were associated with higher risk of having a score below the third percentile on the fine motor development scale (OR=1.27, p=0.002). Chlordecone in breast milk was not associated with neurodevelopment scores.

Conclusion: These results suggest that pre- and postnatal low chronic exposure to chlordecone is associated with deleterious effects on several domains of neurodevelopment during infancy.

STOMACH CANCER MORTALITY AMONG AGRICULTURAL WORKERS*:* RESULTS FROM A BRAZILIAN DEATH CERTIFICATE-BASED CASE-CONTROL STUDY

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Backgrounds and aims: The use of pesticides in Brazil is very intense. Thus, it is important to assess the risk of diseases related to the use of these substances, particularly stomach cancer, which has been closely associated with pesticide exposure in several studies, especially among agricultural workers. This study aimed to estimate the risk to die by stomach cancer among agricultural workers from an intensive pesticide-use area in Brazil, between 1996 and 2005.
Methodology: Therefore, a death certificate-based case-control study was designed to achieve this objective. Cases were individuals from both genders, 20 or more years old, for whom basic cause of death was stomach cancer. For each case two controls were randomly selected, from the universe of deaths, excluding those from neoplasms and hematologic digestive system diseases. In addition, controls were matched with cases by sex and age. Crude and adjusted odds ratios were then calculated to estimate the magnitude of the risk.
Results: Results showed that agricultural workers were at statistically significant higher risk to die by stomach cancer (OR: 1.41; CI95%: 1.10-1.82) compared to non-agricultural workers. Stratified analysis revealed that the magnitude of such risk was higher among younger (OR: 3.34; CI95%: 1.58-7.08) agricultural workers. Stratification by sex showed that magnitude of stomach mortality risk was higher for male agricultural workers (OR: 1.51 CI%: 1.13-2.02) than for female ones (OR: 1.47 CI%: 1.12-1.93). **Conclusions**: These results suggest that agricultural workers living in the Serrana Region of Rio de Janeiro State were at significantly higher risk to die by stomach cancer compared to non-agricultural workers.

Hepatitis B virus infection among immigrant women in Taiwan

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Background and Aims Around 15-20% of adults born before 1984 in Taiwan are chronically infected with hepatitis B virus (HBV). A nationwide vaccination program was initated to control HBV infection in Taiwan since 1984. Most countries in Asia have not introduced HBV vaccination into their national immunization agenda. Cross-national marriages have gained increasing popularity in recent years in Taiwan. This study investigated the prevalence of hepatitis B surface antigen (HBsAg) and antibody to hepatitis B surface antigen (anti-HBs) among immigrants from other Asian countries.

Methods This study recruited 595 immigrant women who provided blood samples for HBsAg and anti-HBs tests.

Results The prevalence of HBsAg(+) was 8.4% (50/595), HBsAg(-) and anti-HBs(-) was 50.5% (301/595), and anti-HBs(+) was 40.7% (242/595).

Conclusions Immigrant women were susceptible to HBV infection. Public health agencies should provide vaccination programs to decrease HBV carrier and infection rates for this population.

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SKINJEM: A JOB EXPOSURE MATRIX FOR OCCUPATIONAL SKIN CANCER RISK

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Background and Aims: Estimating occupational exposure to skin carcinogens at a population level is challenging due to a lack of specific tools to do so. The objective of this project is to create a job exposure matrix for skin carcinogens (SkinJEM), flagging industries and jobs with high potential for exposure in Canada.

Methods: SkinJEM is a 2-dimensional matrix created with a standard coding system (n=520) on one axis and exposure categories on the other. Exposures were selected from the CAREX Canada database and IARC monographs. Jobs were flagged as exposed if ≥25% of workers were likely to be exposed. SkinJEM also includes a flag for 'expert re-evaluation', where exposures in a job differ by industry, or where there is textual information available. For situations where exposure is more industry-based than occupationally (i.e. arsenic exposure in wood preservation plants), data lines have been added to reflect this. There is also an indicator of confidence for each job line.

Results: Eight compounds (solar, artificial, and ionizing radiation; PAHs, creosotes, mineral oil, coal-tars; arsenic) in 3 categories (radiation, petroleum-related, metals) were identified. All 520 unique 4-digit job codes were included in the matrix, in addition to all roll-ups to less specific codes (to accommodate varying data quality in epidemiologic studies). Of note, many jobs had expected exposure to several skin carcinogens, including welders in construction, roofers, medical staff in hospitals, and workers in utilities.

Conclusions: Many Canadian workers are potentially exposed to agents that are known to or suspected of causing skin cancer. Through SkinJEM, we have found that these carcinogens may be encountered together in some workplaces. Further research is required to assess the skin toxicity of chemical/radiation mixtures. Next steps will include linkages of SkinJEM to cancer registries to examine risk for melanoma from occupational exposure to skin carcinogens.

MORTALITY AMONG MINERS FROM TWO IMPORTANT MINING REGIONS IN BRAZIL, 1979-2005

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Background and Aims – Miners are exposed to risk factors related to their working environment such as coal dust, noxious gases, lack of oxygen, high temperature, metals, and radioactivity. Mining contributes for around 5% of the Brazilian Gross Domestic Product (GDP) and more than 70% of all mines are located in the South and Southeast regions of the country. The aim of this study was to evaluate the mortality by Respiratory Disease (RD) of Brazilian miners from 1979 to 2005, comparing it with that experienced by the general population.
Methods – The data of respiratory disease deaths occurred among Brazilian miners, 20 years or older, resident in the south or southeast regions, were obtained from the Brazilian Mortality Information System (SIM) according to ICD-9 (1979-1995) and ICD-10 (1996-2005). Then, the Mortality Odds Ratio (MOR), stratified by age (20-39; 40-59; <60; 60+ yrs old) and periods of death (1979-1987; 1988-1996; 1997-2005) was calculated.
Results – In both regions, it was observed an increased risk of death by RD among miners for the entire studied period and for all ages, and it was higher among miners of the southeast region (MOR_{SOUTH}1,45 95%CI=1,33-1,59; $MOR_{SOUTHEAST}$1,25 95%CI=1,08-1,45). The youngest strata (40-59 years) had the highest risk of dying by RD (MOR_{SOUTH}1,90 95%CI=1,19-1,45; $MOR_{SOUTHEAST}$1,47 95%CI=1,13-1,91), compared to the oldest strata (60 years or more) in both regions and in all studied periods (MOR_{SOUTH}1,31 95%CI=1,55-2,32; $MOR_{SOUTHEAST}$1,41 95%CI=1,18-1,69). When stratified by selected causes of death, miners showed a statistical significant elevated risk of dying by lung disease due to external agents in both regions (MOR_{SOUTH}14,74 95%CI=12,06-17,99; $MOR_{SOUTHEAST}$26,92 95%CI=19,62-36,07), and this elevated risk was maintained when the population was stratified by period and age.
Conclusions – When compared to general population, Brazilian miners were at higher risk to die by RD, specifically by lung disease due to external agents.

CAREX CANADA: OCCUPATIONAL AND ENVIRONMENTAL CARCINOGEN SURVEILLANCE

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Background and Aims: CAREX was created by the Finnish Institute for Occupational Health in the 1990s. It raised awareness regarding occupational cancer, is widely quoted, and used to assess the impact of workplace carcinogens. In 2008 we launched CAREX Canada as a population level occupational and environmental surveillance project. The objectives of the project are to identify how many people are exposed, how and where they are exposed, and their level of exposure.
Methods: CAREX Canada adopted the general approach of the original CAREX project for occupational carcinogens, although estimates are produced at a finer level of resolution and groups (based on industry/occupation) are flagged for potential exposures greater than half the occupational limit. Several different approaches were taken for environmental exposures, including spatial modeling and general risk assessment using published measured concentrations. Environmental estimates were converted into benzene equivalent doses or population-level cancer risks in order to compare the relative contribution from various sources or different exposures.
Results: To date we have assessed exposure to 50 occupational and 30 environmental known and suspected carcinogens. The 10 most common occupational are shift work, solar radiation, diesel exhaust, other PAH-related exposures, silica, benzene, wood dust, lead, asbestos and chromium. In the environment, highest estimated lifetime excess cancer risks (>100/million) were due to formaldehyde (indoor air) and diesel particulates (outdoor air). Elevated risks (>10/million-<100/million) were also predicted for diesel particulates, acetaldehyde, benzene, 1,3-butadiene and total chromium (indoor air); arsenic, chloroform, hexavalent chromium and bromodichloromethane (drinking water); and arsenic (food). Traffic, residential wood burning, and industrial emitters dominate emissions in watersheds and ecoregions.
Conclusions: CAREX Canada is the first program of its kind in Canada. It is raising awareness of the importance of occupational and environmental cancer, providing essential data for prevention, and is already being used for surveillance, risk assessment, and epidemiology.

AMBIENT AIR POLLUTION AND ITS INFLUENCE TO THE CARDIOVASCULAR SYSTEM DISEASE IN ULAANBAATAR CAPITAL CITY OF MONGOLIA

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Background and Aims: Air pollution is an increasingly serious problem in Mongolia, especially in the capital city of Ulaanbaatar, Darhan and several other urban areas. The purpose of this study is to determine the relationships between air pollutants (PM10, PM2.5, NO2 and SO2) and meteorological parameters (average temperature, humidity, and wind speed) cardiovascular morbidity of all secondary level and tertiary level hospitals of Ulaanbaatar and 8 primary level hospitals.
Methods: This is a cross sectional study using secondary air quality and hospital morbidity and mortality data.
Results: The daily concentrations of PM10, PM2.5, SO_2 and NO_2 had exceeded the MNAAQS mainly in the winter months from November to February. The correlation mainly between cardiovascular disease case admissions with meteorological parameters is because the cold winter conditions and excessive ambient air pollution due to burning raw coal in Ulaanbaatar result in the accumulation of pollutants in the atmosphere. Thus, population exposure to air pollution is increase significantly during winter months. Based on resent study result, during winter 1/3 of cardiovascular system disease admission cases were caused due to average temperature, relative humidity, NO_2, and PM10 and cardiovascular disease also caused due to relative humidity, NO_2, and PM10 level.
Conclusions: So thus, not only fuel based pollutants but also vehicle related pollutants and meteorological conditions also causing onset of cardiovascular system disease. Cardiovascular disease admission more registered among older age group of people. In addition, residents of ger area are more visited to the FGPs than the residents of apartment area. For the chronic cardiovascular disease admission, the highest effects of exposure to the air pollution (PM2.5 and PM10 level) were observed at the second and fourth days of exposure. PM2.5 exposure for cardiovascular system chronic disease admission was significantly higher than the PM10 level.
Keywords : air pollution, Mongolia, hospital admission, cardiovascular system disease

META-ANALYSIS OF HEALTH EFFECTS ASSOCIATED WITH RESIDENTIAL PROXIMITY TO TRAFFIC

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Background and Aims: A growing body of research suggests an association between residential exposure to traffic emissions and a variety of health outcomes, including respiratory and cardiovascular disease and premature mortality. In the U.S., an estimated 30.3 million people live within 500 feet (150 m) of an interstate or highway, and this population is disproportionately low-income and minority. Currently, no national and few state policies exist that address this important environmental health issue. Thus, the U.S. Centers for Disease Control and Prevention conducted a systematic review and meta-analysis of observational studies to better understand the health burden associated with residential proximity to traffic.

Methods: We searched 15 electronic databases for original peer-reviewed articles, abstracts, and dissertations published during 1980–2008. Each reference was independently screened, abstracted, and reviewed for quality by two people. Separate meta-analyses were conducted for each health outcome with enough unique studies. We calculated weighted pooled effect estimates using a random effects model to address variability in study design, assessed study heterogeneity, conducted subgroup analyses, and assessed publication bias.

Results: Over 14,500 references were screened, of which 149 met the inclusion criteria (84 respiratory and allergic diseases, 22 cancer, 10 cardiovascular diseases, 9 reproductive outcomes, 8 mortality, and 16 other). Preliminary analysis of 10 case-control studies suggests that residential proximity to traffic is associated with childhood leukemia (odds ratio=1.5, 95% confidence interval=1.1–2.1); however, the effect estimate varied by study quality and evidence of publication bias was observed. Analysis of other outcomes will be completed by summer 2011.

Conclusions: Roughly 10% of the U.S. population lives near heavy traffic, which may contribute to substantial disease burden, including childhood leukemia. Findings from this review will inform the development of national, state, and local policies to reduce traffic emission exposures and improve population health through zoning and infrastructure changes.

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DO RESIDENTS OF SPRAWLING U.S. METROPOLITAN AREAS EXPERIENCE GREATER HEAT- AND AIR POLLUTION-RELATED MORTALITY?

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Word count = 300

Background and Aims: Recent research has found that sprawling U.S. metropolitan regions have experienced double the rate of increase in extreme heat events (EHE) and 50% more high ozone days compared with compact metropolitan regions. During the 2003 European heat wave, heat exposure and elevated pollutant levels were identified as the leading causes of excess mortality. Climate change is projected to increase the frequency and intensity of EHE and air pollution episodes; thus, we sought to examine the link between urban sprawl and climate-induced mortality among large U.S. cities. Specifically, we hypothesize that more sprawling cities have experienced greater mortality from extreme heat and air pollution.

Methods: We compiled a database for 60 metropolitan statistical areas (MSAs) that contains a sprawl index (composite measure of population density, land-use mix, street connectivity, and centeredness) and daily ozone concentrations, meteorological variables, and age-standardized warm-season (May–September) mortality rates from all-cause, cardiovascular disease, and respiratory disease during 1987–2006. We calculated the trend in mortality rates over 20 years using linear regression for each MSA and the correlation between urban sprawl and mortality trends for all 60 MSAs. Second, we determined excess mortality during episodes of concurrent EHE and ozone exceedances and examined the association between urban sprawl and excess mortality using multivariate analysis.

Results: We found a positive correlation between urban sprawl and mortality trends for respiratory disease ($r=0.47$, $P<0.01$) and all causes ($r=0.36$, $P<0.01$), but not for cardiovascular disease. Analysis of excess mortality during episodes of concurrent EHE and ozone exceedances will be completed by June 2011.

Conclusions: The preliminary results from this ecologic study, combined with previous research, suggest that metropolitan structure may be associated with climate-induced mortality from extreme heat and air pollution. These findings will inform practitioners in urban planning and public health on potential climate adaptation strategies.

BISPHENOL A-ASSOCIATED EPIGENOMIC CHANGES IN PREPUBESCENT GIRLS FROM GHARBIAH, EGYPT

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Background and Aims: There is now compelling evidence that epigenetic modifications link adult disease susceptibility to environmental exposures during specific life stages, including pre-pubertal development. Animal studies indicate that bisphenol A (BPA) may impact health through epigenetic mechanisms. Epidemiological data associate BPA levels with metabolic disorders and reproductive effects. Here, we conducted an environmental epidemiology study of BPA exposure and epigenetics in pre-adolescent girls in Gharbiah, Egypt, hypothesizing that CpG methylation profiles will exhibit exposure-dependent trends.
Methods: Total urinary BPA was measured by the CDC for 46 girls aged 9 to 12. We concurrently evaluated genome-wide CpG methylation using the Infinium HumanMethylation27 array in saliva DNA samples. The Linear Models for Microarray Data (Limma) library in R program was used to model age, BMI, specific gravity, creatinine, and log BPA to predict % change in methylation. Top hits below a p-value of 0.05 were subjected to enrichment analysis including pathway and gene ontology via Molecular Concepts Map (MCM).
Results: Overall, urinary BPA levels were lower in Egyptian girls compared to similarly aged U.S. females as reported in NHANES. CpG methylation varied widely between girls, and BPA levels were associated with less genomic methylation. Pathway analyses indicated that genes with decrease in methylation % associated with BPA were involved in immune function, transport activity, metabolism, and caspase activity. In particular, hypomethylation of CpG targets on chromosome X was associated with BPA. Using the Comparative Toxicogenomics Database, we identified candidate genes with upregulated expression associated with BPA and found that many of the targets had BPA-associated hypomethylation in our sample, and visa versa.
Conclusions: Our data indicate that BPA may affect human health through specific epigenomic modification of genes in relevant pathways. Epigenetic epidemiology holds promise for the identification biomarkers of previous exposure and the development of epigenetic-based diagnostic and therapeutic strategies.

ENVIRONMENTAL TOBACCO SMOKE AND HOSPITALIZATION FOR RESPIRATORY DISEASES AMONG CHILDREN UNDER ONE YEAR OF LIFE IN BRAZILIAN STATE CAPITALS AND FEDERAL DISTRICT

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Background and Aim: Passive exposure to tobacco smoke is responsible for diseases related to respiratory system. The objective of this study is to evaluate the relationship between environmental tobacco smoke and hospitalization due to pneumonia, asthma, bronchitis and bronchiolitis among children.
Methodology: This is an ecological study, which had employed Brazilian secondary data (from the Public Health System – DATASUS) of hospitalization among children under one year of life due to pneumonia, asthma, bronchitis and bronchiolitis (as three different outcomes), and the prevalence of tobacco smoking in Brazilian Capitals and the Federal District population as a proxy for enviromental tobacco smoke (obtained from VIGITEL, 2008). The Rate Ratio (RR) of hospitalization was estimated by negative binomial statistical model (CI=95%) for each outcome, adjusted by the Gini Index of the city, and the prevalence of breastfeeding and low birthweight.
Results: We considered for the study 642,792 children under one year of age living in the 26 Brazilian Capitals and Federal District in 2008. The prevalence of smokers in the city population was associated with a higher rate of hospitalization for pneumonia (RR=1.108, 95%CI=1.009-1.216), asthma (RR=1.187, 95%CI=1.047-1.344), and acute bronchitis or bronchiolitis (RR=1.170, 95%CI=1.008-1.357) among children under one year old. The more unequal the conditions of people's income (Gini index) and the higher the prevalence of low birth weight, highest are the rates of hospitalization; and the more prevalent the breastfeeding, lowest are the hospitalization rates.
Conclusion: The prevalence of smoking appears to be associated to hospitalizations for respiratory problems in children under one year of life, and the ecological study was evidenced as an useful tool to evaluate these associations, providing data for policy and public health management.

EVALUATION OF HEARING IN A BRAZILIAN FARMING COMMUNITY EXPOSED TO PESTICIDES

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Introduction: Several studies have shown that chemicals can cause damage to humans and the environment. Although the main focus of studies on hearing health is exposure to noise, studies on the impacts of chemical exposures on hearing ability are becoming more frequent, especially for workers.
Objectives: This study aimed to evaluate the peripheral auditory system, through pure tone audiometry in farmers living in areas of intensive use of pesticides in the State of Rio de Janeiro/Brazil.
Methods: 70 persons of both sexes, residents in a small city, aged between 25 and 59 years, 35 farmers and 35 non-farmers were evaluated. All individuals had their peripheral hearing evaluated by means of audiometry in frequencies of 0.25, 0.5, 1, 2, 3, 4, 6 and 8 kHz. Individuals with external and/or middle ear problem were excluded from the search. All individuals were interviened regarding their health issues, socioeconomic status, education and exposure to pesticides. Hearing loss was considered for thresholds higher or equal to 25dB at any frequency tested.
Results: The frequency of hearing loss was 3.67 times (95% CI: 2.08 to 6.48) among farmers (94.3%) compared to non-farmers (25.7%). Moreover, most of the hearing losses were more observed on high frequencies.
Conclusion: This study suggests that agricultural activity and possible exposure to pesticides increases the risk of hearing loss.

EXPOSURE OF AIR POLLUTION AND CONGENITAL MALFORMATIONS IN STATE OF MATO GROSSO, BRAZILIAN AMAZON

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Background and Aim: Exposure to air pollutants has been associated with congenital malformations MC). In the last decade many municipalities of the state of Mato Grosso has shown concentrations of fine particulate matter ($PM_{2.5}$) higher than recommended by the WHO.

Objective: To analyze the association between air pollution from biomass burning and MC during 2000 to 2007 in the municipalities of Mato Grosso, Brazilian Amazon. Methods: Ecological study of the association between MC at birth or at death and air pollution from biomass burning. The dependent variables were the outcomes of birth and/or death with records of any MC and the independent variables were the number of hotspots during the period in study, as a proxy of the concentration of air pollution from the fires, as well as, the percentage of annual hours of $PM_{2.5}$ above 25• g/m^3. Poisson regression models for rates were carried out adjusted by pesticides marketed and HDI for municipalities. Results: Association between the rates of births with MC and the number of hotspots recorded in 2001 (RR: 1.003, 95%:1.0004-1. 00006), with the percentage of $PM_{2.5}$ above 25• g/m^3 in 2004 (RR: 1.007, 95% :1.0003-1.014), and with the HDI for 2005 (RR: 6.48, 95% :4.06-1.03) were verified. There were association between rates of death with MC with the HDI in 2001 (RR: 1.25, 95%:3.50-4.46) and 2004 (RR: 2.01, 95%: 6.41-6.29).

Conclusion: Congenital malformations registered at birth showed a weak association with air pollutants from biomass burning in Mato Grosso.

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Association between coarse particles air pollution and hospital admissions for respiratory and cardiovascular diseases in Busan, Korea

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Background and Aims: Research on the health effects of coarse particles, greater than 2.5 μm and 10 μm or less in diameter ($PM_{10-2.5}$) is limited and findings have been mixed. The chemical composition of particulate matter differs by size with more crustal materials in $PM_{10-2.5}$ and more combustion related constituents in $PM_{2.5}$. This study aims to estimate risk of hospital admissions for respiratory and cardiovascular diseases associated with $PM_{10-2.5}$ and $PM_{2.5}$ exposure.

Methods: A dataset was collected from for Busan in Korea, which had daily hospital admission rate for respiratory and cardiovascular disease, meteorological variables (temperature, humidity and air pressure), and $PM_{10-2.5}$ and $PM_{2.5}$ concentrations for the periods 2005–2006. We employed a time-stratified case-crossover design.

Result: There were a total of 126,083 and 137,839 inpatient admissions for respiratory and cardiovascular diseases, respectively. During the study period a 10 $\mu m/m^3$ increase in $PM_{10-2.5}$ and $PM_{2.5}$ were also associated with increase in respiratory disease admissions by 2.91% (95% CI: 2 to3.82) and 0.96% (0.35 to 1.58), respectively. However, when mutually adjusted, the association of $PM_{10-2.5}$ and $PM_{2.5}$ with respiratory disease admission were 0.08% (-0.24 to 0.39) and 0.77% (0.3 to 1.25) for exposure on the previous day of hospital admission, respectively.

Conclusions: After adjusted by $PM_{2.5}$, there was no statistically significant association between coarse particulates and hospital admissions for respiratory and cardiovascular diseases.

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IMPACTS OF PARTICULATE MATTER ($PM_{2.5}$) EMITTED FROM BIOMASS BURNING IN THE BRAZILIAN AMAZON REGARDING HOSPITAL ADMISSIONS AND MORTALITY BY CARDIOVASCULAR DISEASES

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Background and aim: Air pollution from biomass burning is an important environmental problem in the Amazon. The aim of this study is to analyze the impacts of exposure of particulate matter emissions from biomass burning in the Brazilian Amazon on hospitalization and mortality by cardiovascular diseases.
Methods: Ecological study using an environmental exposure indicator presented as annual hours percentage (AH%) of $PM_{2.5}$ above 25 • g/m^3. The following outcome variables were considered: rates of hospitalization and mortality due to cardiovascular diseases in elderly. Multiple regressions of outcomes and the predictive variable AH% for $PM_{2.5}$ above 25 µg/m^3 threshold were used. The Human Development Indices (HDI) and average number of blood tests per 100 inhabitants in the Brazilian Amazon region were the control variables.
Results: The association of the exposure indicator (AH%) is significant for the elderly in terms of hospitalization and mortality by cardiovascular diseases (• = 0.01; • = 0,22). For each 1% increase in the exposure indicator there was an increase of 1% in the rate of hospitalization and 22% in the rate of mortality, even controlled by HDI and average number of blood count tests.
Conclusion: The indicator of atmospheric pollution in the Brazilian Amazon region as the annual hour percentage of $PM_{2.5}$ above 25• g/m^3 showed association with the occurrence of cardiovascular diseases in elderly.
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BREASTFEEDING PATTERNS EVOLUTION BETWEEN 1999 AND 2008 AND ITS RELATIONSHIP WITH DIARRHEA HOSPITALIZATION

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Backgrounds and Aims: Breastfeeding prevalence has been increased in the last two decades in Brazil, as pro breastfeeding policy result**.** The objective of this study is to correlate the increase in the prevalence of breastfeeding with hospitalization taxes due to diarrhea.
Metodology: It is an ecological study, with secondary database of Brazilian Capital City and Federal District. The breastfeeding prevalence of 1999 and 2008 was obtained from the "II Pesquisa de Prevalência de Aleittamento Materno" and the under one year of life children population was obtained from National Health Databank (DATASUS) for the same years. The outcome (hospitalization due to diarrhea) was obtained from the Hospitalary Information System (SIH). It was employed a Spearman Correlation and Wilcoxon Correlation as statistical analysis to evaluate correlations and tendencies. A Rate Ratio of diarrhea hospitalization (per 1000 children under one year of life) in 1999 and 2008 was estimated.
Results: 1.329.618 children under one year of life was studied in 1999 and 2008. The hospitalization taxes due to diarrhea had a decrease of 6,96/1000 children between 1999 and 2008 (from 13.18 to 6.22, respectivelly). The increase of exclusive breastfeeding among under 4 months prevalence was correlated with a decrease of hospitalization due to diarrhea (Rho=-0.483, p<0,01), this correlation was stronger for girls (Rho=-0.521, p<0,01) than for boys (Rho=-0.476, p<0,01).
Discussion: The increase of breastfeeding prevalence between 1999 and 2008 seems to reduce hospitalization due to diarrhea at the same period, what brings the importance of public policies that protect, support and promote breastfeeding.

VITAMIN D RECEPTOR POLYMORPHISM INTERACTS WITH SUNLIGHT EXPOSURE IN PARKINSON'S DISEASE IN THE CENTRAL VALLEY OF CALIFORNIA

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Background: Vitamin D is a critically important vitamin/hormone that influences numerous biological processes. Evidence from studies including our own suggests that sunlight exposure leading to vitamin D production may be inversely associated with Parkinson's disease (PD) possibly by protecting against oxidative damage.
Methods: We are examining whether variations in genes in the vitamin D biologic pathway coupled with long-term sunlight exposure decreases PD risk among 288 incident Caucasian PD cases and 472 Caucasian population controls enrolled in the Parkinson's Environment and Genes study. Patients were diagnosed between 1998 - 2007 and clinically confirmed as probable or possible idiopathic PD. Controls >65 years were recruited from Medicare or randomly selected residential parcels. We developed a model using geographic information systems (GIS) tools linking geocoded participant addresses with solar radiation data to estimate historical ultraviolet radiation (UV) exposure. We genotyped single nucleotide polymorphisms (SNPs) rs1544410 (BsmI), rs2228570 *(*Fok1) and rs4334089 in the vitamin D receptor (*VDR*) based on previous studies, potential functional relevance or amino acid change.
Results: High lifetime UV (≥90th percentile) weakly protected against PD (OR = 0.78, 95% CI = 0.46, 1.31), compared to levels <90th percentile. Compared to *Fok1* GG genotype, GA (OR = 0.84, 95% CI = 0.56, 1.24) or AA genotypes (OR = 0.95, 95% CI = 0.56, 1.63) were not individually associated with PD. Among subjects with high lifetime UV, carriers of AA genotype had a lower odds of PD (OR = 0.04, 95% CI = 0.01, 0.84) compared to GG genotype; GA heterozygotes experienced some protection (OR = 0.28, 95% CI = 0.05, 1.65). Subjects with both high lifetime UV exposure and AA genotype were less likely to have PD (OR = 0.14, 95% CI = 0.02, 1.29) compared to subjects with combined lower UV exposure and GG genotype.
Conclusions: Results suggest that *VDR* variations may interact with UV exposure, a surrogate for vitamin D, in PD.

AN OCCUPATIONAL EXPOSURE ASSESSMENT OF POLYCHLORINATED DIBENZO-*p*-DIOXIN AND DIBENZOFURANS IN FIREFIGHTERS

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Background and Aims: Polychlorinated dibenzo-*p*-dioxins and dibenzofurans (PCDD/Fs) are unintentional byproducts of combustion and industrial processes. Firefighters face the risk of occupational exposure to PCDD/Fs. A survey of the PCDD/F levels in firefighters was conducted. Furthermore, we intended to identify potential risk factors associated with the exposure to high PCDD/F levels in firefighters and confirm the presence of high PCDD/F levels in fire accidents.
Methods: Congener-specific analyses of 17 PCDD/Fs were performed on 20 serum samples collected from firefighters and fire scene investigators, and four soot samples that had deposited on the surfaces of the fire helmets and were collected after the firefighters had fought fires.
Results: The PCDD/F concentrations on the helmets that were contaminated by being worn at the fire scenes were 63 - 285 times higher than those on a clean helmet. The median serum PCDD/F concentration of the 16 firefighters (12 pg WHO_{2005}-TEQ g^{-1} lipid) was not different from those of the males from the general Taiwanese population (9.4 pg WHO_{2005}-TEQ g^{-1} lipid). However, the median PCDD/F level in the four fire scene investigators (15 pg WHO_{2005}-TEQ g^{-1} lipid) was higher than those in the male from the general Taiwanese population (Mann-Whitney U test, $p < 0.01$). Furthermore, the serum samples from the firefighters and fire scene investigators, and the soot samples from the fire scenes presented similarly distinctive PCDD/F profiles that had elevated proportions for 10 PCDF congeners.
Conclusions: Firefighters face an elevated risk of occupational exposure to PCDD/Fs due to the large amounts of PCDD/Fs deposited on the surfaces of the fire helmets at the fire scene. The firefighters' thermal protective uniforms provided a protective barrier for exposure to PCDD/Fs. However, the fire scene investigators may have had more occupational exposures to PCDD/Fs due to poor personal protection; however, this requires further investigation.

STRUCTURAL EQUATION MODELING OF INFLAMMATION RESPONSE TO SHORT-TERM LOCAL TRAFFIC POLLUTION EXPOSURE

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Background and Aims: Some epidemiological studies have reported conflicting results on the effect of traffic-related pollutants on markers of inflammation. An alternative approach is proposed to comprehensively interpret study results and to help advance our understanding of air pollution-mediated biological impacts on inflammation. In a Bayesian framework, we examined the effect of local traffic pollution on inflammation using structural equation models (SEMs).
Methods: We studied measurements of C-reactive protein (CRP), soluble vascular cell adhesion molecule-1(sVCAM-1), and soluble intracellular adhesion molecule-1(sICAM-1) on 816 elderly men from the Normative Aging Study. Using SEMs, a latent variable for local traffic pollution that is reflected by levels of black carbon, CO, NO, and NO_2 was fit to estimate its effect on a latent variable for inflammation that included sICAM-1, sVCAM-1 and CRP. Exposure periods were assessed using 1-, 2-, 3-, 7-, 14-, and 30-day moving averages pre-visit. We compared our findings using SEMs with those obtained using Bayesian linear mixed models.
Results: Local traffic pollution was related to increased inflammation. Results from structural equation modeling showed that a 1 $\mu g/m^3$ increase in local traffic pollution (reference pollutant: BC) exposure was associated with an 8.2% (95% posterior interval (PI), 1.6–15.5%) and 16.3% (95% PI, -2.0–37.8%) increase in mean of inflammation (reference marker: sVCAM-1) 1 and 7 days later, respectively. Additionally, in linear mixed modeling, the percentage change in mean of sVCAM-1 per 1 $\mu g/m^3$ increase in black carbon pollution was also associated 1 [6.4% (95% PI, 3.1–9.9%)] and 7 [9.2% (95% PI, 2.5–16.0%)] days later. Furthermore, results from the SEMs gave consistent larger effect estimates and wider PI than results from the linear mixed models.
Conclusions: Local traffic pollution adversely impacts inflammation in the elderly. Structural equation modeling may be an alternative approach in air pollution-cardiovascular epidemiological studies.

ADVERSE PERINATAL OUTCOMES AND ENVIRONMENTAL HAZARDS USING A WATERSHED APPROACH

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Background and Aims: Environmental contaminants linked to increased risks of adverse perinatal outcomes are varied and numerous. The watershed approach framework is able to accommodate a multi-stressor environment as it focuses on hydrologically-defined geographic regions rather than on a single discharger or specific media (e.g. air, water). This paper examines the feasibility of using a watershed approach in the analysis of environmental contaminants and reproductive health in British Columbia, Canada.
Methods: Point-source pollution data and adverse birth outcomes were mapped using two similar sized but vastly different spatial tessellations of local watershed areas and administrative census subdivision areas. Pollution data was modelled using the cumulative annual release of a substance within both spatial tessellations and visually compared. Similarly, risk ratios of small-for-gestational age, preterm births and congenital anomalies were calculated for both spatial tessellations and a sensitivity analysis performed to assess rate stability.
Results: Unlike administrative census boundaries, watershed areas are independent of population size and therefore were more appropriate to model the environmental hazard data particularly for rural and remote areas with low population densities. With respect to birth outcomes, both tessellations were able to pick up many of the same community-level risk estimates thus confirming and often spatially refining the found result. Due to their slightly larger size, the watershed areas produced more stable risk ratios with less variability when sensitivity analyses were performed (70% vs. 50% of areas remaining significant after sensitivity analysis).
Conclusions: The watershed defines an appropriate small-area unit in which to investigate the cumulative impact of multiple physical, chemical, and biological stressors on human populations.

EXPOSURE TO FINE AND ULTRAFINE PARTICLES OF REGULAR BIKE USERS COMMUTING THROUGH DIFFERENT ROUTES IN SANTIAGO, CHILE

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Background and aims: In Santiago (Chile), high levels of fine (PM2.5) and ultrafine particles (UFP) might pose a hazard to cyclists who inhale more air volume than those who commute passively. This could be particularly true in less affluent areas with older vehicular fleet. Our objective was to evaluate the exposure of regular cyclists to fine and ultrafine particles during 30' bike rides in four routes differentiated by affluence of the area and degree of vehicular traffic.
Methods: Experimental study with cross-over assignment to 4 routes with different degrees of exposure (high and low vehicular traffic) in two geographic areas socially differentiated in Santiago. 55 healthy bike users of 18-35 y, nonsmokers, were recruited. Informed consent, questionnaire and assignment order to the routes was performed. Measurements were done (n=200) at morning traffic peak hours and participants were brought up directly from their domiciles. On each measurement participants made a ride of 30 minutes along the assigned route. Exposure to PM2.5 (by DUSTTRAK, TSI INC) and ultrafine particles (by P-TRAK, TSI INC) was measured continuously every 1 second.
Results: In affluent areas the means (±SD) for PM2,5 (ug/m^3) was 29.0 (14.7) vs 47.4 (20.7) in the less affluent ($p<0.05$); for UFP (pt/cc) this figures were 45200 (25200) vs 51900 (19600), $p>0.05$. High traffic routes had a mean PM2.5 of 38.6 (17.5) vs 38.1 (22.3) in the low traffic roads ($p>0.05$) whereas for UFP the means were 56700 (22100) for the high traffic routes vs 39100 (19600) for those roads with low vehicular traffic ($p<0.05$).
Conclusion: Differences in PM2.5 for bike users in Santiago seems likely to be determined by contextual characteristics of wider zones in the city. By the other hand UFP have higher variability related to differences in vehicular traffic emissions forming microenvironments within those wider contextual areas.

Pilot study results for a novel system of networked, low cost personal air quality monitors

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Background and aims: This project uses the latest in personal air quality monitoring to understand the links between location, activity choices and exposure to air pollutants. The aim of the initial user study is to demonstrate the utility of this novel real-time exposure characterization system at developing and comparing distributions of exposure for a small population of students over the course of multiple months.

Methods: The individual personal monitors, referred to as E-pods (exposure-pods), communicate with Android mobile phones via Bluetooth, providing geo-tagged real-time personal pollutant levels and activity logs. We have incorporated low cost sensors, including carbon dioxide, and metal oxide sensors to monitor volatile organic compounds, carbon monoxide, ozone, and nitrogen dioxide. A critical component of the exposure characterization system is calibration; as such details will be presented.

Users and observers may view the exposure, location, and activity data on a web-based GIS interface with built-in analysis tools. In order to track indoor location, a novel WiFi-based room localization system has been built into the mobile phone application.

Results: Calibrations have shown high sensitivity and fast responses for all the sensors. Uncertainty estimates are near +-5% for the metal oxide sensors and near +-2% for the carbon dioxide sensors. Pilot study results are presented from an initial user-deployment of five people. Grouping pollutants by locations and activities showed statistically significant differences in concentrations. Room localization has proven beneficial in this regard.

Conclusions: The personal exposure characterization results are promising and should be of interest to health researchers. Additionally, users and community members have greater awareness and interest in air quality after using the device. There are many opportunities in this area, though the sensors used require significant time and effort for calibration.

TIME TRENDS IN RESIDENTIAL DUST CONCENTRATIONS OF POLYCYCLIC AROMATIC HYDROCARBONS

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Background and Aims:
Exposure information gathered after diagnosis in case-control studies is often used to estimate exposures that occurred before diagnosis. For diseases with long latency periods, the delay between exposure and diagnosis presents a challenge for retrospective exposure assessment. The goal of the study is to examine time trends in dust concentrations of polycyclic aromatic hydrocarbons (PAHs) from households participating in the Northern California Childhood Leukemia Study, and assess whether current dust concentrations of PAHs are predictive of past contamination levels.

Methods:
Household vacuum cleaner contents were sampled twice from 203 homes during years 2001-2007 (initial sampling) and 2010 (repeat sampling). Samples (0.2 g) of fine (<150μm) dust were spiked with an internal standard [d^{12}-benzo(*a*)pyrene], extracted by accelerated solvent extraction, chromatographically purified, solvent-exchanged into tetradecane, and spiked with a recovery standard (d^{10}-pyrene). Eight PAHs were analyzed using gas chromatography-mass spectrometry. Using mixed-effects models we will test for trends in PAH levels while estimating the within- and between-household variance components of PAH concentrations in residential dust.

Results:
To date, we have analyzed 116 initial dust samples and will complete analyses for all initial and repeat samples (n=203x2). Because the analyst must be blinded to residential identities while conducting laboratory work, analysis of time trends cannot be conducted until all samples have been analyzed. Time trend results will be presented at the conference. From preliminary analyses, median concentrations for benzo(*a*)anthracene, chrysene, benzo(*b*)fluoranthene, benzo(*k*)fluoranthene, benzo(*a*)pyrene, indeno(*1,2,3-c,d*)pyrene, dibenzo(*a,h*)anthracene, and benzo(*g,h,i*)perylene in these 116 households were 29, 90, 61, 34, 38, 42, 9, and 98 ng/g, respectively.

Conclusions:
By sampling home dust during two distinct periods, we will evaluate household changes in PAH contamination over up to 10 years and assess the suitability of using post-diagnosis concentrations of PAHs in residential dust to estimate pre-diagnosis exposure levels in a case-control study of childhood leukemia.

RESIDENTIAL WOOD SMOKE $PM_{2.5}$ AND A BIOMARKER OF OXIDATIVE STRESS IN ASTHMATIC CHILDREN

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Background and Aims: Exhaled breath condensate (EBC) is a biofluid that can be analyzed for biomarkers of respiratory stress. Our randomized trial targets in-home interventions to improve air and quality of life among asthmatic children. Results presented here compare baseline measures of indoor fine particulate matter ($PM_{2.5}$) and EBC biomarkers in these children, as well as results from a clinically recognized Pediatric Asthma Quality of Life Questionnaire (PAQLQ).
Methods: Indoor $PM_{2.5}$ was recorded in 28 woodstove homes over a 48-hour period (DustTrak; TSI). EBC samples were collected using Rtubes (Respiratory Research) and were analyzed for 8-isoprostane, a marker of oxidative stress. Regression analyses were performed to establish the relationships between $PM_{2.5}$ exposure, levels of 8-isoprostane in EBC, and PAQLQ score.
Results: The mean (sd) indoor $PM_{2.5}$ concentration was 48.6 (41.1) $\mu g/m^3$. Mean 8-isoprostane concentrations in EBC were 2.42 (± 4.0) pg/mL. Subjects with 8-isoprostane concentrations above the median had a 0.75 (-1.63, 0.14) point lower mean overall PAQLQ score, relative to those with below-median concentrations, though this relationship was not statistically significant. Subjects with above-median 8-isoprostane tended to have lower PAQLQ sub-scale scores with the strongest effects observed for the activity domain (-0.93, 95% CI: -1.9, 0.07). Observed indoor $PM_{2.5}$ effects on PAQLQ were most pronounced, though still modest, in those with above-median 8-isoprostane in EBC (10 $\mu g/m^3$ increase in $PM_{2.5}$ associated with 0.1 decrease in mean score, 95% CI -0.2, 0.02).
Conclusions: Presented here are baseline observations for approximately 30% of the ultimate cohort. We observed an inverse relationship between 8-isoprostane and PAQLQ scores. Our data suggest that subjects with higher EBC concentrations of oxidative stress markers may be more susceptible to $PM_{2.5}$ exposure effects on PAQLQ. Continued tracking of these and other biomarkers will enable us to evaluate the causal and temporal natures of these relationships.

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Profile of lead exposure to children from two socioenvironmental distinct regions of Rio de Janeiro's city

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Background and Aims: Lead is a ubiquitous metal in the environment for its natural occurrence and its wide industrial use to which children are particularly sensitive (Ahamed et al., 2005). This work is part of a population survey of chemical exposure, constituting a sub-project that has as target children 8 to 10 years. It is structured as a pilot project conducted in two public schools in the municipality of Rio de Janeiro, whose criterion of choice was to be located in regions with different socioenvironmental characteristics (level of urbanization, pollution sources). The aim of this study was to evaluate lead exposure in schoolchildren of both sexes.
Methods: Cross-sectional study with the study population comprised 270 students. Two questionnaires were applied: in one child and another on the parent / guardian. Anthropometric measurements were taken of the child and performed collection of biological samples (blood and hair nail). The analysis of biological material was performed by ICP-MS. Statistical analysis was performed using SPSS 17.0.
Results: The mean age of the population is 19.9 ± 0797 years. The average concentration of lead in capillary blood of the population studied was 0.0035 mg / dL ± 0.0022, below the limit set by the Centers for Disease Control (CDC) of 10 mg / dL l. There is a statistically significant difference between the schools studied by comparing the concentration of lead in children's blood, in quartiles of distribution. This difference can be explained by environmental pollution that are distinct among the schools studied.
Conclusion: These results suggest that children living in areas with high environmental pollution are more exposed to lead.

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Comparing changes in air pollutant concentration before and after cook-stove replacement in rural Ghana

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Background and Aims: Using novel, low cost, real-time air quality monitors,we performed a pilot study to analyze the impact of transitioning from open flame cooking to efficient, low emission cookstoves (Envirofit) in a region of Northern Ghana where studies of meningitis epidemics and climate are currently underway. These emissions are important since exposure to air pollution may be a contributing factor towards meningitis transmission and susceptibility.
Methods: Monitors were equipped with sensors to measure concentration of total volatile organic compounds (VOCs), ozone, carbon monoxide (CO), and carbon dioxide (CO2). Typical cooking takes place in a enclosed room with an open doorway and burns dried millet stalks between three rocks on which a pot sits. The monitors were placed inside the enclosed cooking areas at 6 sites.
Results: Cooking resulted in elevated concentrations of CO, CO2, and total VOCs. These three pollutants were positively correlated during cooking with correlation coefficients ranging from 0.34 to 0.88. The cookstoves emit between 1/5 and 1/18 of the combusted carbon as CO. During cooking events, concentrations of those three pollutants, which are products of combustion, were negatively correlated with ozone concentrations, as expected since emissions of nitrogen oxides from the cookstoves consume ambient ozone. After installing the cookstoves, CO2 concentrations decreased, but VOCs and CO increased slightly.
Conclusions: Low cost portable monitors are robust and effective at analyzing variations of concentrations over time. We applied these monitors to evaluate the emissions and air quality in kitchens of rural Ghana before and after new cookstoves were put into use. It is yet unclear whether the long-term use of Envirofit stoves will lead to reduced exposure to various air pollutants within kitchens.

A CASE-CONTROL STUDY OF GLIOMAS AND RESIDENCY WITHIN COUNTIES OF POTENTIAL ELEVATED RADON

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Background and Aims: The only established environmental risk factor for brain tumors is ionizing radiation. Radon gas is the chief source of natural background ionizing radiation humans encounter. We aimed to assess the association between potential radon levels within residential counties and the risk for gliomas.
Methods: A case-control study, conducted between 2005 and 2009, included 505 cases and 811 hospital controls recruited from the NorthShore University Health System (Illinois) and the Duke University Medical Center (North Carolina) (National Cancer Institute Grant P50 CA108786-01). This study population represented twenty-eight states in the mid-west and southern United States. Residential counties were linked to potential radon levels from the U.S. Environmental Protection Agency's (EPA) Map of Radon Zones using geographic information systems. The EPA determined these levels with five factors: indoor radon measurements, geology, aerial radioactivity, soil permeability and foundation type of structures. Logistic regression analyses, adjusted for age and gender, were completed to estimate odds ratios (OR) and 95% confidence intervals (CI).
Results: Living within a county where potential radon was high or moderate (>=2 pCi/L) (pico Curies per Liter)) versus low (<2pCi/L) resulted in an OR of 2.3 (95% CI:1.9 –2.9). Living within a county where potential radon was high (>4pCi/L) versus low (<2pCi/L) resulted in an OR of 5.6 (95% CI:3.9–8.2).
Conclusions: To conclude, there is evidence in these data of an association between potential elevated radon and gliomas although usage of the EPA Map is limited as a substitute for personal exposure.

SOURCES OF HETEROGENEITY IN THE CORRELATION BETWEEN AMBIENT, OUTDOOR AND PERSONAL CONCENTRATIONS OF PM_{10}: IMPLICATIONS FOR BIAS IN EPIDEMIOLOGIC STUDIES

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Background and Aims: Although ambient and outdoor concentrations of particulate matter ≤ 10μm (PM_{10}) are often used as surrogates for personal exposure in epidemiologic studies, the observed correlation between ambient, outdoor, and personal measurements vary. Factors underlying this variation among studies remain poorly understood despite their potential impact on exposure measurement error in PM_{10}-health associations.
Methods: We therefore conducted a systematic review of seven electronic reference databases for literature examining the longitudinal, within-person correlation between ambient, outdoor and personal PM_{10} concentrations.
Results: This review identified 699 studies, of which 15(2%) met inclusion criteria. The studies were published between 1990 and 2009, conducted in five countries, and included 336 participants (age range: 7, 86 years; 14% with chronic obstructive pulmonary disease (COPD)). Of 19 populations represented by the studies, 9(47%) examined ambient-personal correlations and 10(53%) outdoor-personal correlations. The median correlation coefficient (r), based on a median of 9 ambient, outdoor-personal PM_{10} pairs per participant, was 0.48 (range: 0.13, 0.72). There was little evidence of funnel plot asymmetry (P_{Begg}=0.9; P_{Egger}=0.4), but substantial among-study heterogeneity of r (P<0.001). In random-effects meta-regressions, r was higher among studies with ambient, outdoor PM_{10} concentrations at or above the median of 28.9 $\mu g/m^3$ (difference in r: 0.27, 95% confidence interval 0.03, 0.48), with personal: ambient, outdoor concentration ratios below the median of 1.5 (difference in r: 0.34, 95% confidence interval 0.12, 0.53), and in participants without versus with COPD: (difference in r: 0.38, 95% confidence interval 0.10, 0.60).
Conclusions: The observed magnitude and heterogeneity of correlations between ambient, outdoor and personal PM_{10} concentrations are similar to those described by recently published meta-analyses of $PM_{2.5}$. Together, the findings help quantify a common form of measurement error associated with reliance on ambient, outdoor PM mass concentrations as proxies for personal exposure to coarse and fine particulates in epidemiologic studies.
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CARDIOVASCULAR MORTALITY AND OCCUPATIONAL EXPOSURE IN AN ALUMINUM COHORT

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Background and aims: Increased risk of cardiovascular mortality related to combustion-generated particulate matter (PM) in air pollution has become a major public health concern. Although occupational exposures to PM can be orders of magnitude higher than ambient levels, evidence regarding cardiovascular disease risk associated with workplace exposure to PM is scant.
Methods: We examined cardiovascular mortality from 1996 to 2008 in a cohort of over 11,700 aluminum workers which has been under observation for over a decade. Individual level exposure metrics for total PM and $PM_{2.5}$ are being developed for the cohort based on job histories and personal sampling results in smelters, refining and fabrication facilities.
Results: Initial analyses using broad classifications of plant type (smelter vs other) show no increased risk of all-cause mortality among those who worked in a smelter. Thirty percent of the deaths were due to cardiovascular disease (CVD). Stratifying by active versus inactive person-time, we found a 14% increased risk for death from CVD (N = 78) and a 28% increased risk for death from ischemic heart disease (N = 55) for active workers who worked at smelters, although all confidence intervals include the null.
Conclusions: Higher peak and mean PM exposures occurred at smelting facilities compared to refining and fabrication facilities, lending support to the hypothesis that there is an exposure-response association between quantitative exposures to PM and CVD mortality.

Abstract title: PREDICTORS OF INDOOR ENDOTOXIN CONCENTRATIONS IN DUST AND AIR

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Background and Aims: Endotoxin, a component of the outer membrane of gram-negative bacteria, has been found to cause airway inflammation. It has been hypothesized that exposure to endotoxin may have a profound effect on asthma sufferers, but little is known about either the exposure levels or the scale of the impact. One goal of the Fresno Asthmatic Children's Environment Study (FACES), a 10-year epidemiology study to evaluate the role of ambient air pollution and bioaerosols on the natural history of childhood asthma, was to understand and evaluate the exposure to airborne and dust endotoxin. Using data collected in the FACES study, we explore these relationships for use in predicting daily indoor endotoxin exposure for FACES participants.

Methods: Daily ambient endotoxin samples were collected at the US EPA Supersite in Fresno, CA from 5/2001-3/2009. From 2/2002-2/2003, intensive air sampling took place at 84 homes with 4-10 matched pairs of indoor and outdoor 24-hr airborne endotoxin (airEU) measurements per home. During these visits, children completed daily lung function tests and health questionnaires. All FACES subjects completed home visits during which bed and floor dust samples (dustEU) were collected for endotoxin analysis. Information on home characteristics, home activities, pets, mildew, and meteorology was collected. These data, as well as the outdoor airEU concentrations, were candidate covariates in a regression analysis.

Results: Endotoxin concentrations at the Supersite show a seasonal pattern of higher concentrations from May to October, the dry season (mean=2.8 vs 0.8 EU/m3), as did outdoor airEU at residences (dry season, mean=5.6EU/m3, wet season: mean=1.1EU/m3); however, the indoor seasonal dependency was weaker. The dustEU did not show seasonality.

Conclusions: Indoor endotoxin concentrations can be predicted using individual home characteristics. This provides a method for calculating the daily individual indoor endotoxin exposure for FACES participants.

USE OF SELF-ORGANIZING MAPS TO CATEGORIZE EXPOSURE PATTERNS IN AIR POLLUTION MONITORING DATA

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Background and Aims: Spatial variation in air pollution processes has presented a problem for exposure classification in time-series studies of air pollution health effects. The aim of this study is to examine the usefulness of self-organizing maps as a means to assess spatial patterns in the air pollution data and relate them to mortality data in a traditional time-series study design.

Methods: A self-organizing map (SOM) has been applied to daily 1-hr maximum nitrogen dioxide (NO2) observations collected by the Port Phillip Bay air monitoring network in Melbourne, Australia over the period of 1999 to 2006 in order to identify spatial patterns of exposure. Smooth maps for each archetype were created using ordinary kriging. Once the archetypes are defined by the SOM, the daily exposure data was then categorized under the archetype in which it is most similar. This produced a time-series of exposure charts that were then compared to daily mortality using the framework of a generalized additive Poisson regression model.

Preliminary Results: The SOM approach produced 20 archetypes in order to display the range of spatial patterns that occur across the monitoring network. Frequency analysis found the average occurrence of any particular type to be 5% with a range of 1 to 9%.

Conclusions: SOMs are a promising method for assessing spatial variation in air pollution data sets. They provide a visualization of spatial patterns in the data and frequency information – powerful tools in understanding space-time data. Moreover, the output provided is suitable for examination of spatial effects on human health in standard time-series approaches.

ASSOCIATION OF SOCIAL AND ENVIRONMENTAL FACTORS WITH PEDIATRIC ASTHMA

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Background and Aims: Asthma is the most common chronic disease of childhood, affecting approximately seven percent of children in the United States. Evidence has indicated that the social environment and physical environment contribute to asthma prevalence as well as asthma-related morbidity.
Methods: We implemented a geographic information system to determine the relation between ecological level factors and asthma diagnosis and emergency department use in a school-based cohort of adolescent students in Oakland, CA. Social factors were derived from Census 2000 variables from students' census tract; environmental exposures were calculated from distance to non-residential land use designations, toxic release inventory (TRI) sites, and major roadways in the area.
Results: Over a two-year period, 4,017 students completed a brief, in-class asthma survey and provided residential addresses that were able to be geocoded. Controlling for individual level variables, students diagnosed with asthma who resided in the 1st and 2nd quartiles of distance to industrial areas had increased odds of emergency department visits (OR: 1.84, 95% CI: 1.01, 3.36; OR: 1.76, 95% CI: 1.05, 2.94, respectively) ; elevated and non-significant effects were found for asthma diagnosis. Distance to closed-access freeways was not significantly associated with either outcome. With regard to social factors, increases in percent of census tract residents who were currently married was associated significantly to decreased odds of diagnosed asthma (OR: 0.98, 95% CI: 0.96, 0.99). Increases in percent of census tract residents with household income less than $25,000 was significantly associated with odds of asthma diagnosis (OR: 1.03, 95% CI: 1.01, 1.05). When social factors were included in the model, environmental factors were no longer significantly related to outcomes.
Conclusion: Both the physical and social environments are associated with asthma outcomes among adolescents in an urban community. Ecological factors measured have distinct relations with prevalence and morbidity outcomes.

EXPOSURE TO ENVIRONMENTAL TABACCO SMOKE AMONG SOUTH KOREAN ADULTS: A CROSS-SECTIONAL STUDY OF THE 2005 KOREAN NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY.

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Background
Studies have identified that environmental tobacco smoke exposure is associated with sociodemographic factors such as age, sex, and socioeconomic status, but few studies have been conducted in South Korea. In this study, the authors investigated the extent of environmental tobacco smoke exposure and factors related in a nationally representative sample of Korean adults.
Methods
The data of 7,801 adults aged 19 years and over collected during the 2005 Korea National Health and Nutrition Examination Survey were analyzed. Information on smoking habits and exposure to environmental tobacco smoke was obtained by self-reports using a standardized questionnaire. Risks of environmental tobacco smoke exposure conferred by sociodemographic variables and behavioral risk factors were evaluated using logistic regression methods.
Results
Overall, 36.1% of nonsmokers (defined as those not currently smoking) and 50.1% of current smokers were found to be exposed to environmental tobacco smoke either at work or at home. Among the nonsmokers, women were more likely to be exposed to environmental tobacco smoke at home (OR=5.29, 95%CI, 4.08-6.67). Furthermore, an inverse relationship was found between education level and the risk of environmental tobacco smoke exposure at home (OR=1.73, 95%CI, 1.38-2.17 for those with a high school education; OR=2.30, 95%CI, 1.68-3.16 for those with a middle school education; and OR=2.58, 95%CI, 1.85-3.59 for those with less than an elementary school education vs. those with a college education or more). In addition, those with office, sales service, or manual labor jobs were found to be at significantly higher risk of environmental tobacco smoke exposure at work than those with professional, administrative, or managerial jobs. Also, the risk of environmental tobacco smoke exposure in the workplace was significantly higher for alcohol drinkers than non-drinkers (OR=1.23, 95%CI, 1.07-1.47). After adjusting for age, sex and education, it was found that those exposed to environmental tobacco smoke at home were more likely to have been admitted to hospital during the previous year (OR 1.26, 95%CI, 1.002-1.66).
Conclusions
In this study of Korean adults, exposure to environmental tobacco smoke at home or work was found to be affected by sex, age, marital status, educational level, and type of occupation. Accordingly, these factors should be given appropriate consideration by those developing policies or interventions designed to control exposure to environmental tobacco smoke.

Title: THE RATE OF CEREBRAL PALSY AND INTELLECTUAL DISABILITY IN CHILDREN OF MOTHERS WITH AN ALCOHOL-RELATED DIAGNOSIS

Presentation type: Oral
Theme: Child Health

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Background and Aims: Heavy prenatal alcohol exposure is reported to increase the risk of cerebral palsy (CP) and intellectual disability. However they are difficult to attribute to prenatal alcohol exposure when the characteristic facial features of Fetal Alcohol Syndrome are absent. This paper presents the rate of CP and intellectual disability in a large, population-based cohort of children born in Western Australia (WA) to mothers with an alcohol-related diagnosis.

Methods: The exposed cohort includes all children of mothers with an alcohol-related diagnosis recorded on the WA linked administrative health datasets 1983-2007 and a randomly selected comparison cohort of children of mothers without an alcohol-related diagnosis. The comparison cohort was frequency matched on maternal age within maternal race and year of birth of her child with women at a ratio of approximately 4:1 for non-Aboriginal and 2:1 for Aboriginal women. There were 23,997 children in the exposed cohort (59.2% non-Aboriginal) and 61,325 comparison children. These data were linked with data from the WA Cerebral Palsy Register (n=293 cases) and the WA Intellectual Disability (IDEA) Database (n= 1,502 cases). Children with a documented genetic cause of intellectual disability were excluded from the analyses.

Results: The overall rate of CP was 4.1/1,000 births in exposed and 3.2/1,000 in the comparison children and for intellectual disability the rates were 34.1/1,000 and 18.4/1,000 respectively. Rates varied by Aboriginal status for CP and intellectual disability and by geographical region for intellectual disability. The results of regression analyses investigating the association between the presence of any maternal alcohol-related diagnosis and the timing of the diagnosis in relation to pregnancy and (1) Pre/perinatally and post-neonatally acquired CP and (2) intellectual disability will be presented.

Conclusions: Prenatal exposure to maternal alcohol-related problems increases the risk of CP and intellectual disability, while post-natal exposure also increases the risk of CP.

CHILDHOOD ACUTE LYMPHOCYTIC LEUKEMIA AND ESTIMATED EXPOSURE TO HAZARDOUS AIR POLLUTANTS

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Background and Aims: Leukemia is the most common cancer in children and yet there are few established risk factors for the disease. Previous studies evaluating the risk of childhood leukemia associated with exposure to outdoor air pollutants have included all types of leukemia and reported mixed results. Our objective was to evaluate the relationship between childhood acute lymphocytic leukemia (ALL) and estimated exposure to hazardous air pollutants.
Methods: We collected residential history information from 630 cases and 984 controls matched on birth date, sex and race/ethnicity enrolled in the Northern California Childhood Leukemia Study (1995-2008). We used a geographic information system to assign residential addresses to census tracts. Corresponding outdoor concentrations for 20 potentially carcinogenic hazardous air pollutants modeled by the USEPA were used to estimate average ambient concentration during the first year of life and from birth to diagnosis/reference date for the matched cases and controls. We used conditional logistic regression to calculate odds ratios based on the interquartile range of the concentrations of individual air pollutants adjusted for household income.
Results: In multi-pollutant models, we observed an increased risk of ALL with an increase in estimated average ambient concentrations of methylene chloride, a solvent used in residential and industrial settings, equivalent to the inter-quartile range (0.38 $\mu g/m^3$) during the time period from birth to diagnosis date (OR=1.3, 95% CI 1.0 – 1.6). The results were similar for the first year of life. We did not observe significantly elevated odds ratios for estimated exposure to any of the other hazardous air pollutants.
Conclusions: Our results suggest that exposure during the first year of life and over lifetime near a child's residence to higher ambient concentrations of methylene chloride are associated with an increased risk of acute lymphocytic leukemia.

MOBILE PHONES AS PERSONAL ENVIRONMENTAL SENSING PLATFORMS: DEVELOPMENT OF THE CALFIT SYSTEM

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Background and Aims: Mobile phones are pervasive computing technologies that offer opportunities for sensing personal behaviors and exposures to environmental hazards. The CalFit system uses the combination of global positioning system (GPS) and accelerometry on mobile phones for continuous measurements of an individual's time-activity patterns, which can greatly inform spatial and temporal variations in exposures for environmental health studies. As a research platform, CalFit was designed for flexibility, allowing its use in air pollution epidemiology, built environment, and active living research. Here, we describe the development of CalFit's algorithm for estimating energy expenditure for physical activity and minute ventilation for air pollution studies.

Methods: We describe the capabilities of the CalFit software that runs on Android mobile phones, which includes time-location tracking using GPS and the estimation of energy expenditure from triaxial accelerometry. To develop the energy expenditure algorithm, the CalFit phone was compared against the COSMED cardiopulmonary exercise monitor for 24 adult subjects (10 men and 14 women aged 19-59 years) who wore both systems simultaneously during a series of prescribed activities (four levels on treadmill spanning 1-6 mph, stair climbing, sit to stand, lie to stand, jump, and 6-minute walk test). Generalized linear equations were used to estimate COSMED measured energy expenditure and ventilation rate from the CalFit phone's vertical and horizontal accelerometry counts.

Results: In the linear model, CalFit vertical and horizontal accelerometry counts/min were significant predictors (β=0.623 P<0.001 and β=1.65 P<0.001, respectively) of COSMED energy expenditure (R^2=0.80). Inclusion of 2-minute counts improved the linear model (R^2=0.86), as did generalizing the model to account for differences between subjects (R^2=0.81). Moreover, energy expenditure and minute ventilation were linearly related (R^2=0.80).

Conclusions: Environmental epidemiology studies that require the combined assessment of energy expenditure from physical activity, minute ventilation, and time-location patterns may benefit from the CalFit phone system.

Blood Lead Levels and Risk Factors in a Low-Income Latino Population in Seattle, WA USA

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Background and Aims

This study determined blood lead levels (BLLs) and predictors in a low-income urban Latino pediatric population in the northwestern United States (Seattle, WA). Surveillance for lead exposure is historically rare in this region.

Methods

Study subjects comprised a cross-sectional sample of 278 children ages 1 to 6 years attending a clinic serving largely Mexican American and Central American immigrant families. An interviewer administered questionnaire was conducted with the child's caregiver. Measurement of BLL was done using an ESA Lead Care II analyzer. Comparison to national data and multivariate analysis of known and suspected risk factors was performed.

Results

The geometric mean BLL was 1.43 ug/dL (95% CI: 1.13, 1.79). For comparison, nationally representative data from 2007-2008 estimated the geometric mean BLL for children under age 6 years was 1.51 mcg/dL (95% CI: 1.37, 1.66). Most (252, 91%) had a BLL lower than the Lead Care II limit of detection, 3.3 µg/dL. Two children's (0.7%) BLL was higher than 5 µg/dL. None were above 10 µg/dL.

The most informative predictor of detectable BLL included nationality other than the US or Mexico (OR=16.1; 95% CI: 1.6, 220.7), living in homes built before 1950 (OR=5.1; 95% CI: 1.4, 16.9) and observed to put paint chips in the mouth (OR=3.6; 95% CI: 1.1, 11.2). Culturally specific risk factors such as ingesting Mexican candies, use of home remedies, and use of ceramic or clay food receptacles were not associated with elevated risk of a detectable BLL.

Conclusions

Lead exposure in this urban Latino population appeared comparable to observations in other U.S. children. Sample size and power to fully investigate exposure risk factors was a limitation. These preliminary data support targeted screening based on lead based paint and immigration status as conducted in other pediatric U.S. populations.

Air pollution has been implicated to be associated with a wide range of early responses in the lung, the circulation and even at more distant organs. Oxidative stress, immune activation, changes in autonomic function and direct impact on various organs has been implicated. The paper will describe the identified modes of actions of ambient air pollution. It will highlight the role of the different physico-chemical characteristics of aerosols in inducing systemic responses in humans.
In order to further establish the role of the various hypothesised mechanisms, the genomic variability was assessed as potential modifier of the air pollution responses. The paper will review advances made by candidate gene approaches focussing on the cardiovascular system. This evidence will be contrasted with recent advances of genomic control in relevant response-pathways based on genome-wide association studies.

Environmental tobacco smoke increases the risk of breast cancer among pre- and post-menopausal Mexican women

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Background and Aims: Tobacco smoke exposure is considered modifiable risk factor for female breast cancer (BC). According to a recent expert panel report, active smoking (AS) increases the risk of BC by 20%, while the association between environmental tobacco smoke exposure (ETS) or passive smoking, and BC in young non-smoking women, especially premenopausal women, is consistent with causality; however, evidence in relation to postmenopausal status is inconclusive (1).
BC has become the leading cause of female cancer in Mexico with highest incidence in northern states (2). By other hand, 6.5 million Mexican women between 12 and 65 years, who have never smoked, are currently exposed to ETS (3). For that reason the aim was to determine the association between cumulative ETS exposure and AS, and BC in pre- and postmenopausal women residing in northern Mexican states, as well as to explore potential windows of susceptibility.
Methods: We study 504 histologically confirmed incident BC cases and 504 age-matched controls from an ongoing population-based case-control study. AS and ETS lifetime exposure, at home and the workplace, targeting periods of suspected susceptibility, were estimated from direct interviews. Active and passive smokers were compared with never active smokers without a history of ETS exposure. Odds Ratios (OR) were estimated using multivariate logistic regression models, including known reproductive BC risk factors as covariables.
Results: ETS exposure significantly increased BC risk (OR T_3vsT_1=3.31, 95%CI 2.36-4.64, p-trend<0.001) even after stratifying by menopausal status. BC risk was also associated with AS (OR T_3vsT_1=1.49, 95%CI 1.06-2.09, p-trend<0.001). No window of susceptibility was found for ETSS; risk associated with AS increased when women began smoking between menarche and first childbirth.
Conclusions: Our results provide evidence that ETS exposure is a risk factor for both pre- and postmenopausal Mexican women, and confirm that AS is a risk factor for BC.

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DEVELOPMENT AND IMPLEMENTATION OF A COMMUNICATION PLAN FOR THE FRESNO ASTHMATIC CHILDREN'S ENVIORNMENT STUDY (FACES)

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Background and Aims: Communities are often disappointed in their participation in research studies, sometimes because researchers do not report the results to the community or provide assistance with application of the results to improve the well being of the community. A sense that researchers are indifferent to the community may lead to an unwillingness to participate in future research studies. This communication plan had aimed to assess the communication needs; to establish regular communication; and to communicate results to participants and to stakeholders.
Methods: Communication needs of FACES participants were assessed by a telephone survey of 50 participants. An invitation to participate in an online survey was emailed to 28 relevant organizations and 23 stakeholders from various community, non-governmental, and governmental organizations completed the survey.
Results: The results of interviews and surveys with key stakeholders were used to refine and revise the methods of providing feedback to participants and stakeholders. Regular communication was established with newsletters and fact sheets mailed to participants and a website; these included asthma related news and, later, aggregate study results. Individual results initially provided to participants ceased based on participant feedback. Key project results were communicated via three stakeholder meetings with planners, the Asthma Coalition, and the Fresno Medical Association; information packets were sent to school stakeholders.
Conclusions: This communications plan connected our research team with the participant and stakeholder community, fostered relationships and the collaborations have facilitated participant and community trust and satisfaction with the study, in addition to increasing dissemination of study results.

AIR POLLUTION AND AIRWAY INFLAMMATION: A TIME LAG BETWEEN NO_2 AND O_3

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Background and Aims: Although studies have demonstrated that air pollution is associated with adverse health effects, little is thought about a time lag, particularly between NO_2 and O_3. Ozone is a secondary pollutant produced by the reaction of NO_2 in the presence of sunlight. So we observed a time difference between NO_2 and O_3 in detail when we evaluated acute effects of air pollution on biomarkers of airway inflammation.
Methods: The fraction of exhaled nitric oxide (FE_{NO}), a non-invasive measure of airway inflammation, was measured in 939 subjects. Air pollution levels were collected at a stationary monitoring site, and meteorological factors were monitored at a meteorological tower.
Results: NO_2 and O_3 showed a strong negative correlation. Air pollutant concentration was matched with a FE_{NO} level on various lags adjusting age, gender, and meteorological factors. Both NO_2 and O_3 were associated with changes in the FE_{NO}. However, NO_2 and O_3 worked in the opposite direction. When we look the lag structure, NO_2 effects persisted from lag 0 until lag 9, whereas O_3 effects remained from lag 9 up to more than lag 24, prior to FE_{NO} testing. NO_2 and O_3 were significantly associated with 8.3% (lag 0, $p<.0001$) and 11.9% (lag 12, $p=0.0008$) higher FE_{NO} levels over the inter-quartile range of 19 ppb and 14 ppb, respectively.
Conclusions: Short-term increases in NO_2, a pollutant associated with traffic emissions and industry, and O_3, a secondary pollutant formed by the action of sunlight on NO_2, were associated with airway inflammation with an 8~12 hour difference in lag time.

METEOROLOGICAL EFFECTS ON AIRWAY INFLAMMATION AS MEASURED BY EXHALED NITRIC OXIDE

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Background and Aims: To study the effect of outdoor weather conditions on airway inflammation as measured by exhaled nitric oxide during summer month in Korea.
Methods: A total of 991 residents were tested the fraction of exhaled nitric oxide (FE_{NO}), a non-invasive measure of airway inflammation during the summer month, August 8-30, 2005. Air pollution and meteorological parameters were obtained from a near ambient air monitoring station.
Results: The average outdoor temperature, relative humidity, and air pressure were approximately 27.3℃, 81.5%, and 1005.7 hPa, respectively during the study. The hourly average of meteorological concentration was matched with a FE_{NO} level on various exposure windows after adjusting for confounders including age, gender, smoking, cough, asthma, allergic rhinitis, bronchial hyper-responsiveness, skin prick, and air pollutants. Ambient temperature, relative humidity, and air pressure were associated with 7.8% (lag 39, p<.0001), 7.8% (lag 8, p<.0001), and 4.9% (lag 37, p=0.0169) higher FE_{NO} levels over the inter-quartile range of 4.3℃, 20.2%, and 4.0 hPa, respectively. The relations of both air temperature and relative humidity with FE_{NO} appear graphically as a very wide U-like shape, and optimum air temperature and relative humidity with lowest FE_{NO} level are about 25-26℃ and 60-70%, ranging from 18.0℃ to 36.9℃ and 32.1% to 99.5% in study month, respectively.
Conclusions: Adverse inflammatory reactions are expected for both below and above the optimum temperature and relative humidity. However, ambient weather conditions of the summer month in Korea should not have too much effect on airway inflammation as measured by FE_{NO} level.

FETAL VOCS EXPOSURE AND INFANTILE NEUROBEHAVIORAL DEVELOPMENT IN MOTHERS AND CHILDREN'S ENVIRONMENTAL HEALTH (MOCEH) STUDY

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Background and Aims :Prenatal exposures to VOCs are treated as environmental toxicant which has health effect on fetus and their last of life. However, regarding to postnatal neurobehavioral development, limited studies were done and even failed to find a significant relationship between them. Therefore, we aimed to investigate the relationship between prenatal exposure to VOCs and postnatal neurobehavioral development of 6 and 12month.
Methods: 1,751 pregnant women were enrolled in birth cohort of MOthers and Children's Environmental Health(MOCEH) study from 2006 to 2010. We investigated maternal general characteristics including socio-economic and obstetric characteristics by questionnaires. Environmental hygienist assessed total volatile organic compound(TVOC) and formaldehyde(HCHO) exposure by using passive samplers for 382 pregnant women during pregnancy. After delivery, birth outcomes such as gestational age, birth weight and gender of newborns were obtained from delivery records. Certificated investigators performed baley test for measuring mental developmental index(MDI) and psychomotor developmental index(PDI) of infants on 6 and 12month. After excluding twins, undelivered cases and missing values for important covariates, we used 338 newborn's data and multiple general linear models in statistical analyses(SAS version 9.2).
Results: The median values of TVOC and HCHO were 183.8 and 69.5ug/m3. The mean of newborn's birth weight is 3289.3g and 7cases were low birth weight(2%). The mean of infantile MDI scores were 96.4 and 103.8 at 6 and 12month, and PDI were 96.2 and 96.6 at each point, respectively.
In adjusted model controlled covariates including breast-feeding and maternal education, a quartile increase of TVOC showed statistically significant decrease in MDI(ß=-1.7, SE:0.8. p=0.05) at 6 month, however, not statistically significant decrease in PDI score(ß:-1.2,SE=0.9).
Conclusions:These results indicated that elevated exposure to TVOC of fetal period may decrease postnatal neurobehavioral development during early life.
*This study was supported by the National Institute of Environmental Research, Republic of Korea.

TITTLE (THE RELATIONSHIP BETWEEN ENVIRONMENTAL FACTORS AND DEVELOPMENT OF ALLERGIC DISEASE OF INFANT OVER THE TWO YEARS IN MOCEH (MOTHER AND CHILDREN'S ENVIRONMENTAL HEALTH STUDY))

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Background and Aims: The prevalence of allergic diseases has increased in Korean children since 1995. Previous studies suggested that environmental factors may influence on the development of allergic diseases, but the relationship between environmental factors and allergic diseases remain unclear. Moreover, research for infant has been limited. The aim of study was to investigate the relationship between environmental factors and development of allergic disease over the two years

Methods: The prospective cohort study of Mothers and Children's Environmental Health (MOCEH) have been built up in 2006 and we enrolled 1,751 women before second trimester of their pregnancy and their partners in 2006-2010. Information on socio-demographic characteristics, psychosocial status, health behavior and environmental exposure were collected from an interview with trained nurses. After delivery, infants were followed up at 6, 12 and 24 months and the mothers are asked for information on hospital visits due to symptoms of atopic dermatitis, asthma and allergic disease such as allergic rhinitis, food allergy, and allergic conjunctivitis using the questionnaire. The relationships between environmental factors and development of allergic disease were measured by the generalized estimating equations (GEE) model. Statistical analyses were performed using SAS statistical software Version 9.1.

Results; Prevalence (%) of hospital visits due to symptoms of allergic disease was increasing with increase of age, even though atopic dermatitis and asthma were decreasing by age. The use of sofa was significantly associated with an increased development of atopic dermatitis of infants during the two years (Adjusted OR 2.87; 95% CI 1.87 to 1.108) after adjusting for gestational age, maternal age, maternal education, infant's sex, parity, breast feeding, postnatal ETS exposure and maternal weight by the GEE. In addition, use of air freshener was also related to increase the risk of allergic disease (Adjusted OR 3.72; 95% CI 1.001 to 1.143).

Conclusions; This study demonstrates that usage of sofa and air freshener may be risk factors that influence on the development of allergic disease. We also plan to examine the relationship among environmental factors, biomarker, and allergic disease using path analysis.

Acknowledgment: This study was supported by the Ministry of Environment, Republic of Korea.

ANALYSIS OF AEROSOL SIZE DISTRIBUTION DURING SAHARAN DUST EVENTS AT MT. CIMONE (ITALY)

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Background and Aims: There is a growing concern about the health effects of Saharan dust outbreaks but exposure characterization needs to be largely improved both from a physical and chemical point of view. In this work, we investigated the typical aerosol size distribution observed during Saharan dust outbreaks over Northern Italy.
Methods: Saharan dust outbreaks over North Italy were identified by analysing the hourly number concentration of coarse aerosol particles (geometric particle diameter, Dp >1 μm) observed at the Italian Climate Observatory "O. Vittori" at Mt. Cimone (2165 m a.s.l., Italian Northern Apennines), a global GAW station representative for a wide area extending over South Europe/Mediterranean basin. Here, the coarse aerosol particle are considered a marker of mineral dust transported. These measurements were carried out using a optical particle counter (model 1.109; Grimm, Ainring, Germany) following the experimental protocol described by Marinoni et al.(2008). In order to clearly deduce the Saharan origin of coarse particle peak events, 3D air mass back-trajectories from Mt. Cimone were calculated using the FLEXTRA model. Following Bonasoni et al. (2004), in order to corroborate the Saharan dust event identification, the classification procedure involves satellite data and transport modelling analyses.
Results: We found that Saharan dust outbreaks brought pronounced changes in the aerosol size distribution observed at Mt. Cimone.
Conclusions: Our results suggest that Saharan dust outbreaks can influence aerosol concentration from the accumulation to the coarse mode. Further work should be carried out to clarify the relationship between observed mineral dust size distribution, typical atmospheric transport patterns as well as evolution in time and space of the mineral dust plumes along the transport from North Africa to North Italy.

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THE EFFECT OF PM_{10} EXPOSURE ON MORTALITY BY THE TIME OF DEATH

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Background: Many studies have established PM_{10} effects on mortality. However, it is not clear that the relationship between the time of death and PM_{10} exposure. We focused on the relationship between the time of death and PM_{10} exposure in Seoul, Korea.
Data and Methods: We employed a temperature matched case-crossover design. Mortality data (except accidental death) from the Korean National Statistics Office consisted of records for Seoul, Korea for 2008, and included individual characteristics such as age, address, cause of death and time of death etc. A total of 33,728 deaths were identified, including 8,693 and 1,816 for cardiovascular and respiratory mortality, respectively. Stationary monitoring data of PM_{10} at the 25 sites in Seoul was analyzed together with weather data and hourly data of PM_{10} was acquired.
We divided a day into 3 time groups by subject's time of death followed as: Morning time (1 a.m. to 8 a.m.), Day time (9 a.m. to 4 p.m.), Night time (5 p.m. to midnight).
Result: We found that the associations between PM_{10} and mortality were significant during the morning and day time after 24 hours of lag, but not significant during the night time. During the study period, $10ug/m^3$ increase in PM_{10} with the lag of 24 hour was associated with the increases in morning and day time mortality by 1%(95% CI : 1.002, 1.017), 0.8%(1.001, 1.014), respectively for total mortality, 1%(1.001, 1.031), 1%(1.000,1.028), respectively, for cardiovascular mortality.
Conclusion: The effect of PM_{10} exposure with lag of 24 hour on mortality was different by the time of death. Especially, the effect of PM_{10} on mortality was positively associated for the subjects who died in the morning and during the day. However, the subjects who died at night time showed less association with PM10 than other subjects who died between 1 a.m. and 4 p.m.

THE DEVELOPMENT OF NATIONAL SURVEILLANCE SYSTEM FOR THE CLIMATE CHANGE-RELATED HEALTH IMPACTS IN KOREA

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Background and Aims: Climate changes have definite influence on health. The assessment and identifying of climate change-related health impacts is required to establish proper policy for government. Korea has developed the national surveillance system to make reliable data for evidence of policy and investigation about epidemiologic characteristic.
Methods: Delphi technique was performed to identify the climate change-related area among the expert. The study made suggestions about the system building by examining the current state of the nation and additionally required elements in order to help to set up a monitoring system in each subarea.
Results: The following field is selected to be monitored: 1) Influences of severe heat, 2) Influences of meteorological disasters, 3) Infectious diseases via insects and rodents, 4) Infectious diseases via water and food, 5) Influences of pollens, allergens, and air pollution, 6) Cardiocerebrovascular and chronic diseases, and 7) Influences of UV light. Heat related-health impact can be monitored by heat stroke patients based on ER, usage status of emergency department or ambulance service, mortality and predictive model for daily mortality. Morbidity due to meteorological disaster, such as injuries, acute diseases, exacerbations of chronic disease or psychological problems like post-trauma stress disorder is monitored as well as mortality. Surveillance system for arthropod and rodent-borne disease is relatively well implemented under statutory infectious diseases monitoring system. Because water-borne or cadiocerebrovascular diseases does not have enough evidence related to climate change, further researches about relation between them are needed. National cancer registry system can be used for UV light-related health surveillance system. Advanced studies for validity of national surveillance systems are conducted and will be performed in 2011.
Conclusions: National surveillance system can be established by use of existing systems and data and improved by compensation for the defects. It will be helpful for making policy and various studies.

THE RELATIONSHIP BETWEEN INDOOR PM_{10} EXPOSURE DURING PREGNANCY AND INFANT NEURODEVELOPMENT : THE BIRTH COHORT OF MOTHERS AND CHILDREN`S ENVIRONMENTAL HEALTH (MOCEH)

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Background and Aims : A few studies have reported that the effect of ETS in indoor on infant neurodevelopment. However, most of researches did not deal with infant neurodevelopment for PM exposure. Therefore, the aim of this study was to investigate the association between prenatal PM10 exposure and infant neurodevelopment.
Methods: We collected the eligible data of 1,751 pregnant women from three collaborating centers metropolitan area(Seoul), industrial area(Ulsan), and medium-sized urban area(Cheonan). Questionnaire was composed of residential factors, environmental exposure and general characteristics. We measured indoor PM_{10} for 271 houses. And we estimated for emission rate of indoor PM_{10} by using air exchanges per hour for residential characteristics of questionnaire (i.e., smoker in indoor, number of family, house type). We tested correlation coefficient between estimated and measured indoor PM_{10}. PM_{10} spatial estimations were adjusted to correspond to relevant pregnancy periods (i.e., whole pregnancy and trimesters) for each woman. We measured mental developmental index (MDI) and psychomotor developmental index (PDI) score using bayley test [The Korean Bayley Scales of Infant Development (K-BSID-II)] on 6 month. We examined the relationship between indoor PM_{10} during pregnancy and infant neurodevelopment for among 494 babies on 6 month.
Results: In multiple linear regression model after adjusting for maternal age, education, income, breast milk on 6 month, ETS, and gestational age, MDI was decreased by indoor PM_{10} exposure during first trimester (β=-4.67, SE=0.09) and during total period (β=-3.81, SE=0.18). PDI was decreased by indoor PM_{10} exposure during first trimester (β=-5.86, SE=0.11), during second trimester (β=-2.77, SE=0.14), and during total period (β=-6.03, SE=0.22).
Conclusions: Prenatal exposure to indoor PM_{10} may affect infant neurodevelopment. These results suggest that developing strategies to reduce PM_{10} exposure during pregnancy are required in order to prevent risks for fetal health.

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MULTIPOLLUTANT ASSESSMENT OF SHORT-TERM MORTALITY EFFECTS OF FINE PARTICULATE MATTER, ITS CHEMICAL CONSTITUENTS AND GASEOUS POLLUTANTS IN U.S. CITIES.

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Background and Aims: U.S., European, and Canadian multi-city studies have shown relatively consistent short-term mortality effects of particulate matter (PM) and ozone. However, there is less information available for the effects of other gaseous pollutants and the role of PM chemical components. The objective of this study was to identify specific characteristics (e.g., source type) of the air pollution mixture in major U.S. cities.

Methods: We assembled and analyzed mortality and air pollution data for 64 major U.S. cities where fine particulate matter ($PM_{2.5}$), key $PM_{2.5}$ chemical constituents, ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide, and sulfur dioxide were all available for the years 2001-2006. In addition to analyzing individual pollutants, we conducted factor analysis with $PM_{2.5}$ chemical constituents and gaseous pollutants. All-cause mortality risk estimates for the pollutants at lag 0 through 3 days were estimated using Poisson regression models in individual cities, adjusting for temporal trends, immediate and delayed temperature, and day of week. Risk estimates from individual cities were combined in a second-stage random effects model.

Results: Of the criteria pollutants, PM_{25}, NO_2, and O_3 were each associated with all-cause daily deaths, with NO_2 showing the strongest association (e.g., percent excess death of 0.33% [95%CI: 0.17, 0.49] per 10 ppb increase in 24-hr average at lag 1 day). Factor analysis yielded several components that could be interpreted as traffic (EC, OC, NO_2), soil (Al, Si), metals (Pb, Zn), coal (As, Se), sea salt (Na, Cl), and residual oil (Ni, V). Soil and traffic factors showed significant or nearly significant associations with mortality, with magnitudes similar to those for the criteria pollutants per comparable distributional increment, despite the smaller sample size.

Conclusion: Both regional and local pollutants contribute to short-term mortality effects.

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IS THERE SYNERGY IN THE TEMPERATURE AND AIR POLLUTION EFFECTS ON HEALTH? RESULTS FROM THE CIRCE PROJECT IN 10 MEDITERRANEAN CITIES

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Background and Aims: Climate, meteorology as well as air pollution are known to affect health. There is accumulating evidence for synergy between temperature and air pollution. Within the framework of the CIRCE project (Climate Change and Impact Research: the Mediterranean Environment) we studied the joint effects of apparent temperature and air pollution on mortality.
Methods: Mortality, meteorological and air-pollution data from 10 cities around the Mediterranean were available (Athens, Bari, Barcelona, Istanbul, Lisbon, Palermo, Rome, Tel Aviv, Tunis and Valencia). We used GEE models to estimate the confounding and synergistic effects between temperature and air-pollution on total natural and cause-specific mortality. The effect of apparent temperature on mortality was estimated before and after adjustment for air-pollution. To investigate possible synergy we included interaction terms between each pollutant, alternatively and apparent temperature.
Results: The effect of temperature on mortality was consistently smaller when we adjusted for air-pollution. The largest difference was observed when we controlled for PM_{10} which resulted in a reduction of about 15% in the temperature effect estimate. We observed a higher temperature effect in days with higher PM_{10} and ozone concentrations. The synergistic effect was significant in the elderly. Specifically, in a day with low PM_{10} levels (25^{th} percentile of the PM_{10} distribution) the increase in mortality associated with an increase of 1ºC in temperature was 2.37% (95%CI: 1.15-3.60) whilst the increase in days with high PM_{10} levels (75^{th} percentile) was 3.02% (95%CI: 1.71-4.35). The increase in mortality associated with an increase of 1ºC in low and high ozone days was 3.56% (95%CI: 2.36-4.78) and 4.03% (95%CI: 2.65-5.43), respectively.
Conclusions: There is evidence for a synergistic effect between PM10, ozone and high temperature on mortality. Adjustment for particles should be applied in the estimation of the effect of temperature on mortality.

Background and Aims

Increasingly, scientists and consumers alike are concerned about the environmental costs of food, such as greenhouse gas emissions generated by transportation. Food miles, the distance food travels from farm to plate, are used to gauge the environmental impact of food transport. Previous studies have merely assessed transportation distance, fuel consumption, or CO_2 emissions at the aggregate level. We developed a comprehensive method for assessing CO_2 emissions per weight of the edible portion of different types of foods, transported from farm to consumer in California.

Methods

We identified the food distribution networks from production farms to processing plants, to central regional markets/distribution centers of three different food commodity types: produce (grapes), meat (beef), and dry groceries (almonds). Using GIS we mapped the transportation pathways of the trucks for each food and computed CO_2 emissions according to specific fuel efficiencies, payload standards, and distribution practices of a supermarket chain in southern California. Fuel efficiencies were customized as payload changes throughout the distribution network, including empty-truck distance. Additionally, we accounted for commodity-specific changes in weight from source to customer.

Results

Grapes, beef, and almonds travel by road from production farms to southern California consumers 899, 1348, and 1291 miles, respectively. This results in 161, 92, and 400 g of CO_2 emissions per kg of grapes, beef, and almonds, respectively. When adjusting for distance differences from farms to distribution center, the emissions are 130, 110, and 380 g of CO_2 per kg of grapes, beef, and almonds, respectively. These transportation emissions represent 38% for grapes, <1% for beef, and 29% for almonds of the respective production-related greenhouse gas emissions calculated in our previous work.

Conclusions

The presented methodology is a comprehensive approach for assessing the impact of food transportation on climate change. Independent of food mileage, there are commodity-specific transportation emissions.

We tested our model by using three foods: almonds, grapes, and beef.

Although, these studies examined different levels of food transportation systems (e.g., local *vs.* conventional sourcing) and parameters (e.g., fuel efficiency), other important elements were not investigated. Food miles were calculated by modeling distances from sources to central or institutional markets, instead of to the point of purchase; ~~fuel efficiencies were assumed not vary with payload; and weight losses due to spoilage and food processing were not taken into account~~. In this study we developed a methodological framework for comprehensively assessing the CO_2 emissions of food transportation from farm to consumer. We tested our model by using three foods: almonds, grapes, and beef.

First, we identified the geographic source areas in California for the food items of interest using county-level production statistics. A food distribution expert provided information on the locations of the main processing facilities (PF) as well as on the distribution patterns from farm to consumers, locations of distribution centers (DC) and logistics specifics pertaining to one the largest food retailers in southern California. Food-specific distribution pathways were constructed by connecting PFs with consumer point of purchase (POP). Each pathway is delineated through a series of nodes (PF, DC, and POP) and links (the intervening distance vectors). Emissions were quantified for transportation of commodities from agricultural source areas to PFs using midsize trucks, and of processed foods to DCs and to POP by large trailer trucks. Truck and fuel economy data for the U.S. and CO_2 emission factors for transportation fuels were obtained from the EPA, DOT, and DOE. A GIS was used to geocode the food distribution nodes and then to estimate the mileage between them. After the mileage for all truck categories was computed, emissions were calculated according to pre-specified truck- and food-specific maximum freight weights.

Fuel efficiencies were adjusted according to payload variation across the distribution pathways. Empty miles as well as weight losses due to spoilage and food processing were also modeled. Results are summed by means of a common functional unit of grams of CO_2 per Kg of food product at the POP.

THE LEAD-ACID BATTERY FACTORY HARM TO THE SURROUNDING ENVIRONMENT AND POPULATION HEALTH

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Background and Aims: To explore the effects of lead-acid battery factory on surrounding air, water and soil, as well as the impacts to population health neighboring, in order to provide scientific evidences to the strategy of protection and governance.

Methods Literatures in the almost two decades concerning occupational lead contact, lead harm and lead poisoning level in battery manufacturers are analyzed and summarized to investigate the harm status.

Results Lead concentration in air, water and soil exceeds the allowed limit more slightly than before since 1998, and lead accumulation in the body of occupational population and children were higher than the resident around. According to the references, Children's BBL exceeded the allowed level above 70%, and the lead burden of occupational population arranged from 4.8% to 66.7%.

Conclusion The harm of occupational lead contact in our country is relatively serious, so the supervision should be strengthened to ensure the health of workers, staffs and all people involved.

PRENATAL EXPOSURE TO MERCURY AND COGNITIVE AND PSYCHOMOTOR DEVELOPMENT AT FIRST YEAR OF LIFE

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Background and Aims: Mercury is a ubiquitous pollutant that is known to be neurotoxic to humans. Vulnerability of the central nervous system to these substances is increased during early development, especially during the prenatal period. Early mother-child cohort studies have reported evidence about deleterious effect of prenatal exposure to mercury, but others did not find it. The purpose of the current study is to assess whether prenatal Hg exposure may affect negatively both mental and psychomotor development among infants in a large population-based cohort study with moderate-high fish consumption.
Methods: Study subjects (n=1683) were participants in the INMA (Environment and childhood) Project, a multicenter cohort study from four areas of Spain (Valencia, Sabadell, Asturias and Gipuzkoa). Cord blood total mercury (T-Hg) was analyzed by atomic absorption spectrometry. Neurodevelopment of the children was assessed around age 14 months using the Bayley Scales of Infant Development. Covariates were obtained through questionnaire.
Results: Geometric mean of cord blood T-Hg was 8.4 µg/L (95%IC: 8.1, 8.7). At the multivariate analysis, including maternal fish consumption, T-Hg did not show an association with mental or psychomotor development delay. An interaction between sex and T-Hg was observed, with a negative association with psychomotor scores in girls (p=0.06) but not in boys.
Conclusions: Overall, prenatal exposure to mercury was not associated with mental or psychomotor development delay at the first year of life. Observed gender differences need to be confirmed by further studies.
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HORMONAL CHANGES ASSOCIATED WITH DDT UPTAKE IN YOUNG MALES

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Introduction: The data of a cross-sectional study evaluating male fertility parameters in apparently healthy young men from Limpopo exposed to DDT, mainly from Indoor Residual Spraying (IRS) was analyzed to test for an association between DDT isomers and male hormone levels.
Method: Complete data on plasma DDT isomers, serum total testosterone (t-T) and sub-fractions, estradiol, LH, FSH, albumin and SHBG were available for 198 men - mean (SD) age 23(4) years. Information on life style, anthropometry and exposure to other pesticides was sourced from the questionnaire. Data was normalize using appropriate transformations where indicated. Only hormones significantly correlated with any DDE or DDT isomer ($p<0.2$) were further analyzed through linear regression models. Following bivariate linear regression analyses all independent variables having a statistical association ($p<0.15$) were included in an initial multiple linear regression model for each hormone as dependent variable. A manual stepwise elimination process was followed and variables with a 95% confidence interval not including zero or that changed other coefficients >10%, were kept in the final models. DDT or DDE isomers were introduced separately in each final model keeping the other predictors constant.
Results: Maximum levels for p,p'-DDE, o,p'-DDT and p,p'-DDT were: 997, 42 and 519 µg/g lipid, respectively. Fifty-five percent of subjects reportedly used pesticides and 43% smoked cigarettes (mean two/day for three years). Median (range) t-T and % free-T (%f-T) were 24.1(7.0, 53) nmol/L and 2% (0.6, 3.4%) respectively. Concentrations above reference values were observed for estradiol (27%), SHBG (25%) and bio-available testosterone (bio-T) (36%). Total-T, f-T and bio-T were explained by one or more of the DDT/DDE isomers, as well as other variables (adjusted R2 0.07. 0.06 and 0.05).
Conclusions: The results suggest that exposure to DDT from IRS may be associated with altered sex hormone homeostasis in young men.

Flexible heat-mortality models for projecting climate change impact on health

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Background and Aims: Projecting the future impact of climatic heat on human health requires three inputs:(1) climate changes scenarios, preferably downscaled at least to city-sized geographical areas (statistical divisions); (2) dose-response functions specific to local age-specific sub-populations; (3) consideration of the potential for acclimatisation to a changed environment, whether through physiology, technology or behaviour.This talk addresses the second input: how to arrive at heat-mortality response functions that are robust enough to support reliance on both extremes of the temperature distribution.

Methods: Regression analysis of daily mortality data in Australia in relation to local weather, 1998-2007.

Results: The choice of functional form bears greatly on the balance between reduced impact of cold and increased impact of heat in projected climates to 2050 and 2100 in Australian capital cities.

Conclusions: Care is needed in accurately modelling both ends of the temperature-mortality response function.

CHRONIC EXPOSURE TO ARSENIC VIA DRINKING WATER AND EVALUATION OF HEALTH EFFECTS IN 91 MUNICIPALITIES OF THE LAZIO REGION, ITALY

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Background and aims: Chronic exposure to arsenic (As) via drinking water is associated to several health problems, i.e. cancers, diabetes, respiratory and cardiovascular diseases. In response, the EC Directive set a limit of As≤10 µg/L in drinking water. In Italy several areas exceed this limit, including 91 municipalities in the Lazio Region.
This study investigates the association between As exposure via drinking water and health effects (mortality, disease incidence) in the 91 municipalities during 1990-2009.
Methods: The 91 municipalities are located in three provinces: Viterbo (60), Rome (22), Latina (9). Mortality and disease incidence for internal malignancies (lung, bladder, kidney, liver, prostate), diabetes, cardiovascular and respiratory disease were investigated. Relative Risks (RR) were calculated for each municipality using cause mortality/incidence rate compared to the rate in the region.
Chronic As exposure was estimated using As level in drinking water from measurements campaigns and developing an indicator based on the subject's residence. Geographical analysis using GIS techniques was performed to identify disease incidence and mortality clusters. To validate the exposure indicator a bio-monitoring study will be conducted in a sub-sample of the population (500 subjects), using urine, blood and hair samples.
Results: Retrospective mortality analysis for the selected causes showed some clusters in exposed municipalities, most evident in Viterbo and Latina provinces. In Rome province, clusters were found only for lung and bladder cancer. The estimated mortality excess for bladder by province varied from +20% in Rome to +39% in Latina. These preliminary results will be better investigated taking into account population levels of exposure and duration.
Conclusions: Chronic exposure to As in drinking water is a major public health concern. Considering the significant impact of high As concentrations on health reported in the literature, future research should focus on the long-term effects of exposure to low-medium concentrations, as in Italy.

INTERACTIONS BETWEEN ENVIRONMENT AND THE IMMUNE SYSTEM IN DEVELOPMENT OF ALLERGIES

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Background and Aims
Environmental factors may affect the development of atopic dermatitis, and this has been described to be already effective during pregnancy. The aim of the study was to determine prospectively whether the timing of exposures, prenatal and postnatal, especially the introduction of complimentary food during the first year of life, is associated with the development of atopic dermatitis according to different ages of onset. We further analysed the association between the expression of innate immune genes at birth and atopic dermatitis.
Methods: 1056 children who participated in a birth cohort study (PASTURE/EFRAIM) were included in this study. Atopic dermatitis (AD) was defined by doctor's diagnosis reported by the parents up to 4 years of age in combination with a SCORAD score indicative for atopic dermatitis at 1 year of age. Feeding practices were reported by parents in monthly diaries between the 3rd and 12th month of life. Gene expression of Toll-like receptors (TLRs) and CD14 were assessed in cord blood leucocytes by quantitative PCR.
Results: Prenatal exposure to farm animals and cats was associated with a decreased risk of developing early onset (during the first year of life) AD, but not with AD with first manifestations after the first year of life. The diversity of complementary food introduced in the first year of life was associated with a reduction of the risk of having late onset AD. Elevated expression of TLR5 and TLR9 in cord blood was associated with a decreased risk for doctor's diagnosis of AD. A significant interaction between polymorphisms in *TLR2* and prenatal cat exposure was observed on atopic dermatitis.
Conclusions: The timing of exposure has an influence on the development of atopic dermatitis in children according to the age of onset. Our results suggest a role of the innate immune system in mediating the protective effect of prenatal exposures and a slight effect of gene-environment interaction on the development of atopic dermatitis.

EXPOSURE TO SECONDHAND SMOKE AND ASTHMA AMONG KOREAN ADULTS: RESULTS FROM THE KOREA NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY(KNHANES), 2007-2009

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Background: Although previous studies have suggested the exposure to secondhand smoke as an asthma risk factor, there is inconsistency between researches. The objective of this study was to evaluate whether an association of exposure to secondhand smoke with asthma exists and its relation is modified by gender.
Methods: The data of 17,240 adults aged 19 years and over retrieved from the Korea National Health and Nutrition Examination Survey (KNHANES IV). Information on outcome measures (ever asthma, current asthma and physician-diagnosed asthma) was obtained by self-reports using a standardized questionnaire. Participants were classified as being exposed to ETS at home if any household member smoked at home. Multiple logistic regression was used, adjusting for age, marital status, education, income, body mass index, smoking and physical activity.
Results: 4.2% of the participants reported having ever-asthma, while the prevalence of current asthma was 2.5%. Exposure to secondhand smoke at home was associated with increased risks of current asthma (OR 1.38, 95% CI 1.05 to 1.81). Men exposed with secondhand smoke relative to unexposed had odds ratios of ever asthma of 1.79 (95% CI 1.05 to 1.81) and current asthma of 2.60 (95% CI 1.64 to 4.11). In addition, a diagnosis of asthma in men was associated with secondhand smoke exposure (OR 2.23, 95% CI, 1.42 to 3.52).
Conclusions: Among Korean adults, exposure to secondhand smoke was associated with asthma and this tendency was observed apparently in men.

Conclusions: Among Korean adults, exposure to secondhand smoke was associated with asthma and this tendency was observed apparently in men.

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Health impact assessments driven by classical epidemiological-based models: how reliable are our predictions in systems with feedback? A qualitative dynamical systems assessment

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Background and aims: Scenario-based health impact assessment s– such those used to estimate future climate change impacts – are commonly driven by static equations fitted to observed conditions. When using these equations, variable values are changed to reflect scenario conditions, with equation coefficients remaining constant. However, when modelling systems with feedbacks or subject to perturbations, a change of variable value or context may percolate through the system leading to a change in the equation coefficients. In these cases, a static equation may not correctly predict outcomes under scenarios of interest. We use a qualitative dynamical systems approach to demonstrate this.
Methods: We analyse a previously developed regression equation that quantifies the relationship between weight gain, energy intake, and disease. The equation was fitted in a stable setting and then used to estimate population weight gain under various scenarios. Using this framework, we developed a dynamical system incorporating feedbacks. When possible, we quantified relations; when not, we represented them qualitatively (e.g. directionally). We then perturbed the system in various ways and assessed the impact on the coefficients of the original regression equation.
Results: The dynamical model showed that under certain perturbations, the system shifts and settles at a new equilibrium. When this occurs the correlations between the system variables - which represent the coefficients of the original regression equation – also change. This suggests that beyond the situation in which the regression equation was fitted, it does not correctly predict the outcome
Conclusions: This paper has shown that in systems subject to feedback or perturbations, it may not be appropriate to model health impacts under given scenarios using static equations. Additionally, in some situations, qualitative knowledge of relations is sufficient to gain insight into system behaviour and can guide the development of quantitative models.

Korean Research Project on the integrated Exposure Assessment to Hazardous Materials for Food Safety (2010)

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Background and Aims: "Korean Research Project on the Integrated Exposure assessment to hazardous Materials for Food Safety (KRIEFS)" is established by National institute of Food and Drug Safety Evaluation(NiFDS) in March 2010, this project has been operating for three years(2010-2012) .This is a representative and nationwide bio-monitoring project for environmental exposure and human health in Korea, particularly focused on the exposure from foods and health supplements and herbal medicines .This project is gathering integrated data of exposure to hazardous materials (1st year: Cadmium, Lead, Mercury, Methyl Mercury, 2nd year : Phthalate, Aflatoxine, Bisphenol A, 3rd year :integrated analsys, survey High-risk groups) through simultaneous inspection of food and bio samples(blood, 12hours and spot urine) against representative population - adults, infants, children and teenager, total 4000 people-and identifying hazardous materials exposure history in more comprehensive method, in order to protect public from exposure to hazardous materials through food, hebal medice and health supplements food.

Methods: Sample design-This project is a nationwide population survey.Selected sample groups are representative with regard to age, gender, region (urbal/rural). Samples were selected from the whole nation in 6 provinces (do), except Jeju-do. (Include Seoul, Gyeonggi, Gangwon, Chungcheong, Jeonra, Gyeongsang). Sample group's ages are from infant(include mother), schoolchild (elementary, junior, high) to adult, The total number of samples are more than 4000 over 2 years.

Survey-This project has 4 categories of survey; first, Investigating concentration of hazardous metrials in foods, health supplements and herbal medicines; second, dietary intake survey, third,human biomonitoring of exposure and health effect(questionnaires,clinical test, blood, 12hours and spot urine); fourth, analyzing of hazardous chemicals in food, hebal medicine and health supplements food. And residual components among the chemicals in body.

Results: In 2010 survey, we investigaed concentration of hevey metals (Cadmium, Lead, Mercury, Methyl Mercury) in foods (total 3,820 samples from 7 metropolis in the nationwide), health supplements and herbal medicines (total 679 samples from survey targeted groups), and surveied dietary intake survey and human biomonitoring of exposure and health effect. (total 2032 samples, infant 267, infant's mother 271, schoolchild 498, and adult 996) and analyzing of lead in food and residual components in body.

The average blood lead levels of adult is 1.29 μg /dL, accoding to sex, age, region can see that men (women 1.15 μg /dL, men 1.55 μg /dL), older age groups (18-29; 0.79 μg /dL 60<; 1.7 μg /dL), smaller towns (1.45 μg /dL, metropolis 1.12 μg /dL) trend to have greater level in lead.

Conclusions: This project is a representative and nationwide bio-monitoring project for environmental exposure and human health in Korea, particularly focused on the exposure from foods and health supplements and herbal medicines. In 2010 survey, we investigaed concentration of hevey metals (Cadmium, Lead, Mercury, Methyl Mercury) in foods, health supplements and herbal medicines and surveied dietary intake survey, human biomonitoring of exposure and health effect. and analyzied lead in food and residual components in body.

The average blood lead levels of adult can see that man, older age groups, and smaller town's trend to have greater level in lead.

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LONG-TERM EXPOSURE TO AIR POLLUTION WITHIN EUROPEAN CITIES AND CARDIOVASCULAR DISEASE: THE ESCAPE STUDY

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Background and Aims. Work package 5 of the European multicenter ESCAPE project aims to delineate the role of long-term exposures to ambient particles in cardiovascular disease development and coronary artery and cerebrovascular disease incidence. Specifically the impact of ambient air pollution on markers of inflammation, and gene-environment interactions (aim1), on blood pressure and prevalence of hypertension (aim2), on the risk for build-up of preclinical atherosclerosis measured by intima-media thickness (IMT) of the carotid artery (aim3), and on incident coronary events (aim4) will be evaluated.

Methods. The 14 contributing adult cohort studies originate from Austria, Denmark, Finland, Germany, Italy, Norway, Spain, Sweden, and Switzerland and cover different geographical regions within Europe. All participating cohorts assessed the spatial variability of PM_{10}, $PM_{2.5}$ and NO_x within their communities based on the ESCAPE exposure protocol.
City-specific analyses with subsequent pooling of the regression coefficients applying methods for meta-analyses are underway and first results will be shown. Endpoint-specific confounders and effect-modifiers are considered and include e.g. gender, age, BMI, smoking, alcohol intake, social class indicators, dietary variables, and noise.

Results. A different set of cohorts will participate in each specific aim. There are 8 cohorts contributing to aim1 with 32,000 participants, 14 cohorts to aim2 with 228,800 participants, and 4 cohorts to aim3 with 9,500 participants. 9 cohorts participate to aim4 with a study population of 120,000. The follow-up time varied between studies ranging from 15 months to 15 years.

Conclusions. The project will provide important information for the assessments of the role of ambient air pollution on the development of cardiovascular disease integrating effects of pollution on systemic inflammation, hypertension, atherosclerosis, and incident events. Thereby, ESCAPE will provide important information for estimating the overall public health impact of air pollution and for developing prevention strategies for at risk populations based on air quality measures.

IMPACT OF MOTORISED TRAFFIC OF THE NEIGHBORHOOD ON THE INDIVIDUAL WALKING BEHAVIOUR: A MULTILEVEL ANALYSIS

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Background and aims: Motorised traffic may discourage people walking. The main objective is to examine whether motorised transport volume influences the level of walking for transportation measured at individual level, and whether this association persist after controlling for the individual characteristics of the person who travel, and for the environmental and road safety characteristics of the neighbourhoods in Barcelona (area level).
Methods: A cross-sectional multilevel study will be developed. Individual socio-demographic and mobility information was obtained from the 2006 Daily Mobility Survey. 32.343 individuals older than 3 years reported travelling in a workday in Barcelona. Data were aggregated to calculate the total number of motorised trips made in each neighbourhood. Data about the environmental characteristics of the neighbourhoods, in terms of connectivity, aesthetics, land use mix and density, were obtained from the Barcelona Council's Register. Data of road traffic injuries were obtained from the Crash Register of the local police of Barcelona where each collision is geocoded. Road safety indicators include rate of people injured in each neighbourhood in 2004-2008 per 10.000 person who travelled and per 10.000 trips made. Multilevel models will be used to estimate associations between individual levels of walking and motorised traffic volume of the neighbourhood, controlling for individual and neighbourhood variables (environmental, road safety and traffic volume related).
Results: Ecological analysis, using neighbourhood as the unit of analyses, are presented as preliminary results. In each neighbourhood 27.0%[95%CI 23.9-30.0] of the trips made are motorised, ranging from 17.3% in the less motorised to 51.6% in the most one. The total number of motorised trips of the neighbourhood predicted 63% of the variance of the percentage of people who walked in each neighbourhood, $p < 0.001$.
Conclusion: Motorised traffic volume varies across the neighbourhoods and may influence walking behaviour. Results of the multilevel analyses will be presented.

PESTICIDE CONSUMPTION AND PERINATAL OUTCOMES IN BRAZIL

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Background and Aims: to evaluate the degree of correlation between pesticide consumption in all brazilian´states in 2000 and perinatal outcomes the period between 2001 and 2005.
Material and Methods: Informations about perinatal outcomes occurred in children born from 2001 to 2005 were collected from National Birth System. Spearman´s correlation coefficients were obtained for pesticide consumption (per capita), total and types (herbicide, acaricide, fungicide, insecticide) and the following types of perinatal outcomes: low birth weight, preterm delivery, sex ratio and congenital abnormalities and twin births. In addition, ststes were divided into three groups according to their level of pesticide use (tertiles) and prevalence ratios were then calculated using first tertile as reference.
Results: Pesticide consumption showed moderate positive correlation with congenital abnormalities (r=0,469, p=0,016), low birth weight (r=0,498, p=0,010), preterm delivery (r=0,419, p=0,033), criptorchidism (r=0,452, p=0,020), spontaneous abortion (r=0,499, p=0,009) and twin birth (r=0,672, p<0,001). We also observed weak and non-significative negative correlation between pesticide consumption and sex ratio (r=-0,383, p=0,053). For most of perinatal outcomes, perinatal outcomes´ prevalence rates were higher in the states of moderate (2^{nd} ertile) and high (3^{rd} tertile) pesticide consumption.
Conclusions: Moderate-to-high correlation coefficients between pesticide consumption and some perinatal consumption were observed. The results suggest that population exposure to pesticides in 1999 in Brazilian states may have been associated with selected types of perinatal outcomes in the 2000s.

RESIDENTIAL TRAFFIC EXPOSURE AND HYPERTENSION IN AUGSBURG, GERMANY

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Background and Aims. It has been suggested that long-term exposure to air pollution may lead to chronic increase in arterial blood pressure possibly resulting in hypertension. In this study, we investigated the influence of long-term residential traffic exposure on the prevalence of hypertension.
Methods. We used data on 9116 individuals aged 25 to 74 years who participated in the cross-sectional MONICA S3 (1994/95) and the KORA S4 (1999-2001) surveys conducted in the region of Augsburg, Germany. The residential traffic exposure was assessed by specifying daily traffic intensity of and distance to nearest street, and of daily traffic load (sum of product of traffic intensity and length of all segments divided by area) and total road length within buffers of 50, 100 and 300 meters around the residences. Hypertension was defined according to the AHA definition as systolic blood pressure $\geq$140 mmHg or diastolic blood pressure $\geq$90 mmHg. We used logistic regression adjusting for age, BMI, education, alcohol consumption, LDL-cholesterol and smoking status. Additionally, sex was examined as effect modifier.
Results. Traffic load within a radius of 100 meters of a person's residence was associated with an elevated risk for the prevalence of hypertension with an odds ratio of 1.05 (95% CI, 1.01 to 1.10) per increase in 36.2 vehicles/(day*m). The odds ratio for participants living near major roads within 100 meters compared to other persons was 1.14 (95% CI, 1.01 to 1.28). Results for 50 meter buffers were similar. Traffic intensity of the nearest road and inverse distance to nearest road showed positive but not significant effects. Almost 60% of participants with hypertension were male. However, in stratified analyses significant associations were found in women only.
Conclusions. Long-term residential exposure to high traffic may induce hypertension. An influence only in women has to be verified by other studies.

CATALUNYA ESCAPE LUR MODEL PERFORMANCE IN COMPARISON TO LOCALLY DEVELOPED MODELS.

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Background: The crux of ESCAPE (European Study of Cohorts for Air Pollution Effects) is uniform air pollution exposure assessment methodologies applied to 37 study areas across Europe. Land Use Regression (LUR) models are developed for within-city to large regional scales to capture air pollution spatial variability. Catalunya, Spain, presents interesting opportunities to compare the large area ESCAPE model with two LUR models estimated specifically for local cohorts. Our aim is to compare ESCAPE NO_2 models with more measurement-intensive locally-derived LURs, keeping in mind different modelling philosophies in the three projects.
Methods: The Catalan ESCAPE LUR model domain is 513 km^2, including the Sabadell-INMA study area (38km^2), and the REGICOR region of Girona (375km^2, including 12 towns). We discuss differences in methodologies (monitoring campaign spatial-temporal coverage, NO_2 samplers, input variables) to contextualize contrasting model results. We regress the three model outputs against values measured from the project monitoring campaigns, and against predictions made at cohort subjects' addresses. Further we will: estimate Pearson's correlations and Bland&Altman plots testing agreement between different measures, visualize spatial patterns of discrepancies between models, and perform stratified analyses comparing conditions affecting model performance (urban, rural, semi-urban, high-to-low traffic).
Results: The Catalan ESCAPE LUR model, based on 80 measurement-sites, has a leave-one-out crossvalidation R^2 of 0.69. Initial results show that it explains in Sabadell 55% of the variability in the 57 INMA measurement-sites, and 31% of the 547 REGICOR measurements. The Sabadell model explained 74% and the REGICOR model 47% of the variability measured at the ESCAPE sites.
Conclusion: The region-wide ESCAPE model explains less variability in measured NO2 in Sabadell and Girona region than suggested by the cross-validation R2. It explains more variance in our within-city than our larger regional scale context. Further analyses are being conducted. We discuss result interpretations given contrasting model development contexts, and lessons learned for ESCAPE model applications.

IMPROVING ESTIMATES OF TRAVEL ACTIVITY AND AIR POLLUTION EXPOSURE THROUGH UBIQUITOUS SENSING TECHNOLOGIES

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Background: Travel activity may have important influences on health, potentially contributing meaningfully to both physical activity (PA; walking and cycling) and inhaled air pollution. Ubiquitous sensing technology is a promising innovation to track locations of travel activity and associated levels of energy expenditure. We present results of a pilot study testing the use and performance of Calfit, a novel smart-phone based software that continuously records geo-positioning and PA estimated from an accelerometer integrated into Android cell-phone technology.
Methods: We equipped 36 volunteers with an Android phone that had Calfit software installed. Subjects were monitored during 5 days of regular activities in Barcelona, Spain. Volunteers kept a travel diary and wore two additional commercially-available accelerometers (Actigraph and Bodymedia Sensewear). We identified travel periods and compared energy expenditure levels as measured by the three devices for their activities. We estimated the contribution of transport to PA and to overall daily air pollution exposure of nitrogen dioxide estimated by a land use regression model.
Results: Preliminary results show the cell phone measurements of energy expended (kilocalories) correlated highly with the Actigraph (Spearman coefficient > 0.90 for each of 4 travel modes) and correlated well against the Bodymedia Sensewear, for which the lowest correlation was for cycling trips (Spearman coefficient 0.63). We estimated inhaled dose for a subject who spent 2% of their time daily in active travel (walking or biking). Active travel contributed disproportionately to inhalation dose, accounting for about 12% of the daily total.
Discussion: Ubiquitous sensing technology provides unparalleled data collection opportunities to measure travel-related PA and route choices, which can be highly relevant for built environment research and air pollution exposure assessment. In addition to monitoring large populations, cell phone technology may in the future improve activity measures compared to accelerometry by accounting for speed and topography collected using GPS.

WHY A CHILDREN ENVIRONMENTAL HEALTH? DIFFERENCES IN CHILDREN'S VULNERABILITY TO POLLUTION AND SANITATION.

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Background and Aims: To discuss the differential susceptibility of children to environmental exposures, as illustrated in the environmental impact on mortality rates for children and adults for infectious respiratory and gastrointestinal problems.
Materials and Methods: We conducted an ecological study of time series from the trend of the mortality rate and proportional mortality rate from acute respiratory infections and acute diarrheal diseases and, respectively, the consumption of chlorofluorocarbons - CFCs (air pollutant) and coverage of sewage services in Brazil. We used the polynomial regression model for assessment of trends, which were compared according to age categories with air pollution or water pollution proxy (coverage of exhaustion).
Results: The consumption of CFCs was proportional mortality due to respiratory acute infection and, similarly, it is observed that the higher the percentage of coverage, the lower the mortality rate. This relationship becomes more acute in children than in adults.
Conclusion: Therefore, the increase in knowledge and information about children and their windows of susceptibility to environmental agents will help to identify subgroups and age sensitive to planning specific preventive actions.

INCREASE INCOME AND MORTALITY OF COLORRECTAL CANCER IN BRAZIL.

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Background and Aims: The objective of this study is to determine the correlation between average per capita income and the rate of colorrectal cancer mortality in Brazil between 2000 and 2007.
Materials and methods: We obtained data on median household income and mortality rate for colon, rectum and anus between 2001 2007 by DATASUS. A trend analysis was performed using linear regression, and correlation between variables by Pearson's correlation coefficient**.**
Results: There was a tendency towards an increase average family income and standardizedmortality rate of colon, rectum and anus in Brazil. There was also strong positive correlation ($r = 0.81$, $p < 0.001$) between incomeand mortality for this cancer located throughout the study period.
Conclusion: Theincrease in income may partially explain the increased occurrence of cancer of thecolon, rectum and anus, and this is possibly due to differential access to food recognized as a risk factor, such as red meat and fat food.É therefore important Assess the priority of public health programs addressing nutrition in countries with intermediate economy, as is the case in Brazil.

SERUM CONCENTRATION OF HCH, DDT AND METABOLITES IN ADOLESCENTS EXPOSED TO ORGANOCHLORINE PESTICIDE RESIDUES IN BRAZIL

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Background and Methods: To evaluate the concentration of biomarkers of exposure to residues of organochlorine pesticides in adolescents in Rio de Janeiro, Brazil.
Methods: We obtained laboratory results of serum concentrations of the isomers of HCH and DDT metabolites from the data collection from medical records at a local health unit from a previous screening.
Results: We observed concentrations were considered well above the tolerance limits allowed. The distribution shows typical asymmetrical pattern, because of the presence of individuals with concentrations outliers distribution. Deserve special attention from the HCH congeners, the p,p'DDT and p,p'DDE; whose serum concentration mean and median are much higher than the level of tolerance permitted. Concentration obtained were from α HCH (115.81 Mean ± SD 1438.529) , β HCH (1616,266 Mean ± SD 135.15), γ HCH (Mean ± 5373.357SD 447.66), p, p'DDE (Mean 94.92 ± 884,979 SD), p, p 'DDD (5:23 Mean ± 43,350 SD), o, p 'DDT (3596 Mean 1.82 ± SD) and p, p' DDT (45.61 Mean ± SD 464,389). In measuring the correlation between different types of organochlorine compounds evaluated, it is observed that the majority has mayor correlation ($r = 1.000$), or nearly so, with great statistical significance ($p < 0.0001$).
Conclusion: There is needing for monitoring and periodic evaluation of health of this population, considering that the blood is altered especially at this critical period of development.

CORDBLOOD ACRYLAMIDE AND GLYCIDAMIDE HAEMOGLOBIN ADDUCTS, METABOLIC POLYMORPHISMS AND MICRONUCLEUS FREQUENCY

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Background and Aims: Exposure to acrylamide (AA) in the non-smoking general population occurs almost exclusively via foods cooked at higher temperatures (i.e., potato chips and fries). AA is metabolized to glycidamide (GA by cytochrome P450 enzyme 2E1, CYP2E1). AA and GA bind to glutathione and are excreted with the urine. Concerns about acrylamide exposure in utero and the risk of adverse health effects are justified by AA/GA potential carcinogenicity. Hemoglobin adducts (HbAA and HbGA) are well-established biomarkers of exposure to these chemicals. The cytokinesis-block micronucleus assay (CBMN) quantifies early genetic effects associated with cancer risk. Furthermore, individuals may be at increased risk due to particular genetic predisposition. The relationship between cord blood HbAA and HbGA and the frequency of micronuclei in cord blood lymphocytes, and the effect of CYP2E1 (Rs2480258 and Rs915906 single nucleotide polymorphisms) were studied in EU funded Integrated Project NewGeneris (Newborns and Genotoxic exposure risks).

Methods: The study included newborns from Greece, Norway, Spain, Denmark, and the United Kingdom (n.=1040) whose mother gave informed consent at recruitment. Hb adducts were measured by the “adduct FIRE procedure” using LC-tandem mass spectrometry. CBMN assay was used to measure micronuclei in binucleated and mononucleated cells (n.= 470).

Results: HbAA and HbGA were highly correlated (r=0.85, p<0.0001). Multiple regression analysis failed to show a linear relationship between HbAA and the frequency of micronucleated-binucleated cells (p-trend=0.161) but revealed an increased frequency of micronucleated-binucleated cells in the highest quintile of HbAA compared to the lowest quintile (RR= 1.36, 95%CI: 1.00-1.86, p=0.05). The CYP2E1 variant was associated with a 50% higher frequency of micronuclei in binucleated cells (RR=1.53, 95%CI:1.02-2.23, p=0.04).

Conclusions: The association between cord blood hemoglobin adducts from AA and micronuclei frequency is suggestive of the role of a maternal intake of foods with a high content of acrylamide during pregnancy and genotoxic effects on the fetus, with CYP2E1 enzyme possibly playing a role as an effect modifier.

TREND OF MORTALITY OF BREAST AND CERVIX CANCER IN THE BRAZILIAN CAPITALS FROM 1996 TO 2007

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Background and Aims: To analyze the trend in mortality from breast cancer and cervical cancer in Brazilian capitals from 1996 to 2007.
Materials and Methods: We calculated mortality rates for breast cancer and cervical cancer in Brazilian capital cities from 1996 to 2007, standardized for the Brazilian population and for the world's population. Trend analysis was performed using the polynomial regression model, considering the simple linear regression models, parabolic, exponential and third degree. It was considered as the best model, the one with the highest coefficient of determination (R^2).
Results: The cancer of the cervix showed a considerable reduction in the mortality rate in most capitals, although this trend is present in the opposite way in some cities. In opposition to this, breast cancer, most of the capital showed up with a high rate of mortality. Most of the trends for both was linear.
Conclusion: You could say that, according to the epidemiological transition, mortality from cancer of the cervix may be suffering a reduction on account of improvement in relation to adherence and completion of Pap smear, whereas the same ratios for breast cancer may show increased in recent years, the fact that cancer is related directly to the habits, lifestyles and culture.

RELIABILITY OF CLINICAL AND PUBERTAL SELF-ASSESSMENT IN ADOLESCENTS EXPOSED TO ENDOCRINE DISRUPTERS

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Background and Aim: To assess the reliability of the information self-refeered assessment of pubertal development in adolescents exposed to endocrine disrupters.
Methods: This cross-sectional study included 72 adolescents (18 boys and 54 girls) between 12 and 20 years incomplete residents of Cidade dos Meninos, Rio de Janeiro, local contaminated by organochlorine pesticide residues. Each participant had their pubertal assessment performed by professional and self-evaluation. To assess the correlation of data for assessing the Tanner scale was used weighted kappa test and Mc Nemar´s chi-square test.
Results: The Kappa showed moderate to self-evaluation of both the developing penis (Kw = 0.51, Ep = 0.20) and the pubic hair (Kw = 0.54, Ep = 0.22). This means that the level of agreement between adolescent and evaluator is regular. In the same way, when analyzing the correlation between self-assessment of the stage of development of the Tanner girls, kappa showed moderate to self-assessment, both thelarche (Kw = 0.55, Ep = 0.11) and the pubarche (Kw = 0.48, Ep = 0.12). This means that the level of agreement between adolescent and evaluator is regular.
Conclusion: Among adolescents exposed to organochlorines, by being more aware of changes in pubertal development, this study suggests that self-assessment of Tanner stages is not valid as a proxy measure for clinical evaluation.

PUBERTAL DEVELOPMENT IN ADOLESCENTS EXPOSED TO ORGANOCHLORINE COMPOUNDS: A CROSS- SECTIONAL SURVEY IN BRAZIL

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Background and Aims: To evaluate pubertal development in adolescents exposed to residues of organochlorine pesticides, known to act as endocrine disrupters.
Methods: We conducted a survey with a population of 100 adolescents between 12 and incomplete 20 years residents of Cidade dos Meninos, Brazil. Each participant had their pubertal assessment according to Tanner Stages, and performed by trained nurses.
Results: The mean age of adolescents was 15.5 years (SD ± 2.5) in a total of 76 girls and 24 boys. The ages found for the male pubertal development were: pubarche, 12.4 years (SD ± 1.4), semenarche 11 years (SD ± 6.10), and penis enlarge 12.5 years (SD ± 1.5). As well, the girls had the following ages for development: menarche 11.8 years (SD ± 1.4), thelarche 11.1 years (SD ± 1.5) pubarche and 11.1 years (SD ± 1.4). The data show a typical pattern of distribution by age, being more frequent change of the structure of the genitalia observed between 12 and 13 years old. However, observed values were outliers, 10 and 15 years. It's shown up outliers higher values for the distribution of hair, with 14 and 15 years. At group of girls, the infants has two outlier values (15 and 16 years) than the appropriate default development. A similar analysis it is up to the age of thelarche, where there is a higher outlier (16 years).
Conclusion: The pattern of the sample, therefore, is adolescents reaching menarche, thelarche and pubarche at ages considered normal.

DISSIMILAR ACCUMULATION OF ORGANOCHLORINE COMPOUNDS, PBDES AND HBCD IN COLOSTRUM FROM MOTHERS LIVING IN URBAN/INDUSTRIAL AREAS ACCORDING TO GEOGRAPHIC ORIGIN

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Background and Aims: Human milk is lipid-rich and a good store of lipophilic pollutants such as organohalogen compounds. This study is aimed to determine the accumulation patterns of organochlorine compounds (OCs), PBDEs and HBCD in colostrum samples of general population from two urban/industrial areas, to compare them and to identify the main determinants of their accumulation in these populations.
Methods: 368 colostrum samples from Gipuzkoa and Sabadell INMA cohorts (1) were analysed for OCs (HCB, • -HCH, DDTs and PCBs), PBDEs (including BDE209) and HBCD. Maternal factors such as cohort area and geographic origin of mother were evaluated.
Results: In both cohorts 4,4'-DDE was the most abundant pesticide and PCB153 the main PCB congener, whereas PBDE levels were one-fold lower than OCs, BDE153 being the most abundant congener. Median levels were similar to previous observations in other European studies (2, 3). HBCD was detected in more than 50% of samples, with similar levels to those found for main PBDEs. Gipuzkoa cohort had significantly higher levels of main OCs (especially PCBs) and PBDEs, compared to Sabadell. Regarding geographic origin of mothers in both cohorts, those from Latin America had significantly higher concentrations of 4,4'-DDT and 4,4-DDE than European mothers, whereas HCB, • -HCH, PCBs and BDE153 were significantly higher in European women than in those from Latin America.
Conclusions: OCs and PBDEs were higher in Gipuzkoa than in Sabadell colostrum samples, reflecting the influence of heavy industry in Gipuzkoa area. In both cohorts, geographic origin of mothers was the main determinant of OC and PBDE concentrations. Those from Latin America have higher concentrations of 4,4'-DDT and 4,4'-DDE whereas European mothers exhibit higher concentrations of compounds of industrial origin. The higher accumulation of industrial pollutants is observed independently of the European banning regulations that control the present use of these compounds.

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THE RELATIONSHIP BETWEEN DDT UPTAKE, HORMONAL CHANGES AND CIRCULATING HOMOCYSTEINE CONCENTRATIONS

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Background and aims: As sex hormones reportedly alter homocysteine metabolism, we hypothesised that pesticides that exert anti-androgenic and estrogenic may affect total homocysteine (t-Hcy) concentrations. Plasma samples for total homocysteine (t-Hcy) were collected during some of the visits of an on-going cross-sectional study evaluating male fertility parameters with Indoor Residual Spraying (IRS).
Methods: The t-Hcy concentration and its determinants, estradiol (E2) and testosterone sub-fractions, and SHBG and Albumin were compared between young males from sprayed (n=219) and unsprayed villages (n=215), taking the variance of the data and co-variates into account. Regression analyses were performed in the exposure group.
Results: The mean (SD) t-Hcy concentrations in sprayed villages were significantly lower (7.7(2.4) vs 8.3(2.5) µmol/L; $p<0.05$), while t-Hcy determinant concentrations did not differ significantly. Lowertotal testosterone (t-T) concentrations (21.3(6.0) vs 25.2(9.1) nmol/L; $p<0.001$), % bio-available testosterone (%bio-T) (40.9(8.3) vs 50.3(14.5); $p<0.005$), albumin (44.8(4.5) vs 46.0(6.0) mg/dL; $p<0.05$) and E2 concentrations (115.6(32.5) vs 136.2(36.8) pmol/L; $p<0.001$) were observed in non-sprayed villages. After correcting for vitamin B12 and either *p,p'*DDE or *p,p'*DDT, t-Hcy concentration no longer differed significantly between groups. In sprayed villages significant Spearman rank correlation coefficients were observed for t-Hcy with *p,p'*DDE, *p,p'*DDT,and bio-T (respective r-values: -0.260, -0.289, 0.197; $p<0.005$). When comparing regression lines for Log_Hcy = %bio_T, the slopes did not differ significantly between groups, while elevation differed significantly ($F=7.28$, $DF=1, 423$, $p= 0.007$). Concentration-dependent linear trends were observed, using Polynomial contrast, across *p,p'*DDE and *p,p'*DDT quartiles for Log-Hcy (decreasing) and for serum creatinine (increasing) ($p<0.001$).
Conclusions: Lower t-Hcy concentrations appear to be related to DDT uptake. This stucy does not explain these findings. Association between t-Hcy and sex hormones is not clearly evident, except for the association with %bio-T. What is apparent is that uptake of DDT may be associated with altered sex hormone and homocysteine homeostasis.

DERMAL EXPOSURES TO SARIN IN MILITARY VETERANS AT PORTON DOWN

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Background The modification of dermal exposures by clothing, which may either protect from exposure or increase its effect, is of considerable interest. Here, we describe early analyses of the effects of dermal exposures to the nerve agent sarin, using data drawn from our previous cohort study of military veterans of chemical tests at Porton Down between, 1939-1989.
Methods Data on exposures were abstracted from the Porton Down historical archive. For each nerve agent test we abstracted data on date and type of test, the principal chemical(s) used and exposure intensity, duration and route. We also noted the presence of exposure modifiers. Maximum percentage change in the following cholinesterase (ChE) measures were abstracted or calculated: unspecified, whole blood, plasma and/or red blood cell (RBC) ChE.
Results 3597 veterans were recorded as involved in 4299 tests with nerve agents, 1945-1987. The most tested nerve agent was sarin: 2980 veterans were involved in 3511 tests. 288 sarin exposures were dermal (9.6%) and most of those were modified physically, eg by clothing (188; 65%). Dermal sarin tests took place 1951 - 1953.
Quantity of exposure to dermal sarin was measured for 273 tests and ranged from 0.13 to 300 mg. Applied exposures were higher in tests with modification (IQR 200-300 mg with modification and 0.28-8 mg without).
Change in ChE activity was available for 279 dermal sarin tests (97%). The median change was -22% (IQR -10 to -37%, range +12.5 to -99%). The median without modification was -4.5% (IQR 0 to -13%) and -31% (IQR -19 to -46%) with modification.
Conclusions The quantity of dermal exposure to sarin influenced effect. However, modifier use may be confounded by exposure so further investigation of the relationships between exposure, effect, and modification will be carried out.

ENVIRONMENTAL EXPOSURE OF CHILDREN TO POLYCHLORINATED BIPHENYLS AND DEFICITS IN COCHLEAR STATUS

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Background and aims: The mammalian auditory system forming a part of CNS, with its complex development, is a typical target of neurodevelopmental toxicity. Polychlorinated biphenyls (PCBs), a member of neurodevelopmental toxicants, can induce hearing impairment in rats (Crofton 2000) and humans (Trnovec 2008, 2010). The underlying process is a damage of the outer hair cells in cochlea. A mode of action based on deficit of thyroid hormones proposed for rodents does not hold for humans (Crofton and Zoeller 2005). In our cross-sectional studies the level of otoacoustic emissions (OAE), a marker of cochlear status, was associated with actual PCB exposure and not related to thyroid hormones. However, no data on prenatal exposure, a marker of which is PCB cord blood concentration, were available (Trnovec 2008, 2010).
Methods: Longitudinal cohort study, complex audiological examination.
Results: n a random cohort of 485 infants exposed to PCBs from Michalovce district, eastern Slovakia (Hertz-Picciotto 2003), children were audiologically examined at the age of 45 months. The transient evoked (TE) OAE and distortion product (DP) OAE were related to PCB serum concentration at birth, 6, 16 and 45 months of age. The gender specific deficits were manifested in decreased amplitudes of both TEOAE and DPOAE in a similar way as with noise trauma or effect of cochleotoxic substances. For DPOAE two primary tone f2 frequencies, 3364 and 2828 Hz for left and right ears, resp., showed highest sensitivity from 11 tested frequencies. The BMDL (p_0=0.1; BMR=0.05) for this effect in left ears of males is 419.3 ng PCB/g lipids and an alarming MOE = 1.11 at median PCB serum concentration of 377.4 ng PCB/g lipids.
Conclusions: Multivariate regression has shown that the OAE amplitudes were significantly related to PCB exposure at 16 and 45 months. There was no relationship with neurodevelopmentally relevant prenatal time period.

ADDITION OF MEASUREMENTS OF BISPHENOL A IN URINE TO THE STUDY PROTOCOL FOR A EUROPEAN HUMAN BIOMONITORING (HBM) PILOT STUDY

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Background and Aims:
In December 2009 the COnsortium to Perform Human Biomonitoring on a European Scale (COPHES) financed by FP7 EU, began work towards an EU HBM framework. This will be accompanied by a feasibility study called DEMOCOPHES, co-financed by Life+, which started in autumn 2010 and requires shared contribution from EU and the participating countries.
In all countries participating in the pilot study of Human Biomonitoring in Europe[1] a basic scenario will be followed measuring cadmium, cotinine and phthalates in urine and mercury in hair. In addition, some countries will analyse other substances, including measurements of Bisphenol A in urine. Bisphenol-A is considered a high-volume chemical (>1000 tons produced or imported in the EU) used in a wide range of applications. BPA is mainly used as a monomer in the production of polycarbonate and epoxy resins. Polycarbonate is a hard and transparent plastic used in reusable drinking bottles and baby bottles, electrical and electronic household and office equipment. Epoxy resins are mainly found in coil coatings and as coating in food and drink cans. The concern about human exposure to BPA has risen since recent findings that BPA has estrogenic effects in *in vivo* animal experiments at low doses which are within the expected human exposure range. Following oral administration, BPA appears to be rapidly absorbed from the gastro-intestinal tract and undergoes a practically complete first pass metabolism in the liver by conjugation with glucuronic acid. Subsequently, the formed glucuronide is rapidly cleared from the blood and eliminated through urine.

Methods: Urine samples will be collected in autumn 2011 from children in the age range of 6-11 years and their mothers with a 60 pairs rural and 60 pairs urban distribution in each of the participating countries (Belgium, Denmark, Luxembourg, Poland, Sweden, Slovenia, Cyprus and Spain). The samples will be analysed following a harmonised protocol with interlaboratory harmonisation presently ongoing.

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[1]http://www.eu-hbm.info/.

Selection of Indicators for Green Growth by applying OECD's Framework

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Background and Aims: Climate change is emerging as one of the world's biggest environmental problems. Global warming causes weather disasters and ecological chaos, and even threatens the survival of mankind. Thus, it is imperative that economic growth and environmental substantiality be harmonized through what is termed "green growth." In order to achieve such growth, green indicators and statistics are essential, since these not only measure environmental progress and sustainable development but also monitor and evaluate policy integration.
Methods: Existing indicators relevant to green growth were first collected and compared, in order to select a potential pool of indicators. This pool was sorted according to OECD's framework. Each indicator was scored on a scale of 1 to 3 for each criterion, that is, policy relevance, analytical soundness, and measurability. For each indicator, the scores of the three criteria were summed, and the indicators were ranked according to the scores. Twelve international indicators were chosen from the indicator pool. The current data for each international indicator was compared to the OECD countries' 25th percentile data and evaluated on a scale of 1–5 within the framework.
Results: The average scores for five categories were 2.00, 1.67, 3.50, 3.00, and 2.50, respectively; (i) environmental efficiency of production and changes in production patterns, (ii) environmental efficiency of consumption and changes in consumption patterns, (iii) stocks of natural capital and environmental quality, (iv) objective and subjective environmental quality of life, and (v) responses by economic actors.
Conclusions: These findings can be interpreted as they are not at the same levels within the framework. It seems the qualities of Korea's natural capital, environment, and life are high. In comparison, its economic activity scores (production, consumption, trade) are relatively low when compared to the OECD's 25th percentile level. However, Korea's current green growth strategy emphasizes economic value, such as development of new technologies; it is moving, therefore, in the right direction.

HEALTH STATUS OF THE POPULATION LIVING IN THE GEOTHERMAL AREA OF TUSCANY REGION, ITALY

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Background and Aims: in two areas of Tuscany 31 geothermal power plants have been operating since the eighties. Hydrogen sulphide (H_2S) and mercury vapours in the air, inorganic arsenic in groundwater and in drinking water are the main pollutants. Communities' concern for health effects increased in the last decade. A descriptive epidemiological study commissioned by the Tuscany Region was carried out in 2010.
Methods: sixteen municipalities, 43,400 inhabitants were considered; 60 causes of mortality 1980-2006 and of hospitalization 1998-2006 were compared with regional and local figures (80 municipalities around the study areas). For the total area, 2 subareas and 16 municipalities, standardized and Bayesian age-adjusted rates and clustering analysis were performed.
Results: in the whole area total mortality was in excess for men (SMR=106) but not for women; significant excesses emerged for respiratory causes (SMR=125) and infective diseases (SMR=236) in men, for hepatic cirrhosis among women (SMR=142). No excesses of hospitalization for all causes, all cancers, all cardiovascular diseases resulted; SHR was in excess for stomach cancers in males and females (SHR=146;185), for leukaemia among women (SHR=167). In the northern subarea excesses of hospitalization for leukaemia in women (SHR=250), digestive diseases in both genders (SHR=113) were found. In the southern subarea mortality excesses of total causes, all cancers, respiratory diseases emerged for men (SMR=113;119;128), for acute respiratory and digestive diseases among women (SMR=141;132). Excesses of hospitalization for stomach cancers in males and females (SHR=160;208), kidney failure in both genders (SHR=136), respiratory diseases among women (SHR=113) emerged. Excesses of mortality and hospitalization prevailed in municipalities of southern subarea. Bayesian and clustering analysis confirmed the main results.
Conclusions: although the mortality and hospitalization profiles did not show a critical situation and some excesses were likely to be associated with past occupational exposure or life-style determinants, a GIS assisted case-control study is in progress for some emerged signals, mainly regarding leukaemia, renal and respiratory diseases particularly to assess possible effects of H_2S low doses exposure.

SENTIERI – OCCUPATIONAL EXPOSURE CONTRIBUTION TO MORTALITY: THE CASE OF MASSA CARRARA POLLUTED SITE

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Background and Aims: SENTIERI project is aimed to describing health status of resident populations in Italian polluted sites defined as "of national concern" (Ministerial Decree n. 486, 2001, and successive Decrees) using mortality data. Identified sources of contamination were categorized as chemical industry, petrochemical plants & refineries, harbour area, asbestos or other mineral fibers, steel plants, thermoelectric power plants, mines or quarries, landfills, incinerators. Sixty-three groups of causes of death (ICD IX) were selected.
Methods: A descriptive analysis (1995-2002) of mortality for both gender was performed calculating Standardised Mortality Ratio (SMR), crude and adjusted for deprivation (90% Confidence Intervals). Regional population was used for comparison. SENTIERI adopted an *a priori* definition of contaminated site and an *a priori* evaluation of the epidemiological evidence of the association between *environmental exposure/s* and cause specific mortality. Epidemiologists in working group examined bibliographic information, assessing the presence of a causal association between environmental exposure/s and cause specific mortality following standardised criteria. Evidence was classified as: Sufficient or Limited to infer the presence of a causal association, Inadequate to infer the presence or absence of a causal association. To take account of occupational exposures, authoritative publications were considered.
Results: As an example, the case of Massa Carrara will be presented, as it is among the most complex polluted sites in terms of environmental contamination (asbestos, production of chemical substances, harbour area, incinerator, petrochemical plant and/or refinery, steel industry). Increased risk of death from several causes were found: diseases of cardiovascular, respiratory and digestive systems, malignant neoplasms of liver, lung, pleura.
Conclusions: The potential contribution of previous occupational exposures to overall mortality in the polluted sites should not be overlooked, and the a priori SENTIERI approach seems to be fruitful.

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COPD, SMOKING AND SES IN FOUR POPULATION-BASED COHORTS AS PART OF DATA HARMONIZATION IN THE ESCAPE PROJECT

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Background and Aims : Longitudinal studies on the long-term influence of air pollution on chronic respiratory disease in adults are rare. Workpackage 4 (WP4) of ESCAPE investigates this in six adult cohort studies in 12 European countries namely ECRHS, EGEA, E3N, SAPALDIA, SALIA and NSHD. This analysis compares prevalence of COPD by smoking status, as a first step to understand similarities and differences across the cohorts involved.

Methods: Four population-based studies of this workpackage have lung function data (ECRHS, NSHD, SALIA, SAPALDIA). Data were harmonised to ensure consistency of statistical analysis (by study and meta-analyses). COPD variability by sex, smoking status, SES (education level) and age were explored and logistic regression was used to determine cross-sectional associations with spirometrically defined COPD using the GOLD criteria where COPD is defined as an FEV1/FVC ratio <0.7.

Results : There were 13'282 participants with at least two spirometric measures and 18'088 participants with questionnaire data about chronic bronchitis symptoms. The follow-up time varied between studies from 10 to 20 years and mean age from 42.6 to 73.5 years among studies. The unadjusted prevalence of moderate COPD at the most recent follow-up varied across studies ranging from 1.6% to 4.6%. Smoking was significantly associated with COPD in all studies with OR's ranging 1.87 to 2.86 for 'current smoking', while women were found to have 40-70% of the risk of men. No significant association could be found for SES in all studies.

Conclusions: An important part of the ESCAPE project is harmonisation of datasets for use in future analyses of associations of respiratory outcomes with air pollution. Findings for cross-sectional associations of COPD with major risk factors were comparable despite differences in protocols, areas and timing of cohort studies. These analyses are being extended to all respiratory outcomes being investigated in WP4 and will inform analytic strategies.

INTERACTIONS BETWEEN DISINFECTION BY PRODUCTS IN DRINKING WATER AND GENETIC SUSCEPTIBILITY VARIANTS IN RELATION TO ADVERSE REPRODUCTIVE OUTCOMES (THE HIWATE STUDY)

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Background and Aims: The Hiwate project (Heath Impacts of Long-Term Exposure to Disinfection By-Products in Drinking Water) studied the relation between prenatal exposure to DBPs (Disinfection by-products) in drinking water and adverse reproductive outcomes, without finding evidence of any effect. This lack of association could be partially caused by differences in genetic background. Thus, a gene*environment (G*E) interaction study was undertaken within Hiwate project.
Methods: A nested case control study was designed using samples (maternal and child DNA) from four European birth cohorts (INMA, KAUNAS, PELAGIE and RHEA). Forty-nine Single Nucleotide Polymorphims (SNPs) and 4 Copy Number Variants (CNVs) in DBP detoxification genes (CYP1A cluster, CYP2A6, CYP2E1, CYP3A cluster, GSTP1, GSTT1 cluster, GSTZ1, GSTM1 and GSTM4) were successfully genotyped using Illumina and MLPA, respectively, blindly to the case-control status. Prenatal exposure to total trihalomethanes (tTHMs), the most abundant DBP group, was considered continuous in models. Main genetic effects were initially explored under an additive genetic model, and those with a p-val<0.2 (in mothers or children) were included in the G*E analysis.
Results: In total, 270/228 (mother/child DNAs) preterm cases, 368/377 small for gestational age (SGA) cases, and 416/429 controls were analyzed. A SNP in CYP1A cluster (in child DNA), and two SNPs in GSTZ1 (in maternal and/or child DNA) showed an interaction with tTHMs in relation to preterm (p int ≤0.052). Regarding SGA, mothers with 0 copies of the GSTT1 CNV tended to have children more susceptible to be SGA after prenatal exposure to tTHMs (p int=0.050). None of the interactions were statistically significant after correction for multiple testing.
Conclusions: Genetic variants in the CYP1A cluster, GSTZ1 and GSTT1 may modulate the effect of prenatal exposure to DPBs on reproductive outcomes. Although biologically plausible, the findings should be interpreted with caution because effects were small and only marginally significant.

ANALYTICAL UNITS BASED ON NATURAL SYSTEMS IN UNDERSTANDING ENVIRONMENTAL FACTORS ASSOCIATED WITH DISEASE: A CASE-STUDY OF PEDIATRIC DIARRHEA IN BRAZIL

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Background and Aims: Over two million children die annually due to disease attributed to enteric disease. The importance of an improved understanding of environmental factors associated with this disease has been widely recognized. An important factor is the geographic extent and framework of the unit of analysis. In this study we evaluate a geospatial method for identifying spatio-temporal patterns in mortality attributed to pediatric diarrhea in Brazil based on the natural system, hydrologic regime, rather than political census units.
Methods: We analyze trends in peak timing of pediatric mortality (MPT) attributed to diarrheal disease in Brazil. We evaluate multi-scale analytical units including: (1) Country-wide municipal level mortality data aggregated to Census Micro Regions (CMR) and to a grid of 20 Km^2 raster cells generated by geostatistical modeling; (2) Within eight officially designated Hydrographic Regions of Brazil based on results from the geostatistical models; and (3) Along longitudinal "vectors" of 1 km raster cells defining the stream network (hydrologic regime) within each Hydrographic Region.
Results: We found evidence of a country-level trend west to east of increasing MPT over an annual cycle. However, when we examined the model results across the Hydrographic Regions, we discovered greater geographic heterogeneity in MPT. At the spatial scale of the stream network within the Hydrographic Regions, trends were generally consistent and no longer predominantly east to west, but oriented in the direction of flow of the major river draining the basin.
Conclusions: We found the geographic orientation of trend in MPT to be highly dependent on the geographic extent and derivation of the analytical unit. We demonstrate that a unit based on natural boundaries, e.g., stream segments or watershed boundaries, resulted in more consistent and robust prediction of trends in MPT attributed to diarrhea.

RADON MONITORING IN GROUNDWATER FROM THE MT. ETNA AREA

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Background and aims The natural radionuclides generally occurring in ground waters and those pose health risks are 222Rn, 226Ra, 228Ra and 232Th. Since no limits for radon in drinking water supplies have been set yet, radon monitoring by regulatory authorities has not been established. This had led to a lack of knowledge about the geographic distribution of radon, which is needed in water supply planning and development. Due to the high permeability of Mount Etna volcanic rocks, it hosts one of the biggest hydrogeologic reservoirs of Sicily. The Etnean groundwaters are very important being the only water resource for drinking, agricultural and industrial purposes not only for the people living in this area but also for those who live in the surrounding areas. This study reports the results of a groundwater radon survey in the Etnean area.

Methods: Evaluation radon progeny (214Pb and 214Bi) in water was developed by using gamma ray spectrometry. Groundwater samples were collected throughout the Etnean area from drainage galleries, springs and from wells with submerged pumps. These water are used for drinking purposes.

Results: The measured activity values range from 1.3 to 5.8 Bq/L.

Conclusions: The USEPA has proposed in 1991 a maximum contaminant level (MCL) of radon in public drinking water supplies serving more than 25 residences to be 11 Bq/L, that our samples are compliant. Is still necessary to integrate our results with temperature, salinity and CO_2 partial pressure and continue to make the monitoring seasonally.

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RISK PERCEPTION OF TURKISH HIGH SCHOOL STUDENTS RELATED TO CELL PHONE USE AND BASE STATIONS IN BORNOVA, TURKEY

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Background and Aims: Cell phone (CP) use has increased rapidly; specifically adolescents' use is intensive (Söderqvist etal 2007). The question of potential risk for young age groups remains unresolved (Röösli etal 2010). This study aims to define the perceived risk for CP use and base stations and to determine the factors associated for Turkish high school students.
Methods: This cross-sectional study was conducted on December 2009-April 2010. The target population were 20,493 students, sample size was 2530 (p=50%, d=3%, design-effect=2 and 20% non-response). Stratified clustered sampling was used. Independent variables were; type of school, grade, age, gender, income, income perception, mother's and father's education, father's occupation, CP utilization and ownership, the presence of base stations. Risk perception (RP) was questioned with a five-item likert scale for 25 statements. RP scores of the students were classified into 5 dimensions as base station, CP, public, individual, general.
Results: Response rate was 88.5% (51.6% female, 48.4% male). The mean scores for RP for 5 dimensions were ranged 3.16-3.96. Type of school, gender, income, father's occupation, mother's and father's education, CP utilization, CP ownership was significantly associated with CP risk perception scores. Gender and presence of base stations were significantly associated with the base station RP scores. All the independent variables were significantly associated with the general RP scores except gender, income perception, CP ownership and presence of base station ($p<0.05$).
Conclusions:
The lowest RP scores for the CP and public and highest scores for individual dimensions were found. The girls' perception of risk was higher both for CP and base station. General RP significantly increased with increasing school grade and age. Low socioeconomic status was associated with high RP. Adolescents' participation in risky behaviour is consistent with their RP (Gullone 2000;Cecile M etal 2007). The student knowledge should be improved about the health effects of CP use and base stations.

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BIOMONITORING OF ACRYLAMIDE, GLYCIDAMIDE AND N-ACETHYL-S-(2-CARBAMOYLETHYL)CYSTEIN IN HUMAN URINE

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The objective of this study was to evaluate the internal exposure of acrylamide (AA) in Korean. We collected urine samples in the general population aged from 18 to 69 years(n=1,866) and measured concentration of AA, glycidamide (GA) and N-acethyl-S-(2-carbamoylethyl)cystein (AAMA) in urine samples.
Determination was developed by ESI-tandem mass spectrometry (ESI-MS/MS) in positive ionization mode.
The total geometric mean (GM) level was 5.39±0.35 ng/g creatinine for AA, 7.17±0.14 ng/g creatinine for GA and 20.13±1.03 ng/g for AAMA in sample. No significant difference was observed between male (n=803, 5.45±0.50 ng/g creatinine, 7.00±0.13 ng/g creatinine) and female (n=1,063, 5.33±0.36 ng/g creatinine, 7.34±0.22ng/g creatinine) both in AA and GA. But significant difference ($p<0.001$) was observed between male group (23.06±1.79 ng/g creatinine) and female group (17.56±0.91 ng/g creatinine) in AAMA level.

TOWARDS THE DEVELOPMENT OF PRACTICAL TOOLS FOR INTEGRATED ASSESSMENTS OF HEALTH EFFECTS OF TRANSPORT POLICIES: A CONCEPTUAL FRAMEWORK

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Background and Aims: Transport policies widely affect the environment and public health. Some even specifically address issues outside the transport domain, i.e. promotion of active travel to increase physical activity.
Transport and urban planners would benefit from practical tools to navigate and evaluate complex interrelations of health-related factors affected by transport, which would improve project assessments over current state of the art.
Methods: Intending to complement evidence-based modeling and feasibility-focused tool development, we created a conceptual map of health-relevant factors affected by transport policies and their relationships, based primarily on plausibility considerations and reviews of relevant publications. To ensure breadth, data availability or quantitative evidence were not requirements for inclusion in the map. Additionally, transport and health indicators from existing indicator systems were identified.
Results: The resulting conceptual map consists of a classification scheme for transport policies, and of pathways from policy targets to health endpoints. The map distinguishes two main target domains of policies: travel behavior and physical aspects of transport. Five main pathways link these to health: exposure to air pollution and noise, injury risk, impacts on physical activity and access to health-relevant goods, services and opportunities. Health endpoints include morbidities, injuries and mortality.
The map identified and linked over 350 factors. In addition, 40 existing indicators were identified, mainly on physical aspects of traffic.
Conclusions: The map showed that **e**xisting indicators address only limited aspects of the transport-health field. Although not comprehensive, the map assists the development of integrated evaluation tools for transport policies, as it visually digests the complexity of the matter, facilitating the identification of causal pathways of adverse and beneficial health effects of transport. Similar future efforts to dissect complex transport-health relationships would benefit from the use of interactive electronic applications, which may improve user-friendliness, which is often limiting the practical application of such tools.

EVALUATION OF METAL BIOACCUMULATION (Cd, As, Pb, Zn, Cu, Cr, Ni, Hg) AND RISK TO HUMAN HEALTH IN MUSCLE OF EUROPEAN ANCHOVY (SICILY-ITALY)

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Introduction: Marine pollution leads to environmental changes affecting biological components, and fish are certainly good bio-accumulators that provide information on the environmental quality. Hence, a monitoring to evaluate risks for human health associated with consumption of contaminated fish, is needed.
Methods: In this study 60 fish of European anchovy were sampled in the Gulf of Catania. In particular 30 fish were catched in winter and 30 in the summer period. For the lab tests 1 g of sample per fish was mineralized in a microwave system using a heated mixture of strong acids. The reading of Cd, As, Pb, Zn, Cu, Cr, Ni and Hg was performed with an ICP-MS.
Results: The average bioaccumulation level ($\mu g/g^{-1}$, w.w.) in winter follow the order Zn (8.96) > As (6.63) > Cr (0.89) > Cu (0.69) > Hg (0.10) > Cd = Pb (0.01) > Ni (< 0.007), in summer follow the order Zn (27.19) > As (5.61) > Cu (1.95) > Cr (1.15) > Ni (0.13) > Hg (0.05) > Cd = Pb (0.01). Zn, Cr, Cu and Ni concentrations are significantly higher in summer respect to winter ($p < 0.001$), and vice versa for As ($p < 0.05$).
We have also calculated the dietary exposure suggested by US-EPA (1994), and our estimate weekly intake are below the provisional weekly intake PTWI set by EFSA (2004, 2009_a, 2009_b, 2010) for Hg, As, Cd and Pb, and below the PTWI suggested by De et al. (2010) for Cu, Ni and Zn. Furthermore Cd, Pb and Hg concentration are below the limits set by E.C. 1881/2006 in muscle fish.
Conclusions: Results show that in the area of the Gulf of Catania, even if a bioaccumulation of metals is present, especially in the summer period, concentrations measured in European anchovy don't represent a risk for human health.

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ASSOCIATIONS OF LUNG CANCER MORTALITY WITH LONG-TERM EXPOSURE TO $PM_{2.5}$ COMPONENTS

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Background and Aims: Numerous epidemiological studies have now documented that long-term exposure to fine particulate matter air pollution mass ($PM_{2.5}$) is associated with an increased risk of mortality. The ACS study has found associations of $PM_{2.5}$ with increased risk of lung cancer mortality, but the types of particles that are most related to these associations have not been investigated. The focus of this new research was to determine which components of $PM_{2.5}$ mass were most explanatory of the previously reported $PM_{2.5}$ association with lung cancer mortality.
Methods: Using the ACS cohort (extended through 2004), and the U.S. EPA $PM_{2.5}$ Speciation data, we evaluated mortality associations between various composition and source components of $PM_{2.5}$ in 100 U.S. metropolitan areas. Source apportionments were conducted using methods by Thurston and Spengler (1982). Individual elements were also considered as exposure indices. Mortality analyses employed Cox Proportional Hazards modeling.
Results: The major U.S. $PM_{2.5}$ sources identified, their key tracer elements, and their mean nationwide $PM_{2.5}$ impacts were: Metals (Pb, Zn) 0.2 ug/m^3 ; Soil (Ca, Si) 0.8 ug/m^3 ; Traffic (OC, EC, NO_2) 4.6 ug/m^3 ; Steel (Fe, Mn) <0.1 ug/m^3 ; Coal Combustion (As, Se, S) 1.1 ug/m^3 ; Oil Combustion (V, Ni) 0.9 ug/m^3 ; Salt (Na, Cl) 0.1 ug/m^3 ; Biomass burning 1.3 ug/m^3; Other Sulfates (S) 4.3 ug/m^3; Other Nitrates (NO_3^-) 0.6 ug/m^3; and, Other Organic Carbon (OC) 0.6 ug/m^3. Coal combustion-related $PM_{2.5}$ and its key trace elements were most strongly associated with lung cancer $PM_{2.5}$-mortality associations.
Conclusions: Particles resulting from the combustion of fossil fuels, especially coal, are most associated with increased risk of lung cancer mortality from long-term $PM_{2.5}$ exposure.
Acknowledgement: This research supported by the Health Effects Institute's National Particle Component Toxicity Initiative.

TITLE: EXPOSURE TO AIR POLLUTION DURING PREGNANCY AND ANTHROPOMETRIC MEASURES AT BIRTH IN FOUR COHORTS IN SPAIN

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Background and Aims:

A growing body of research has found associations between prenatal exposure to air pollution and adverse birth outcomes. The aim is to assess the association between exposure to traffic-related air pollution during pregnancy and anthropometric measures at birth in the Spanish INMA cohorts in Asturias, Gipuzkoa, Sabadell, and Valencia.

Methods:

Exposure to ambient nitrogen dioxide (NO_2) and benzene was estimated combining spatial modeling (land use regression) and temporal correction for a total of 2337 pregnant women's residence for each trimester and the whole pregnancy. Outcomes included birth weight, length, and head circumference adjusted by gestational age and sex. The association between air pollution exposure and birth outcomes was assessed with linear regression models controlled for potential confounders. We also examined the shape of the relationship using generalized additive models. We performed sensitivity analyses for the subset of women who spent ≥15 hr/day at home during pregnancy. Finally, we performed a combined analysis with meta-analysis techniques.

Results:

No significant improvement in the model was obtained with non-linear models. In the combined analysis, an increase of 10 $\mu g/m^3$ in NO_2 exposure during pregnancy was associated with a significant (at 95% confidence level) reduction in birth length near 1 mm. For the subset of women who spent ≥15 hr/day at home, the change in birth length was twice that. A nearly significant reduction in birth weight of 22 grams was found for the same NO_2 increase in the second trimester. We observed no significant relationship between benzene levels and birth outcomes.

Conclusions:

Residential NO_2 exposure during pregnancy was associated with reductions in size at birth. This association was clearer for the subset of women who spent more time at home.

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CHALLENGES AND OPPORTUNITIES OF USING SYSTEMATIC SOCIAL OBSERVATION IN STUDIES OF NEIGHBOURHOOD AND HEALTH IN INFORMAL URBAN AREAS IN ALEPPO, SYRIA

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Background and Aims

Systematic social observation (SSO) is a method primarily used in studies of neighbourhood and health in western countries. The method is useful in measuring integral neighbourhood characteristics relevant to residents' health and well-being. Despite growing number of publications on the method, there has been none on its application to study informal urban neighbourhoods. The aim of this paper is to provide a critical discussion of the limitations and opportunities of using the SSO method to study characteristics of an informal area in Aleppo, Syria.

Methods

Twenty one observation points were randomly selected. Two teams of observers were trained to collect data on neighbourhood characteristics using an observational instrument with 32 items on land use; environmental quality and the social environment. The unit of observation (the spatial scale at which neighbourhood characteristics may differ) was identified as 100 meters of the right hand side of a street. Inter-rater reliability was calculated using percent agreement and Krippendorff's α.

Results

The inter-rater reliability ranged from poor to fair for most items. The main limitations included defining a meaningful unit of observation; the difficulties of validating whether the same points were observed and lack of routine health data at a small area level. The opportunities related to the novel application of a *Garmin* Global Positioning System and Google Earth maps to characterise an informal area and in finding out about variability in neighbourhood characteristics within the same area.

Conclusions

Systematic social observation is a valuable method to collect data on informal neighbourhoods especially, where routine environmental data are seldom available. However, special care should be taken to adapt the method and procedure of the observation to the context of informal areas. We offer several recommendations of how this method can be adapted to study informal areas.

PREVALENCE OF ASYMTOMATIC TOXIC AND NONTOXIC CLOSTRIDIUM DIFFICILE IN A BAVARIAN POPULATION

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Background and Aims:
Health care associated outbreaks especially with toxigenic C. difficile (CD) are difficult to control and increasingly reported from America and Europe with new, highly virulent strains, e.g. PCR-ribotype 027. Financial impact of CD associated disease (CDAD) on the healthcare system is substantial (5-15,000 euro/case in England and $1.1 billion/year in the USA). CD can be transmitted via personal contact or environmentally. In the majority of cases, it is associated with previous antibiotic exposure. The role of patients and healthcare workers who are symptom-free but colonised with CD in the intestinal tract is unclear, especially as CD is recognised increasingly in individuals previously not considered to be predisposed.
Most of these studies on prevalence of CD have looked at clinical or hospital admission specimens though, thus subjects with some recent previous medical treatment. Therefore they are inappropriate to assess the relevance of asymptomatic CD colonisation in the general population for health care associated CDAD.
We assessed gastrointestinal CD in asymptomatic subjects from a pool of routine stool samples of the Bavarian Health and Food Safety Authority.
Methods:
Stool of 767 individuals (gender, age and place of residence obtained during surveillance) was screened for CD and toxin production with an antibody-based test (C. diff Quick Chek Complete, Fa. Oxoid), supplemented by a culture-based approach and PCR -ribotyping.
Results:
Of 767 individuals 25 (3.3 %) were screened CD positive. From 12 (1,6 %) individuals toxigenic CD isolates were obtained, none were PCR-ribotype 027. In follow-up questioning 7 of these 12 individuals reported recent hospitalisation. When these are excluded prevalence to CD colonisation with toxigenic strains was 0.7% (5/767).
Conclusions:
CD prevalence was low in this asymptomatic population, indicating transmission in heath care and predisposition, i.e. antibiotic treatment being most relevant for health care associated CD.

ACTIVE TRAVEL, GENERAL PHYSICAL ACTIVITY, AND BODY MASS INDEX IN SWISS ADULTS: RESULTS FROM THE SWISS HEALTH SURVEYS 2002 AND 2007

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Background and Aims: Physical activity (PA) is associated with numerous health benefits. Active travel (AT), such as walking and bicycling, is of interest for health promotion as an opportunity to achieve activity recommendations of at least 150 minutes per week through routine activities, such as commuting or running errands. Therefore, AT may suit people which are not inclined to engage in sports or other forms of leisure time exercise.
Methods: Literature relating AT, total PA levels, and Body Mass Index (BMI) was systematically reviewed. The cross-sectional Swiss Health Surveys in 2002 and 2007 included over 18'000 participants each, assessing daily duration of walking and cycling, travel modes for daily routes, frequency of moderate- and vigorous-intensity PA, as well as BMI.
Means and proportions were age-standardized. Ordinal logistic regression models were calculated for BMI and PA as outcome variables and AT as predictor, adjusting for sports and other exercise, demographics, and other potential confounding variables.
Results: Most reviewed studies confirmed associations in the expected directions, such as more AT being associated with more PA and lower BMI, but varied in quality and quantitative comparability. Swiss adults (age 15-75) spent on average 33 minutes walking or bicycling with a marginal increase between 2002 and 2007; however, almost half did not report any time spent walking or cycling.
AT showed significant associations with total PA. Those reporting any AT (Ave. 62 min/day) were 16% (CI95%:11-22%) more likely to be in a higher activity category than drivers. Only travel mode was significantly associated with BMI. Associations with both outcomes were stronger for travel mode bicycling than for walking.
Conclusions: Swiss data confirm patterns between AT, PA, and BMI observed in the literature and thus the importance of AT for general PA. Cross-sectional analyses are limited in their capability to disentangle (reverse)-causality of the observed associations.

SEASONAL INFLUENZA: LINKS WITH METEOROLOGY AND SOCIAL NETWORK

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Background and Aims: Prevention of influenza is a long-standing public health objective. Recent observational studies demonstrate that complex seasonal influenza patterns are sensitive to changes in social networks. The experimental studies suggest potential links with meteorology, when influenza virus infectivity depends on the effect of ambient temperature and humidity. We examined the relationship between influenza, meteorological conditions, and social contacts' intensity using influenza virus surveillance in Milwaukee, Wisconsin, USA.

Methods: Laboratory-confirmed influenza cases were provided by the Milwaukee Health Department Laboratory during 5/22/2004-02/22/2011. Records contain weekly positive test results for the influenza A/H1N1, A/H3N2, 2009-A/H1N1 and Influenza-B strains detected in human subjects from six CDC-WHO-specified age groups (<1,1-4,5-24,25-44,45-64, and ≥65 yrs). Daily meteorological parameters (maximum/mean/minimum for temperature and relative humidity) were aggregated into weekly time series. Public school calendars were used to create the time series to reflect the probability of person-to-person contacts. Poisson harmonic regression models were used to assess seasonal characteristics: peak timing and absolute intensity for each strain and age group. Relative risks of influenza associated with temperature and humidity and their interactions with viral genome were estimated using non-linear regression models. The preliminary results are limited by the first 128 weeks of the study period (prior to the massive testing for 2009-A/H1N1 influenza).

Results: Three major influenza strains (A/H1N1, A/H3N2, Influenza-B) have distinct peaks at weeks: 8.6 [95%CI:8.0-9.1], 9.6 [95%CI:8.3-10.3], and 12.9 [95%CI:11.6-15.3] respectively. Influenza-A peaked at colder and less humid weather conditions compared to Influenza-B. The intensity of Influenza-B exhibited the 6-fold increase ($p<0.001$) over the study period. Intensity of community social network has minimal, impact on the influenza seasonality.

Conclusions: The seasonal influenza incidences are likely to be linked with meteorological conditions and school-related activities, however their effects on the circulating viruses and severity at a community level is inconclusive.

LEUKEMIA MORTALITY RISK FROM IONIZING RADIATION IN THE COHORT OF WISMUT URANIUM MINERS 1946–2003

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Background and Aims: The dependence of the risk for leukemia mortality on ionizing radiation in the low dose range is of much interest in radiation protection. Data from the German Wismut uranium miner cohort study are analyzed here to further evaluate this topic.

Methods: The cohort includes about 59 000 men contributing 128 leukemia deaths and approximately 2 million person years during the time-span from 1946–2003 (uranium mining was done until 1989). The excess relative risk (ERR) and 95% confidence limits (CI) for leukemia in relation to absorbed red bone marrow (RBM) dose has been assessed using Poisson regression stratified by age and calendar year. Both linear and categorical models have been used. The average absorbed RBM dose was 48.8 mGy (range 0 to 989 mGy) to which external gamma radiation contributed on the mean 40.9 mGy (range 0 to 909 mGy).

Results: The linear trend in leukemia excess relative risk per unit absorbed RBM dose was ERR/Gy = 1.39 (95%CI −1.18 to 3.97, p = 0.29) assuming a lag-time of 2 years. The chronic lymphatic leukemia (CLL) and non-CLL sub-type linear risk estimates are 0.33 (95%CI: −3.44 to 4.11) and 2.08 (95%CI: −1.39 to 5.55), respectively.

Conclusions: The results do not show a statistically significant increase in risk of death from leukemia, but risk coefficients are consistent with published estimates. The present study is limited by low numbers of leukemia cases, a low dose range and lack of data on leukemia incidence. Presently information on medical radiation exposure is gathered in an ongoing nested case control study on leukemia based on an extended follow-up period.

DESIGNING RELEVANT STUDY ZONES FOR ECOLOGICAL STUDIES: THE PAISARC+ PROJECT

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Background and Aims: Spatial boundaries constructed from population census data or for other administrative purposes do not necessarily match to the neighborhood contours that define a community. This in turn may hamper the relevant testing of epidemiologic hypotheses in ecological studies.
Our aim was to design the appropriate areal unit for testing the neighborhood influences on the relationship between ambient air pollution and 2 short-term health outcomes, that is, asthma exacerbation and onset of myocardial infarction, on a very small scale ecological basis.
Methods: Using GIS (Geographic InformationSystem) tools and concepts, we designed and applied five approaches for census-block population disaggregation, in cells of 250 x250 m (a common spatial unit to explored contextual variables available at different scales). Homogeneous neighbourhoods were constructed according to our Deprivation Neighbourhood Measure (The NDM is calculated from 27 relevant variables grouped into 3 domains -socio-economic feature; social cohesion and public resources). AZTool software (David Martin, University of Southampton, UK) was used to then re-aggregate cells into a new, both hypothesis-driven and data-driven, areal unit. Three criteria were considered: *(i)* output zone homogeneity as regards neighborhood context characterization, *(ii)* population target size, *(iii)* shape compactness. We tested several relative weighing combinations of these parameters.
Results: The original 1608 (at 250mx250m) cells were aggregated into 220 non-linear neighbourhoods including 2000 persons, and similar as regards neighborhood context (intra-area correlation = 0.58).
Conclusion: Our approach allows to design on a relevant basis, a very small scale spatial unit, to be used in further case-crossover studies, as indicated in the objectives.
Keywords:
MAUP; Zone design; Neighbourhood; Ecological study

A RETROSPECTIVE COHORT STUDY OF RESIDENTS NEAR MULTIPLE POINT SOURCES OF AIR POLLUTION

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Background and Aims: In the area of Malagrotta, a suburb of Rome (Italy), a large waste landfill, an incinerator and an oil refinery plant have been operating since the early 1960s. To evaluate the health effects due to airborne contamination, a retrospective cohort study is on-going using GIS and dispersion modelling to characterize the exposures.
Methods: The study area was defined as the 7 km zone around the landfill. The cohort was based on the Rome Longitudinal Study based on the 2001 census with a mortality follow-up until 2008. For each cohort member, individual (education, occupation, place of birth, civil status, area-based SES) and GIS variables (distance from motorways and from high traffic roads) were available. Exposures to NO_2 from traffic and from diesel trucks collecting waste were available from a land use regression model (R^2=0.72) and an ADMS dispersion model, respectively. Exposure assessment to the incinerator (NOx), the refinery plant (SOx) and the landfill (H_2S, indicator of diffuse emissions) was done with the SPRAY Lagrangian dispersion model. Cox regression analysis was used considering individual and GIS variables as confounders.
Results: The cohort included 85,559 individuals (8.5% distant less than 3km from the plants). During the study period, 4,848 deaths for all causes, and 1,741 for cancer were observed. There was some degree of correlation among the three exposure indicators of interest (NOx, SOx, and H_2S). No association with distance from the plants was observed. Exposures from the refinery plant (hazard ratio, HR=1.43, 95%CI:1.17-1.79, high vs low SOx) and from the landfill (HR=1.26, 95%CI:1.01-1.57, high vs low H_2S) were associated with overall mortality.
Conclusions: Evaluation of the health effects near multiple sources of air pollution is difficult. We used a large retrospective cohort with detailed exposure assessment. Health effects, not detectable using distance as a proxy of exposure, were observed.

LIVING CLOSE TO A MAIN ROAD DURING INFANCY IS ASSOCIATED WITH ATOPIC ECZEMA IN KOREAN SCHOOLCHILDREN

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Background and Aims: The prevalence of allergic diseases has increased during the past decades in Korea, with the increasing tendency that more children are exposed to traffic-related air pollutants as potential risk factor of allergic diseases. The objective in our study is to assess the relationship between living close to a main road during infancy and atopic eczema in Korean children.
Methods: From 2005 to 2006, we studied the first or second grade elementary school children at the age 6~8years in ten South Korea cities as part of the first Children's Health and Environmental Research (CHEER) survey. During the first two years of the CHEER study, 2927 children were included in these analyses. To collect information on the medical history of the children, we used standardized questionnaires that include the International Study of Asthma and Allergies in Childhood (ISAAC) questions. In order to assign an exposure estimate to each subject, the residential address of each participant was geocoded and subsequently mapped using geographic information system (GIS) computer software ArcGIS 9.3. Distance of residence from the nearest main road was classified into four categories (<75, 75 to 110, 110 to 200, and >200 m) and length of main roads within a 200m buffer was also classified into four categories (0, 1 to 150, 151 to 300, and >300 m). Logistic regression analysis was performed to estimate odds ratios (ORs) and 95% confidence intervals (CIs) of atopic eczema relative to the distance of homes from the nearest main road and length of main roads.
Results: The lifetime and 12-month prevalence of atopic eczema, the lifetime atopic eczema diagnosis, and 12-month treatment were 37.7%, 21.9%, 33.4%, and 9.4%, respectively. Inverse associations were found between the distance to the nearest main road and atopic eczema. The highest adjusted odds ratios(ORs) for children living less than 75m from main roads were found for lifetime atopic eczema (OR, 1.36; 95% confidence interval(CI), 1.04-1.77), past year atopic eczema (OR, 1.50; 95% CI, 1.06-2.24), atopic eczema treatment (OR, 1.54; 95% CI, 1.06-2.24), respectively.
Discussion: The current cross-sectional study found that a shorter distance from the residence to the nearest main road during infancy, especially within 75m, was significantly related to an increased prevalence of doctor-diagnosed atopic eczema and symptoms of atopic eczema at the age 6~8years. Furthermore, a positive exposure-response relationship between length of road within 200m of the residential location was significant for doctor-diagnosed atopic eczema and symptoms of wheeze or atopic eczema. However, our findings were based on a proxy marker for traffic-related air pollution and on crude exposure period. Further investigation with longitudinal models are needed which incorporate life-time exposure to pollution.

INTEGRATED ENVIRONMENTAL HEALTH IMPACT ASSESSMENT OF DISINFECTION BY-PRODUCTS

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Background and Aims: Disinfection by-products (DBPs) in drinking water are associated with several health outcomes. Impact assessment of DBPs is dominated by unitary approaches relying on monitoring data and toxicological estimates of dose-response. This study aimed to carry out an integrated environmental health impact assessment (IEHIA) of DBPs that took into account the full chain between environmental drivers of DBP formation (organic carbon in surface water) and health impacts, under contrasting climate change scenarios.
Methods: The assessment was carried out for two UK regions for which land use scenarios had been previously developed for 2051. A regression model was constructed and validated using dissolved organic carbon (DOC) monitoring data. A published water balance model was modified and combined with the regression model, and DOC concentrations were estimated under each scenario. Estimates of total trihalomethane (TTHM) concentration were generated using laboratory-based models. Exposure-response functions (ERF) were derived from meta-analysis (SGA) and pooled analysis (bladder cancer). Health impacts were computed probabilistically, by applying the ERFs to projections of population and rates of disease.
Results: Estimated health impacts in the two study areas for SGA and bladder cancer increased under both climate scenarios relative to a 2001 baseline. Increases were greatest in the region where surface water is primarily used as a source: attributable cases of bladder cancer increased by 60-70%; cases of SGA increased by around 35%. The low emissions scenario yielded smaller impacts, but any health benefit from adopting low emission policies was small: in the order of a 20% reduction of cases of bladder cancer and 9% of SGA in the high surface water use region.
Conclusions: IEHIA was applied for the first time to DBPs, a systemic risk factor in drinking water. Modelling of the full chain produced estimates of health impacts under future climate scenarios.

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USE AND PERCEPTION OF URBAN (INDUSTRIAL) FORESTS

Background and Aims

Urban nature and green areas are of a high value for public health (physical activity, climate adaptation strategies, reducing hazardous substances, etc.). The industrial forest Rheinelbe in Gelsenkirchen (Germany) also constitutes a health-promoting resource, especially for the local population. The extent to which this resource can unfold its various potentials, depends on how it is or is not used. Decisive factors here can be how the public perceives it as well as eventual obstacles to its use. In order to determine non-use, perception and possible obstacles to use in various population groups, in 2008/2009 a study was carried out on the use (or non-use) of the industrial forest by the (local) population.

Methods

In 2008 a conceptual study was done on procedures for developing the industrial forest (on-site observation, surveying, interviewing experts). As part of a follow-up study in 2009, a mail survey was taken of the population in the adjoining city district. The bilingual questionnaire developed specifically for this purpose included quantitative and (semi-)qualitative items which were then evaluated as descriptive statistics and compared with the results of the concept study.

Results

The industrial forest is used for rest and leisure, its road also for non-motor transport. People visiting the forest report positive health effects (e.g. relaxation, good air quality) and active/passive nature experience. While those surveyed in the forest reported coming there to visit it often, residents from the adjoining area came over less often. Furthermore, individuals with an immigrant background visited the forest less often than did natives. Potential obstacles to visiting the forest were feelings of low personal safety (dependent on gender and/or nationality), no knowledge of the forest, and little or no feelings of identity with the former colliery's area.

Conclusions

Visitors surveyed on site and people surveyed by mail in adjoining areas perceived the industrial forest as an important and long-term health factor. From a health sciences viewpoint, the salutogenic potential of natural urban green areas need to be communicated more broadly and clearly so these areas will be used by as many population groups as possible. Further research is needed to determine how the effect of targeted, long-term, target group-specific measures can be embedded already at the planning stage.

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ASSOCIATIONS BETWEEN SHORT-TERM CHANGES IN AMBIENT PARTICULATES AND GASEOUS POLLUTANTS AND TRANSIENT ISCHAEMIC ATTACK

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Background and Aims: While several studies have investigated the effects of short-term air pollution on cardiac outcomes, less is known about its effects on cerebrovascular disease, including stroke and transient ischaemic attacks (TIA). The aim of this study was to assess the effects of short-term variation in air pollutants on the onset of TIA and minor stroke.
Methods: We performed secondary analyses of NORTHSTAR, a prospective multicentre study designed to investigate the prognostic role of peripheral and genetic inflammatory markers in patients with recent TIA or minor stroke. A case crossover study was conducted to determine the association between occurrence of TIA or minor stroke and changes in ambient PM_{10} or gaseous pollutants.
Results: A total of 709 cases of TIA and minor stroke were recruited from the Manchester (n=335) and Liverpool (n=374) areas. The participants were mostly elderly patients with an age range of 27-93 years and a mean of 66.8 ± 11. Data for the Manchester cohort showed an association between ambient nitric oxide (NO) and risk of occurrence of TIA or minor stroke with a lag of 3 days (odds ratio 1.06, 95% CI 1.01 – 1.11), whereas no association was found for the patients from Liverpool. Effects of similar magnitude, although not statistically significant, were generally observed with other pollutants. In a two pollutant model the effect of NO remained stronger and statistically significant when analysed in combination with CO and SO_2, but was marginal in combination with NO_2 or ozone and non-significant with PM_{10}. There was evidence of effect modification by age, gender and season.
Conclusions: Our data suggest an association between changes in ambient NO concentration (which may have been a surrogate for another pollutant), and the occurrence of TIA in Greater Manchester.
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North West of England: The NORTHSTAR Study. *J Neurol Neurosurg Psychiatry* 2008, 79: 38-43.

ANALYSIS OF TUBERCULOSIS IN CHILDREN UNDER 15 YEARS IN ONE OF THE MOST AFFECTED REGION IN ROMANIA

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Background and Aims. Dolj County is one of the counties with highest incidence of tuberculosis in Romania. The purpose of this study was evaluation of tuberculosis in children under the age of 15 years in this region.
Method. Were included a 347 cases during 2001 and 2010. Inclusion criteria were diagnosis of tuberculosis, and age under 15 years. For statistically analyze it was used incidence, relative risk, and 95% confidence interval for risk.
Results. The average incidence was 32.79/100000 and was noticed a certain downward trend of incidence over the past 5 years (p <0.005). Decreased average incidence over the past five years was 43%. The risk of tuberculosis in the period 2001-2005 was 1.45 times higher compared with the period 2005-2010 (CI95% 1,09-2,11; p=0,018).
Pulmonary forms predominated (76.23%) compared with extrapulmonary (23.77%). The risk for pulmonary localization tuberculosis was 3.2 times higher (CI95% 2.5-4.04, p <0.005). He was also noted a higher frequency of extrapulomonary forms in children in urban areas (25.83%) compared with those in rural areas (19.81%). Analysis of smear positive rate showed a low rate of only 25.84%, the risk of BK negative sputum being 2.88 (IC95% 2,29-3,61; p<0,005). Risk of a positive sputum in children from urban was almost two times higher than rural children (RR=1,85 IC95% 1,20-2,86; p=0,004).
A total of 31 cases (7.75%) were from known outbreaks of tuberculosis. All cases of outbreaks of tuberculosis, however, were only identified in children from rural areas (21.09%).
Conclusions. Decreased incidence of tuberculosis in children under 15 is the result of joint efforts at regional and national level and WHO support. Lower rate of positive sputum in children continues to hamper the identification of new cases of tuberculosis in children. Outbreaks in rural areas require further combat and control of tuberculosis in rural communities.

OUTDOOR AIR POLLUTION AND SOCIAL STRESSORS ACROSS NYC COMMUNITIES: A GIS-BASED SPATIAL CORRELATION STUDY OF MULTIPLE EXPOSURES IN THE URBAN ENVIRONMENT

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Background and Aims: Chronic psychological stress has been linked to respiratory health, both independently and in combination with air pollution. Geographically patterned community-level social stressors (e.g., noise, violence) may impact upon individual psychological stress. Here, we address methodological challenges in characterizing spatial correlations among community stressors, and in interpreting publicly available data collected at different administrative areas. We then validate the utility of community-level stressor indices to explain differences in individual-level stress, enabling a meaningful exploration of synergistic effects of social and environmental exposures on urban health.
Methods:Building on the New York City Community Air Survey (NYCCAS), a year-round study of intra-urban variation in air pollutants, we use GIS-based methods to explore spatial correlation among community-level stressors (e.g. violent crime, noise annoyance, mental health, poverty, quality of life, childhood stressors), and with air pollution. We employ simultaneous autoregressive (SAR) modelling, leveraging spatial autocorrelation within indicators, to assess correlations among exposures, and developed a novel GIS-based method for comparison among incongruent administrative areas. Tests for sensitivity to unit of aggregation were conducted using high-resolution air pollution and census data.
Results: Using GIS-based spatial analysis, we identified spatial autocorrelation and inter-neighborhood variability in all covariates. Preliminary analyses showed that stressor and air pollution exposures were not uniformly correlated across the city. Leveraging autocorrelation revealed inconsistent influence on observed associations among these community-level exposures.
Conclusions:Our analyses suggest that community stressors are not consistently spatially correlated with neighbourhood poverty or air pollution. These spatial discrepancies enable examination of independent and synergistic effects on health, and characterization of potential differential air pollution impacts on susceptible communities. Unmeasured spatial confounding and autocorrelation may bias epidemiologic findings on multiple exposures. Next steps include participatory GIS to validate neighborhood boundaries, focus groups to identify important community-level stressors, and surveys to assess the relevance of community stressors in explaining individual-level stress.

Climate change adaptation and mitigation strategies: considerations with respect to electromagnetic fields

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Background and aims: Technological developments to mitigate or adapt to climate change may alter the population's exposure to electromagnetic fields (EMF), in particular extremely low frequency (ELF)-EMF. Our main objectives were to perform a "horizon scan" about potential effects of climate change adaptation/mitigation strategies on the design, use, location or quantity of sources of EMF, and concomitant changes in exposure to EMF of (groups of) the population. Existing knowledge about potential health effects is briefly summarised in the poster.
Methods: Information about EMF-related aspects of climate adaptation and mitigation strategies was obtained by consulting experts in electricity production and transport. The (scientific) literature was consulted about health effects of EMF exposure.
Results: A major developments will be that a central production process that is dependent on fossil fuels (coals, oil and gas) will be replaced with a combined central and decentral production process that uses solar panels, wind turbines and hydro-electric power stations. Further, (inter)national electricity systems will be more interconnected. Both developments require a strong expansion of the network of overhead or underground high-voltage power lines. If the electric car will be used on a large scale, this has to be accompanied by a dense charging infrastructure in public and private spaces.
How these developments will translate to the public's EMF exposure is dependent on a.o. how the electricity infrastructure will be designed in relation to residential areas.
Conclusions: The climate change induced adaptations in electricity production and transport may change average proximity to (overhead) power lines and exposure to ELF-EMF in the population, which may change the associated risk of childhood leukaemia. Moreover, we anticipate proliferation of idiopathic environmental intolerances attributed to EMF, and increased concerns about health risks.

METHYLMERCURY IN SPORT FISH AND ADVERSE REPRODUCTIVE OUTCOMES IN SOUTH CAROLINA

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Background and Aims: Sport and subsistence fishing are common in South Carolina (SC, USA), although there is limited information on the potential health effects of these activities. Mercury is a neurodevelopmental toxin with widespread distribution in aquatic ecosystems. Fish consumption advisories for methylmercury (MeHg) have been issued for many SC rivers.
Methods: Residential locations of live births from 1995 to 2005 (birth certificates, SC Vital Statistics Registry) were geocoded and statewide sportfish MeHg biomonitoring data were spatially interpolated via kriging to estimate MeHg concentrations at each location. Generalized estimating equations were used to test the hypothesis that risk of low birth weight (LBW, <2,500 grams) was greater among women living in areas with elevated MeHg in fish, after adjustment for maternal age, race, education, smoking, prenatal care, and parity. Separate analyses evaluated the proximity of each residence to rivers with MeHg fish consumption advisories (within or beyond 8 kilometers).
Results: There were 362,580 live births available for analysis (statewide LBW rate=7%). LBW cases were more likely to reside in residences in the upper quartile of predicted MeHg (odds ratio [OR]=1.04; 95% confidence interval [CI]: 1.00-1.09) or within 8 kilometers of a river with a 'do not eat' fish advisory (1.05; 1.00-1.11) compared to the lowest quartile, or to rivers without fish consumption restrictions, respectively. In general, stronger associations between low birth weight and elevated MeHg were observed among African compared to European American mothers. The monthly average number of sport fish meals among African American women in one region with elevated fish MeHg was five times greater than European American women (5 ± 8 vs. 1 ± 2, respectively).
Conclusions: This analysis suggests a need for more detailed, individual-level studies to assess reproductive health risks related to MeHg exposure from sport fish consumption in SC.

Adverse pregnancy outcomes and maternal urban or rural residence at birth

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Background and Aims: Adverse birth outcomes such as low birth weight, preterm birth, and congenital birth defects are important risk factors for infant mortality and are a major public health issue in rural areas. This study aimed to explore the distribution of selected adverse birth outcomes in newborns according to rural/urban status of maternal residence at birth in a Brazilian municipality.

Methods: Information about all live births occurred between 2004 and 2006 in the Municipality of Nova Friburgo, Brazil, was retrieved from the Live Birth Information System. Liveborns were classified as rural or urban, according to their mother's residence address. Prevalence ratios were then calculated, along with their respective confidence interval (CI95%). Analyses were stratified by education level, age, number of examinations, type of gestation (single or multiple), and type of delivery (natural or c-section) and by using Poisson regression we did adjust prevalence ratios.

Results: Among C-section births, we observed in pregnant women from rural zone an increased risk of malformation (PR: 2.14; CI95%: 1.06-4.33). Pregnant women from rural areas were also more likely to give birth to very low weighted babies (PR: 5.19; CI95%: 1.72-15.17) in twin pregnancies, when compared to pregnant women from urban areas.Adjustment prevalence ratio showed agreater risk of very low birth weight (PR:1.25; CI95%:0.80-1.95), and low APGAR score in the 5th minute (PR:1.61; CI95%:0.78-3.33) and an increased risk ofmalformation detectable at birth (PR:1.73; CI95%:0.89- 3.38).

Conclusions: Our results indicate that women residing in rural areas were at higher risk to give birth to an infant with very low birth weight, low Apgar index at the 5th minute and malformations detectable at birth, regardless of socioeconomic and gestational conditions.

EFFECTS OF PRENATAL EXPOSURE TO ORGANOCHLORINES AND MERCURY ON GROWTH PARAMETERS IN INUIT NEWBORNS FROM THE CANADIAN ARCTIC

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Background: Maternal consumption of seafood during pregnancy has been shown to be a source of exposure for the foetus to several environmental contaminants (ECs), including polychlorinated biphenyls (PCBs), chlorinated pesticides (CPs) and methylmercury (MeHg). These ECs have been found to be related to impaired foetal growth and shorter pregnancy duration in previous studies. On the other hand, seafood products are also an excellent source of docosahexaenoic acid (DHA), which has been shown to have beneficial effects on pregnancy outcomes and foetal growth. So far, it remains unclear if DHA intake during pregnancy can attenuate the potential adverse effect of ECs on foetal growth.
Objectives: To investigate the association of *in utero* exposure to ECs with pregnancy duration and foetal growth while taking into account the possible beneficial effects of DHA.
Methods: Pregnant Inuit women (n = 251) from Nunavik (Canada) were interviewed at mid-pregnancy and 1 month postpartum. Umbilical cord blood samples were collected from their newborns and analyzed for contaminants and DHA. Birth weight, length and head circumference were measured, and gestational age was assessed from date of last menstrual period. Multiple linear regressions and path models were used to evaluate direct effects of exposure to ECs on growth parameters and indirect effect on foetal growth through their impact on pregnancy duration.
Results: PCB 153, two CPs and MeHg were negatively associated with pregnancy duration in multivariate models. Indirect models revealed that all ECs were negatively associated with growth measurements through their negative relationships with pregnancy duration. Conversely, umbilical cord DHA concentration was positively related to growth parameters through its positive association with gestation duration.
Conclusion: *In utero* exposure to ECs of Inuit newborns was associated with reduced pregnancy duration, which adversely affects foetal growth. However, cord DHA appears to mitigate these effects on growth by prolonging gestational length.

BIOMBIENT.ES: ONGOING HUMAN BIOMONITORING OF THE SPANISH POPULATION

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Background and Aims: BIOAMBIENT.ES Is the first Human Biomonitoring study made in Spain at national level including Canary Islands and the autonomous African province of Ceuta. The study is carried out under the responsibility of the National Spanish Institute of Health, Carlos III, and funded by the Ministry of Environment.
Methods: The study involved 1936 voluntaries, from 18 to 67 years old, using a complex design intended to reflect the Spanish active population structure by sex, economic activity sector and region. Recruitment campaign, started in March 2009 finished in July 2010, included four sampling periods in order to cover for season variability. Urine, blood, serum and scalp hair were analyzed for persistent organic pollutants, cotinine and heavy metals and followed up by epidemiological questionnaires of living style and diet.
Results: Analysis are not finished. The first results show: Geometric mean (GM) and 95% confidence intervals (CI) for urinary cadmium concentrations were 0.24 (0.23-0.25) µg Cd/g creatinine. Mercury concentration (GM) in scalp hair was 1.86 (1.76-1.97) µg Hg/g hair (only given by 31% of the participants volunteers) The GM (CI95%) for the sum of PCB 138, 153 and 180 was 135.6 (130.5-140.8) ng/g lipid. For PCB 28, PCB 52, 99% of the studied population was bellow 59 ng/g lipid and 94% bellow 11,8 ng/g lipid for PCB 101. Polybrominated diphenyl ethers (PBDEs) levels were below the quantification limit (0,01ng/mL)
Conclusions: Results from BIOAMBIENT.ES show that the concentrations of environmental pollutants in the Spanish population are similar to that reported in HBM studies from other countries (USA; CDC 2009, Germany; Schulz et al 2003). The exception is mercury in hair which is much higher in the Spanish population, probably because of a high consumption of fish and other marine products.
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UNDERSTANDING WALKABILITY: HOW POLICYMAKERS ASSESS FACTORS THAT INFLUENCE ACTIVE TRANSPORT

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Background & Aims: In recent years there has been considerable growth in the public health research area investigating the influence of the built environment on physical activity. Simultaneously, environmental, transport and planning professionals have been promoting a modal change to active transport modes to reduce traffic congestion and air pollution. A core factor in both areas of research is the concept of 'walkability'. International literature suggests that walkable areas are favourable to active transport (i.e., walking and cycling) but the factors used to identify what a walkable area or neighbourhood actually is can be varied and contradictory. In addition, many professionals and policy-makers have different ideas or expectations as to what makes an area walkable or not. The purpose of this paper is to examine how various professionals and policy-makers in Dublin understand and operationalize the concept of walkability. A key component of this study is to understand to what extent these decision-makers consider public health concerns as well as others concerns such as safety issues, traffic management, air quality, the nature of the local economy, and aesthetics, among others.
Methods:This study is part of a larger study called the The 'Cleaner, Greener, Leaner Study', which is funded in part by the Irish Environmental Protection Agency's STRIVE programme. The study aims to examine to what extent urban form impacts individual level health; transport behaviour; and hence the production of air pollution and greenhouse emissions in the Greater Dublin Area. The first stage of the study is to develop a local definition of 'walkability' that is suitable for use in an Irish context.
In order to understand the views of various relevant professions on the concept of 'walkability', we conducted a comprehensive survey targeting professionals and policymakers who work in the area of planning, urban design, engineering, and construction of the built environment and transport systems. Our final sample size was 218 professionals and policy-makers. In addition we conducted five in-depth focus groups with a sub-sample of these decision-makers. We use information from these focus groups to further interpret our quantitative based survey findings

Results: The data collection phase for this stage of the project was recently completed. We are in the process of analyzing our findings. Initial results, clearly indicate that whilst quality footpaths or sidewalks and nearby destinations are important to all professional groups and policy-makers there are some significant differences on how professionals view walkability and its value to the public. Many professionals and policy-makes do not adequately consider health concerns when making decisions about the nature of the built environment.
Conclusions: We feel our study is important because we work to "get inside the heads" of professionals and policy-makers who make decisions about the way our built environments function and the way we travel. In doing so, we provide key insights into the conceptualization of walkability and the thinking that affects decisions to build or not build places that enable active transport and improve health.

PLASMA HOMOCYSTEINE LEVELS ACCORDING TO TWO *METHYLENETETRAHYDROFOLATE* GENETIC POLYMORPHISMS AND SERUM FOLATE LEVELS IN A POPULATION-BASED STUDY IN SÃO PAULO, BRAZIL

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Background and Aims: Hyperhomocysteinemia is a risk factor of cardiovascular disease. Homocysteine remethylation requires vitamin B12, folate and methylenetetrahydrofolate reductase (MTHFR) enzyme. The TT homozygosis of the C677T and CC of A1298C in the MTHFR gene are associated with reduced MTHFR activity. This study aims to assess the impact of serum levels of B12 and folate on plasma homocysteine considering C677T and A1298C polymorphism in a Brazilian sample.

Methods: Serum vitamin B12, folate, and plasma homocysteine of 259 participants from a population-based survey in São Paulo were used. The genotypes were done with an *allele-specific* polymerase chain reaction. Two generalized linear models with gamma distribution and link identity were applied to model homocysteine according to sex, age, vitamin B12 as well as folate (cut-off at tercile 7.1 ng/mL) and each polymorphism (C677T: non-TT and TT; A1298C: non-CC and CC) interactions.

Results: Significant effects of males ($p<0.01$) and age ($p<0.01$) were found for both models. An increase of 50 pg/mL in vitamin B12 was associated with a reduction of 0.11 ng/mL ($p=0.01$) and 0.13 ng/mL ($p=0.01$) in homocysteine levels for C677T and for A1298C model, respectively. Finally, an interaction between C677T and folate was found ($p<0.01$) whereas between A1298C and folate was not significant. In the C677T model a mean difference of 5.7 ng/mL of homocysteine levels was observed between lower and higher folate among TT genotype ($p<0.01$) whereas a difference of only 1.1 ng/mL among non-TT ($p<0.01$). Homocysteine levels among participants with higher folate were similar between non-TT and TT ($p=0.57$). In the A1298C model a 1.86 ng/mL homocysteine levels difference was observed between higher and lower folate for non-CC and CC genotypes similarly.

Conclusion: Lower levels of folate are associated with higher levels of homocysteine, but in the presence of TT homozygote for C677T genotype homocysteine is even higher.

POLYBROMINATED DIPHENYL ETHERS AND SOCIAL AND EMOTIONAL DEVELOPMENT IN TODDLERS

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Background and Aims: Polybrominated diphenyl ethers (PBDEs) are widely used flame retardants that have become ubiquitous environmental contaminants. PBDEs accumulate in breast milk and have been linked to adverse neurodevelopment in animals and humans, raising concerns about adverse health impacts of exposure during infancy. We investigated the association between breast milk exposure to PBDEs and social and emotional development in toddlers.

Methods: A longitudinal cohort study followed pregnant women and their children through 36 months of age in central North Carolina. Breast milk samples obtained at 3 months postpartum were analyzed for PBDEs. The Infant-Toddler Social and Emotional Assessment (ITSEA) was completed by mothers to assess children's social and emotional development at age 24 months (n=222). We assessed the relationship between the most commonly detected congeners in our study population, BDE-28, 47, 99, 100 and 153, and child social and emotional development using multivariate regression analysis, adjusting for maternal age, parity, income and education, as well as child's age, gender, and breastfeeding duration.

Results: Median breast milk concentrations of BDE-28, 47, 99, 100, and 153 were 2.2, 28.7, 5.5, 5.3, and 5.6 ng/g lipid, respectively. A small but consistent positive dose-response relationship between BDE-47, 99, and 100 and increased externalizing behaviors, specifically impulsivity, was apparent. Externalizing behavior scores ranged from 30 to 87 with a mean of 48. Compared to those with BDE-47 exposures below the median, adjusted externalizing behavior scores were 1.5 and 2.4 points higher for children with exposures in the 3rd and 4th quartiles (99% Confidence Intervals: -2.3, 5.2 and -1.4, 6.2, respectively). PBDEs were not associated with other social and emotional developmental domains.

Conclusions: Our results, although imprecise, are consistent with an association between early life PBDE exposure through breast milk and increased impulsivity in childhood. Confirmation of these results is needed in other longitudinal studies.

AIRBORNE TRICHLORAMINE (NCl_3) EXPOSURE IN INDOOR SWIMMING POOLS AND PREVALENCE OF SELF-REPORTED RESPIRATORY AND OCULAR SYMPTOMS IN OCCUPATIONALLY EXPOSED SUBJECTS

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Background and Aims: The aim of this cross-sectional study was to investigate the association between airborne NCl_3 exposure in indoor swimming pools and the prevalence of self-reported respiratory and ocular symptoms in occupationally exposed subjects.
Methods: Twenty indoor swimming pools in the Emilia-Romagna region of Italy were included in the study. Information about the health status of 128 employees was collected using a self-administered questionnaire. Exposure to airborne NCl_3 was evaluated in indoor swimming pools by a modified DPD/KI method.
Results: The airborne NCl_3 levels ranged from 204 to 1020 µg/m^3 with a mean value of 648.7 ± 201.4 µg/m^3. More than 50% of the swimming pools showed airborne NCl_3 levels higher than 500 µg/m^3 (recommended WHO guidelines). Both ocular and upper respiratory symptoms were very frequent in the 128 employees: red eyes, runny nose, voice loss and cold symptoms were declared more frequently by pool attendants (lifeguards and trainers) when compared with employees working in other areas of the facility (office, cafe, *etc.*). Pool attendants exposed to airborne NCl_3 levels higher than 500 µg/m^3 experienced higher risks for runny nose (OR: 2.9; 95% CI: 1.22-6.94), red eyes (OR: 3.2; 95% CI: 1.5-6.8), voice loss (OR: 3.6; 95% CI: 1.6-8.0), itchy eyes (OR: 2.2; 95% CI: 1.0-4.8) than other employees. When high levels of airborne NCl_3 were taken into account (airborne NCl_3 levels ≥ 800 µg/m^3 *vs.* < 800 µg/m^3) ocular and respiratory symptoms became much more evident, with higher risks (as ORs) in exposed subjects (lifeguards and trainers) compared with other employees.
Conclusions: This study confirms that lifeguards and trainers are at risk for respiratory and ocular irritative symptoms more than other employees in indoor swimming pools, in particular in presence of high airborne NCl_3 levels.

RELATIVE IMPORTANCE OF CONCURRENT EXPOSURES TO MULTIPLE INDOOR BIOLOGICAL AGENTS ON CHILDHOOD ALLERGY AND REPORTING SYMPTOMS

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Background and Aims: Literatures have consistently demonstrated associations between exposures to different kinds of bioaerosols in indoors and increasing risk of respiratory and allergic diseases, however, mostly based on measurements of single or selected agents while environmental microbes and allergens are often co-existing in nearly all environments at all times in reality. This study conducted concurrent assessment of related bioaerosol indicators to elucidate their individual or synergistic roles deriving at corresponding childhood health outcomes of concerns.
Methods: A total of 101 children (3-9 years old), recruited from a prior cross-sectional questionnaire survey, were investigated for exposure levels of fungal spores, total culturable bacteria and fungi in the air of their bedrooms, and the concentrations of endotoxin, 1,3-β-D-glucan and *der* p1 allergen in dusts on their bed. The health status of each child was verified during a clinic visit, and parents kept symptom diaries for the week during which environmental sampling took place on the 1st day of the week. Multivariate logistic regression models were applied to characterize the relative importance for individual bioaerosol indicator after adjusting mutually for each other, and other confounding factors, reported as aOR.
Results: Increasing concentrations of culturable fungal I/O ratio, endotoxin and glucan were associated with higher risk to be characterized as being the case subjects (aOR= 2.78), to report physician-diagnosed allergic rhinitis (aOR=1.60) and eczema (aOR=2.28) during clinical examination, respectively. Moreover, the level of culturable fungal I/O ratio (aOR=3.61) was found for influencing the presence of childhood reported respiratory symptoms while getting up as well as the concentrations of fungal spore (aOR=16.25) and *der* p1 (aOR=1.54) allergen were associated, respectively, with reported respiratory symptoms during sleeping and during daytime of children.
Conclusions: It was the first study to reveal the synergistic effect of various bioaerosol indicators on children health in tropical Asia where higher bioaerosol levels were reported frequently.
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DEMOGRAPHIC AND LIFESTYLE FACTORS AFFECTING GENOMIC BLOOD DNA METHYLATION BIOMARKER LEVELS

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Background and Aims: Levels of DNA methylation can be altered by environmental exposures and have been shown to be important molecular markers in disease etiology. Several methodologies are available to determine genomic DNA methylation including overall genomic DNA methylation and repetitive DNA methylation measurements. It is not clear what the determinants of these methylation measures are in healthy individuals. The aim of this study was to examine whether age, gender, smoking status, and ethnicity are associated with several DNA methylation measurements in white blood cell (WBC) DNA of healthy individuals.
Methods: Individual data from three studies including a total of 1300 healthy subjects were combined. WBC genomic and repetitive element DNA methylation was quantified by three different assays: LUminometric Methylation Assay (LUMA) for genomic DNA methylation levels, and PCR-pyrosequencing (*LINE-1*) and MethyLight (*LINE-1* and *Sat2*) for repetitive element DNA methylation. Demographic and lifestyle characteristics were evaluated in relation to the epigenetic biomarkers.
Results: Smoking status was associated with a decreased in genomic DNA methylation by LUMA. Current smokers had lower levels of DNA methylation than never and former smokers *(*66.3% vs. 68.3%, p=0.0132). No gender or age differences were observed for any of the biomarkers understudy. Repetitive element DNA methylation levels were lower in Caucasian women than other ethnicities (*Sat2:* 38.5% vs. 49.7% (p=0.005) and *LINE-1:* 73.9% vs. 75.2% (p<0.0001). Statistically significant correlations were found for LUMA and *LINE-1* measurements (Spearman coeff=0.11 (p=0.04)), but not *Sat2.*
Conclusions: Genomic DNA methylation levels vary in relation with smoking status and ethnicity. Differential correlation between repetitive sequences and global measurements of DNA methylation suggests contributions of the different biomarkers might be different to global genomic DNA methylation levels. These findings need to be considered in designing epidemiological studies aimed at identifying associations between DNA methylation, disease and environmental exposures.

TRANSPORTION, AIR POLLUTION AND PHYSICAL ACTIVITIES (TAPAS), A 6- CITY INTEGRATED HEALTH RISK ASSESSMENT PROGRAM OF ACTIVE TRAVEL POLICIES: THE PRAGUE CASE STUDY

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Background and Aims: The aim of the paper is to introduce one of the case studies of the international project "TAPAS", which will take place in Prague. Prague is a city with a low share of cycling in the modal split, and a high share of cars. It also suffers from worse death rate indicators in comparison with cities in Western Europe.
Methods: We collected data on active travel, health and environmental conditions. We also met individually with different stakeholders. Further, we proposed a number of policy scenarios to be assessed by the model. Our Institute is also responsible for a statistical analysis of impacts of active transport indicators and policies on public health.
Results:Prague, capital of the Czech Republic, has 1.25 mil. inhabitants and area of 496 km2. The dominant mode of transport is public transport (43%) and cars (33%), while walking contributes to modal split by 23%, and cycling by 1%. To support cycling, several measures have been implemented at the city level since 2004, above all construction of cycling infrastructure (from 245 km in 2003 to 518 km in 2009), and promotion campaigns (maps of cycling routes, information brochures). Safety of cyclists has increased (from 159 registered accidents of cyclists in 2003 to 70 in 2009). Most of the pollution in Prague is caused by traffic (approx. 80-90% of total emissions of NO2, benzene, and CO, more than 90% of PM). Average annual concentration of PM10 was 25.3 μg/m3, PM2.5 20.7 μg/m3 and NO2 29.1 μg/m3 in 2009. Relevant identified policies to be assessed include: 1) construction of cycling infrastructure, 2) building of a new parking system, 3) traffic calming.
Conclusion: Prague seems to be an interesting case as physical inactivity and air pollution from traffic are one of the most serious problems. Further support of active transport could improve these challenges.

OCCUPATIONAL AND ENVIRONMENTAL FACTORS RELATED TO THE INCIDENCE OF MALIGNANT MESOTHELIOMA IN THE URBAN AREA OF ROME, 2001-2009

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Background and Aims: The occurrence of malignant mesothelioma (MM) reflects past asbestos exposure at population level, both in the occupational and in the environmental settings. Our aim was to examine incidence rates of MM in Rome (2.8 million inhabitants) and in the surrounding Lazio region (5.6 million inhabitants), during the period 2001-2009, to identify etiologically relevant occupational and environmental asbestos exposures.
Methods: A population MM register has been collecting data for the period 2001-2009. Incidence rates (per 100,000) of MM in Rome and in the rest of the region were estimated. The possible asbestos exposure was also investigated by standardized interviews.
Results: We recorded 327 MM cases in Rome (219 men and 108 women) and 269 cases in the region (206 men and 63 women). Similar incidence rates were found among men in Rome (1.89; IC95% 1.66-2.16) and outside Rome (1.84 IC95% 1.60-2.11). Among women, the rate was higher in Rome (0.68, IC95% 0.56-0.82) than in the region (0.47, IC95% 0.36-0.60). Asbestos exposure was identified in 54% of the subjects (251 men and 78 women). Occupational exposure was found in 62% of men and 13% of women in Rome, in 82% of men and 3% of women in the rest of the region. The exposure was unknown in 32% of men and 74% of women in Rome and in 15% of men and in 83% of women in the region.
Conclusions: The incidence rates of MM in Rome and in the rest of the region were similar for men and higher for women. Since Rome has only a tertiary productive system, while the rest of the region had industrial complexes with occupational exposure, we suggest that the occurrence of MM in the population of Rome could be related to several occupational exposures and to unrecognized domestic and environmental conditions.

CLIMATE CHANGE, WATER AND HEALTH

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The climate change inevitably leads to changes in weather conditions in affected regions. Extreme weather events, that are manifested with severe droughts and floods represent risks that may adversely affect public health through impact on water quality, availability and efficiency of water supply and sanitation system.
Water shortage due to droughts is already noticed in the Mediterranean, involving mostly the northern African countries, the eastern Mediterranean and the southern regions of the European countries. The increased demand for water, of about 20% in 2025, due to population growth, according to Blue Plan Centre coupled by the decreased amount of affordable water will lead to the deterioration of the water quality. The health impacts, are related to increase of lake and river surface water temperatures, reduced water flows, heavy effects on drinking-water quality as a consequence of decrease of pollutants dilution and unsuitability of water for drinking and agriculture purposes as a consequence of saline intrusion. In addition, extremely intense rainfall and river flooding that affect the sanitation system efficiency are characterized by a primary risk for public safety. Uncontrolled surcharges may introduce microbial and chemical pollutants to water resources that are difficult to handle through the usual treatment systems.
It is undoubtadly significant to decrease the effects of extreme weather effects by applying precationary measures and especially to implement adaptation activities to climate change.
The Mediterranean Countries, Contracting Parties to the Barcelona Convention, in their five year programme, 2009-2014, included a number of activities that underpin the adaptation to climate change, including water and health. Furthermore the European countries, including the Mediterranean ones, signatories to the Protocol on Water and Health, address the water and health issues related to climate change in a very distinctive way.

THE EXPOSOME APPROACH FOR ASSESSING THE RISKS IMPOSED BY SELECTED VOLATILE CONTAMINANTS OF ENVIRONMENTAL TOBACCO SMOKE (ETS)

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Background and Aims: Characterization of ETS exposure and the associated risks are subject to misclassification bias, caused by responses such as “exposure to ETS perception”, or “living with a smoker” in questionnaire-based surveys, affecting epidemiologically derived exposure risk functions. This study aims at the development of a methodological framework for assessing mechanistically the risks imposed by ETS, by evaluating biomonitoring data, internal dose modeling and Biology Based Dose Response (BBDR) modeling for three organic contaminants, namely 4-(N-nitrosomethylamino)-1-(3-pyridyl)-1-butanone, benzene and formaldehyde, related to lung cancer, leukemia and nasopharyngeal cancer respectively.
Methods: A nicotine-cotinine PBPK model was developed, allowing the use of biomarkers such as urinary cotinine and nail nicotine for short and long term exposure through reverse modeling. Exposure scenarios reconstruction are fed forward to BBDR models coupling PBPK/D with mechanistic pathology modeling for each carcinogenic contaminant. Genetic polymorphisms linking variation of human susceptibility to xenobiotics were explicitly accounted for. Extrapolation to the wider population through hierarchical population modeling incorporated all variabilities and uncertainties governing exposure and response to xenobiotics from ETS.
Results: Individual risks estimated for lung cancer, leukemia and nasopharyngeal cancer ranged within a magnitude of order 10^{-5}, 10^{-7} and 10^{-9} respectively. Exposure duration had a non-linear effect on lung cancer, while the limited variability of formaldehyde exposure was compensated by the strongly non-linear mechanism governing formaldehyde-DNA adduct formation. Considering that benzene toxicity relies upon the presence of its toxic metabolites, polymorphism variability among gene variants of CYP2E1 and NQO1 was found to be determinant for overall risk assessment.
Conclusions: A multi-tiered approach is proposed here as a valid alternative to classic epidemiological approaches. According to the proposed methodology exposure burden is estimated based on actual biomonitoring data, individual risk is estimated using models with a strong biological underpinning and extrapolation to the wider population is done probabilistically.

IS ECONOMIC PROGRESS MAKING CHILDREN SICK?

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Background and Aims: In recent years Slovenia has seen a growth in hospitalization rates of children under age of 14 due to respiratory problems. Since 2002 when 6 per 1000 children were hospitalized due to five most common respiratory diseases, a number has surged to almost 8 in 2008. In this paper we investigate the relationship between hospitalization and air pollution, which is based on yearly exhausts from industrial plants, while we are aware that "the quality of exposure measurement is often the most critical determinant of the validity of an environmental epidemiological study" (Rothman et. Al, 2008, pp.600)
Methods: To estimate the effects of industrial plants on children's hospitalization rates, while accounting for socio-economic status, we use a SARAR model specification of a Cliff and Ord-type (Kelejian and Prucha, 1998), which simultaneously allows for spatial lag in the dependent variable as well as lag in disturbances. We further allow for processes where the innovations in the disturbance process are assumed to be heteroskedastic of unknown form.
Results: Our results indicate that socio-economic status is important with respect to explaining the children's hospitalization rates. We find that average wage rate has little or no effect, while the social inequality, measured as a standard deviation of wages, is accompanied with increased prevalence. Education on the other hand has a negative effect on hospitalization. We also find some evidence that hospitalization rates are higher where reported exhausts for industrial plants are higher.
Conclusion: Further investigation on correlation between socio economic status and illnesses caused by means of industrial progress and their impact on environmental pollution are recommended in order to enable us to better predict the effects of development on health care expenditures. A special stress should be given to chronic diseases that can be a consequence of environmental pollution as those are the ones that take over the role of main drivers of health care expenditures.
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CUMULATED INTERNAL DOSE OF METALS AND PULMONARY FUNCTION AMONG METAL EXPOSED WORKERS

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Background: Inhalation of metals might be toxic to the respiratory system. Metal/chemical industries are important sources of exposure to metals via direct inhalation to the lungs. We studied the relationship between cumulative internal dose of metals and pulmonary function (spirometry) among a group of workers exposed to metals.
Methods: We obtained results of toenails metal levels and spirometry in 55 volunteer workers from the chemical/metal industry and 42 unexposed service workers. Forced vital capacity (FVC), forced expiratory volume in one second (FEV1), peak expiratory flow (PEF), and forced expiratory flow at 25-75% of forced vital capacity (FEF25-75) were measured with a portable spirometer. Toenail metal levels were measured by multielemental analysis with emission spectroscopy by ICP-MS. Comparison of the median of metal levels between two categories of qualitative variables was tested using by the U Mann-Whitney test. The correlation between each metal and the spirometry parameters was estimated with the Spearman's rho.
Results: Molybdenum levels correlated inversely with the percentages of VEF1 (p=0.015), PEF (p=0.009), FEF25-75 (p=0.008), and the FEV1/FVC ratio (p=0.032). Vanadium levels correlated inversely with the percentages of PEF (p=0.001), and FEF25-75 (p=0.019), and with the FEV1/FVC ratio (p=0.019); while manganese also correlated inversely with the percentage of PEF (p=0.039). Cumulative internal dose of vanadium were associated with the presence of an obstructive pattern (p=0.002), with a FEV1 percentage lower than 80% (p=0.008), with a FEV1/FVC ratio lower than 70% (p=0.0001), and with a percentage of FEF25-75 lower than 60% (p=0.011). Similar associations were observed for manganese, molybdenum and cobalt. Chromium levels were associated to a lesser extend with the same parameters, and resulted also associated with the lack of presence of a restrictive pattern (p=0.048).
Conclusions: We observed individual associations between the cumulative internal dose of vanadium, molybdenum, manganese, cadmium, lead and cobalt, and pulmonary function.

Mobile phone use and early-childhood neurodevelopment at 2 years of age

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Background and aims : This study was to examine the association between prenatal and postnatal mobile phone use exposure and early-childhood neurodevelopment in two-year-old children from the general population in Taipei, Taiwan.

Methods: The study was a part of the Taiwan Birth Panel Study. A total of 150 pairs of parents and their singleton child were selected into this study. We used the Comprehensive Developmental Inventory for Infants and Toddlers (CDIIT) to assess child neurodevelopment at two years of age. The CDIIT was used to assess development in the areas of cognition, language, motor (including gross motor and fine motor), social, and self-help of children. Exposure to mobile phone was reported on a questionnaire. Regression model was used to estimate the association between mobile phone exposure and children's neurodevelopment.

Results: In logistic regression models, there aren't any significant associations in all the eight domains of the CDIIT. The adjusted OR was 1.1 (95% CI: 0.3-3.5) for motor during 7 months of gestation to birth, and the adjusted OR for gross motor and fine motor were 1.2 (95%CI: 0.4-3.6) and 0.7 (95%CI: 0.1-3.6), respectively in the early-childhood neurodevelopment at 2 years.

Conclusions: In this study, we didn't find any significant association between prenatal and postnatal mobile phone use exposure and early-childhood neurodevelopment in two-year-old children. However, research on the negative effect of mobile phone use and neurodevelopment is still scanty. Therefore, the further association of mobile phone use and neurodevelopment is needed to explore.

A SURVEILLANCE PROGRAM ON AIR POLLUTION EFFECTS: THE ITALIAN EPIAIR PROJECT

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Background and Aims: Air pollution levels are critical in many urban areas in Italy. The objective of this presentation is to describe the methodology and the main results of the Italian "Air pollution and Health:Epidemiological Surveillance and Primary Prevention – EpiAir- project".
Methods: The EpiAir project, funded by the Centre for Disease Control and Prevention of the ItalianMinistry of Health, was designed to provide methods and criteria for epidemiological surveillance of the health effects of air pollution in large Italian cities. A network of public institutions in the field of environmental control and public health participated in the project. The main elements of the project are: -Evaluation of the short-term health effects (mortality, hospital admissions) of air pollution in large Italian cities, using a standardized methodology (case-crossover approach). –Evaluation of factors (socio-demographic characteristics, co-morbidities) that can confer a higher susceptibility to the effects of air pollution. -Collection of information on the mobility policies recently implemented by local administrations.
Results: The first phase of the project (2001-2005) involved ten Italian cities (Turin, Milan, Mestre, Bologna, Florence, Pisa, Rome, Taranto, Palermo,Cagliari); statistically significant effects of all pollutants (PM10, NO2, Ozone) were observed for natural and cardio-respiratory mortality. Exposure to PM10 and NO2 was found strongly associated with hospital admissions for selected respiratory and cardiac diseases. Several pre-existing chronic conditions appear to confer a higher susceptibility to the adverse effects of NO2. The second phase of the project (2006-2010) is on going; it follows the same methodology while involving a larger number of cities (including also Ancona,Bari,Genoa,and Trieste); in this second phase we will also analyse PM2.5 data, as well as data on admissions to Emergency Departments for selected disorders.
Conclusions: A long-term surveillance program has been implemented in order to evaluate the effects of potential future preventive programs.

IMPACT OF MATERNAL OBESITY ON NEURAL TUBE DEFECTS AND CARDIOVASCULAR ANOMALIES: ABSOLUTE RISK AND TEMPORAL TRENDS

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Background and Aims: UK guidelines advocate that obese pregnant women (body mass index, BMI≥30kg/m^2) be made aware of the increased risks to them and their offspring. This study pooled data from several sources to derive estimates of the absolute and attributable risks of neural tube defects and cardiovascular anomalies for obese women in England, and predict changes in prevalence resulting from trends in BMI.

Methods: The BMI profile of the maternal population of England and of the prevalence of each outcome were obtained from nationally representative sources. Trends in BMI were modelled by logistic regression. Risk ratios for neural tube defect and cardiovascular anomaly were derived from Stothard *et al*. Absolute risks, attributable risks, and future prevalence were estimated.

Results: The estimated absolute risks of a neural tube defect or cardiovascular anomaly for an obese pregnant woman in England are 19 (95% confidence interval, CI=1.6-2.2) and 75 (95% confidence interval, CI=66-84) per 10,000 births respectively, compared to 10 (95% CI=9.5-11.4) and 60 (95% CI=67-63) per 10,000 births respectively for women of recommended BMI (25-29kg/m^2). An estimated 9.8% (95% CI=5.6-14.1) of neural tube defects and 3.0% (95% CI=0.5-5.4) of cardiovascular anomalies in England are attributable to maternal obesity.

If trends in maternal BMI continue, 24.0% (95% CI=22.1-25.9) of the maternal population of England will be obese by 2020. This is predicted to result in increases of 6.5% and 4.3% respectively in the prevalences of neural tube defects and cardiovascular anomalies compared with the prevalence in 2010.

Conclusions: This study provides estimates of the individual risk and population burden of neural tube defects and cardiovascular anomalies in England resulting from maternal obesity. The results have implications for public health planning and for providing clear information to obese women about their pregnancy-related risks.

References:
Stothard *et al* (2009). *JAMA* 301: 636-650

LONG-TERM TRENDS OF POPs IN HUMAN MILK IN CZECH REPUBLIC & APPLICATION FOR HUMAN HEALTH RISK ASSESSMENT

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Background and Aims: Human biomonitoring of persistent organic pollutants (POPs) concentrations in breast milk in Czech Republic is carried out since 1994 (by **National Institute of Public Health** - NIPH). The main aim of this study was to evaluate long-term trends of selected POPs in human milk in Czech Republic – as background levels for central Europe for use in the project ArcRisk (http://www.arcrisk.eu/).

Methods: All milk samples are obtained under the **Environmental Health Monitoring System in the Czech Republic**. The human milk samples are analyzed for a number of chlorinated organic chemicals including polychlorinated biphenyls (PCB28, PCB52, PCB101, PCB118, PCB138, PCB153, PCB180, PCB170) and selected chlorinated pesticides (OCPs: HCB, alfa-HCH, beta-HCH, gama-HCH, ppDDD, opDDE, ppDDE, opDDT, ppDDT).

Results: More then 4600 breast milk samples were collected and analysed from 9 sites in the years 1994 – 2009 (about 50-200 samples/region/year). Exposure factors that may influence these levels were investigated using a questionnaire according to the WHO protocol (age of mothers, BMI – body mass index, medication, occupational exposure and lifestyle habits, above all smoking). Backward predictions of the internal total POPs exposure doses from human milk concentrations were computed. These dangerous organic substances (neurotoxicity, carcinogenicity and endocrine disrupting effects) are widespread throughout the environment, persisting for decades. They accumulate in the fatty tissue, entering the human body through the food-chain.

Conclusions: Human biomonitoring is a useful tool to evaluate internal exposure of humans with different chemical substances. The next aim of this work will to predict of human health risks by using of slope factor and RfD (reference doses) approach with a spatial GIS visualisation. Relationships between exposure factors from questionnaires will be also investigated. The research was supported by the CETOCOEN project from the European Regional Development Fund (No. CZ.1.05/2.1.00/01.0001) and by the ArcRisk European Community 7th Framework Programme Project (226534).

CUMULATED INTERNAL DOSE OF NATURAL URANIUM IN WORKERS OF AN INDUSTRIAL AREA NEAR A FERTILIZER PRODUCTION PLANT

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Background: Natural uranium is a low radioactive element that decays slowly by emitting an alpha particle. If absorbed, uranium can damage human health. Working nearby and at a fertilizer production plant might be an important source of exposure to natural uranium. We compared cumulative dose of uranium between workers from a fertilizer plant, chemical/metal workers from the same industrial park, chemical/metal workers from industrial parks of other regions, and workers unexposed to metals.
Methods: Cross-sectional epidemiological study design. We obtained satisfactory results of uranium-238 levels in toenails of 5 workers of a fertilizer production plant, 44 workers of the chemical/metal industry at the same industrial park, 24 workers of the chemical/metal industry from industrial parks of other regions, and of 43 workers unexposed to metals from the service sector. Internal dose of uranium-238 was measured by emission spectroscopy by ICP-MS with collision cells.
Results: The median of the cumulated dose of uranium-238 among the group including all 63 chemical/metal industry workers was 4.9 ppb; and 3.5 ppb in the group of the 43 unexposed workers ($p<0.001$; U Mann-Whitney test). The median of uranium-238 in the group of fertilizer plant workers was 6.5 ppb; 4.9 ppb among chemical/metal industry workers from the same industrial park, and 4.5 ppb among chemical/metal industry workers from industrial parks without fertilizer plants from other regions ($p=0.056$; Median test).
Conclusions: Our results suggest that occupational activity on the chemical/metal industry is related to accumulation of natural uranium, mostly among workers from fertilizing plants.

APPLICATION OF CLIMATE INDICATORS TO US CHILD POPULATION: TRENDS IN TEMPERATURE VARIABILITY

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Background and Aims: Children may be particularly susceptible to climatic change, including extreme temperature. Childhood exposure and health effects of recent temperature extremes remain largely unknown. We highlight the development and initial evaluation of multiple climate indicators and their evaluation through linkage to child population counts to identify childhood exposure trends.
Methods: County-level daily maximum and minimum temperature records from ~8,000 national weather stations (National Climatic Data Center) were geospatially and temporally-linked to US Census annual child population estimates (ages 0-17 years) for 2,311 US counties (~xx% of children). Indicators were developed by: (1) Defining a reference period, 1977-1987; (2) calculating 99th and 1st percentile thresholds of MAX and MIN temperature values for each month/county over the 11-year period; and (3) tabulating the days which exceeded hot and cold thresholds for our study period (1988-2008). Trends in childhood exposure to extreme temperature were stratified by month, season, year, and region.
Results: Days exceeding the 99th percentile hot threshold varied greatly by month, decade, and region, with January experiencing the greatest increase in extreme heat days by decade and region (excluding Western US). Median number of days exceeding the 1st percentile cold threshold dramatically decreased by 85% from the 1980s to 2000s, even when stratified by season and region. There was a 26% increase in percentage of children from 1988-2008 exposed to heat exceeding the 99th percentile of reference period, and a decreased percentage of children exposed to unusually cold days.
Conclusions: Since 1988, US children have been exposed to an increasing number of unusually hot days. Implications for short and long-term child health effects remain to be investigated. Application of climate indicators to national health databases (e.g. National Health Interview Survey) will further investigate children's health implications of extreme temperature.

EFFECTS OF LEAD AND CADMIUM ON BIRTH WEIGHT IN A COHORT OF PREGNANT WOMEN IN CALI - COLOMBIA

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Background and aims: Population's exposure to heavy metals may affect foetal growth. Studies in Cali show presence of heavy metals in the environment and plausible routes of exposure among vulnerable population. This study aims to evaluate the association between maternal exposure to lead and cadmium and the occurrence of LBW and IUGR.

Methodology: A prospective cohort study was developed. The enrolment of pregnant women was carried out at 11-13 weeks of gestation. Follow-up from admission to delivery included three ultrasounds, clinical evaluations, and determining maternal blood levels of lead and cadmium during the first and third trimesters of pregnancy. Surveys were used to characterize risk behaviours and habits of mothers and their partners. At birth, an anthropometric evaluation was performed on the newborn.

Results: 386 pregnant women were included. Among them, 50% were 18-22 years old; 43%, black; 77%, housewives; and 34% have no social security. At first trimester median lead and cadmium levels were 1.01(0.00-16.1), and 0.11ug/dl(0.01-4.2), correspondingly; while at third trimester were 0.84(0.00-27.95) and 0.04ug/l(0.01-7.08). 47% of women live with people handling Pb/Cd (at job or at home), 35% live close to commercial sources of Pb/Cd, and 48.3% are near a large municipal dump. The incidence of LBW is 7.87% and IUGR is 4.7%. Lead levels ≥5ug/dl at first trimester were associated with an increased risk of LBW (RR: 3.65; CI95% 0.97-13.69; p=0.054).

Conclusions: Women are exposed to several sources of heavy metals during the first trimester of pregnancy, and presented an increased risk of LBW. This knowledge is useful for implementing preventive actions by identification of risk factors of exposure.

UNDERSTANDING THE COMMON EXPOSURE TO TRANSPORTATION NOISE AND AIR POLLUTION AND THEIR POTENTIAL COMMON HEALTH ENDPOINTS

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Background and Aims: Epidemiological studies have shown that air pollution exposure is associated with cardio-pulmonary health outcomes and noise exposure is associated with cardiovascular outcomes. The main source of both exposures is, to a large extent, vehicle traffic. Typically in studies of one exposure the other one is not adjusted for. Investigations of long-term effects are usually based on modeled exposures, using common predictors, which result in (possibly partially artificial) spatially correlated estimates. For short-term exposure variations, there is no evidence on their potential mutual confounding. In this presentation, data from Athens are shown to illustrate the problems and indicate future pathways for distinguishing the effects of the two environmental stressors.
Methods: 1) Within the HYENA study, long-term noise and air pollution (PM_{10} and NO_2) exposure was estimated for 780 subjects living near Athens Airport. Air pollution estimates were derived from the APMoSPHERE project and were also modeled using AERMOD; 2) Continuous measurements for PM and noise were performed in 2 typical Athens apartments for one week using a real time noise analyzer and a real time aerosol monitor for different PM fractions.
Results: AERMOD PM_{10} concentrations originating from vehicle traffic were highly correlated to road traffic noise (r=0.76) but moderately correlated to aircraft noise (r=0.23). Correlations of the APMoSPHERE estimates for PM_{10} & NO_2 and aircraft noise were 0.11 and 0.56 and 0.06 and 0.24 for road traffic noise respectively.
Conclusions: The magnitude of the spatial correlations depends on the way exposures were modeled. Further investigation is needed to better understand the determinants of the resulting estimates. In the time scale, air pollution depends on road traffic load as well as on meteorological conditions, in contrast to noise which is also determined by other local noise sources and is modified by meteorology to a much lesser extent.

QUALITY OF LIFE IN BRAZILIAN WOMEN WITH BREAST CANCER – ASSOCIATION WITH THE SOCIAL ENVIRONMENT

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Background and Aims: The incidence of breast cancer is increasing in Brazil, constituting a major cause of morbidity and mortality with major social and epidemiological impact. The aim of this study is to evaluate the association between social support before the treatment of breast cancer and quality of life (QOL) six months after starting treatment.
Methods: Eligible participants were women with no history of cancer and who were treated for breast cancer in National Cancer Institute of June/2009-March/2010. The evaluation of the social support was performed before the oncology treatment. EORTC QLQ-C30 was used to measure quality of life. Medical Outcomes Survey-Social Support Survey was used to assess social support. The bivariate analysis of dichotomous variables and odds ratio with confidence interval 95% were analyzed.
Results: 195 women were evaluated and it was observed that good emotional support is a protective factor for overall health (OR=0.42 95% CI 0.23-0.79) and scale functionality (OR=0.36 95% 0, 18-0.71). The information support was associated with better global health (OR=0.41 95% CI 0.22-0.76), functionality (OR=0.35 95% CI 0.18-0.70) and symptoms scale (OR=0.38 95% CI 0.18-0.77). Women who reported good emotional support showed reduced of 70% to have general health problems after six months of treatment (95% CI 0.13-0.65).
Conclusions: The results of this study suggest that a good social environment in which these women are inserted prior to treatment showed a positive association with the better quality of life six months after surgery in women with breast cancer, underscoring the importance of environmental assessment of the social in these patients.

THE EFFECT OF AIR POLLUTION ON MORTALITY: META-ANALYSIS RESULTS FROM THE ESCALA PROJECT

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Background and Aims: The ESCALA project investigated the association between PM10 and Ozone and premature mortality in nine Latinamerican cities: São Paulo, Porto Alegre and Rio de Janeiro in Brazil; Concepción, Temuco and Santiago, in Chile; and Mexico City, Monterrey and Toluca in Mexico, from 1997 to 2005. The project used a common methodological framework to estimate city specific effects, providing a comparable set of results. So, the aim of this work is estimating the overall effect of air pollution on mortality in nine Latinamerican cities.
Methods: Unipollutant distributed lag models were fitted in each city using the same controls for temporal and meteorological effects. Fixed and random effects were estimated for six causes of death for all ages and for older than 65 years. Heterogeneity was assessed using Cochran Q test and the I2 percentage.
Results: Most of the results showed heterogeneity among cities, so we report the random effects estimates, as the percentage change in risk for 10 ug/m3 increment of 24hr PM10 or 8hr Ozone levels. For PM10, all causes, all ages estimate the RR is 0.77% (95%CI:0.60-1.00). For RSP a 1.39% (95%CI:1.0-1.8) for all ages and 1.64% (95%CI:1.0,-2.3). For CPM, 0.94% (95%CI:0.84-1.05) for all ages, and 1.15% (95%CI:0.93-1.37) for elder. The highest risk was for COPD, all ages: 2.44% (95%CI:1.36-3.59). Results for O3 showed more variability, with most of the random effects estimates non-significant. The excess risk of death for all causes in all ages was 0.05% (95%CI:-0.24;-0.33). The higher risk was for CPM, 65+ years: 0.28% (95%CI:0.09-0.46).
Conclusions: PM10 was associated with increased mortality in most cities for all and specific causes of death. Higher effects were observed in the elderly (65+ years old) and for respiratory causes. The effects were somewhat higher than those reported in other multi-city studies. Ozone effects were less consistent.

ASSESSMENT OF THE HEALTH BENEFITS OF THE IMPROVEMENT OF WATER SUPPLY AND SANITATION SERVICES IN TANGIER (2004-2009)

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Background and Aims Access to water and sanitation are major issues of Public Health. A very large works program to improve drinking water supply and sanitation was conducted since 2002 in the metropolitan Tangier (750,000 inhabitants) in Morocco. To assess the benefit of the works on the population health, an epidemiological study with a pre-post methodology was achieved between 2004 and 2009.
Methods An epidemiological register was implemented in 17 health facilities in order to follow the incidence of three water-related diseases: diarrhoea in children under 5, conjunctivitis and skin diseases in the overall population. At the same time, surveys were conducted in two-pilot districts which had no water supply other than wells/fountains nor wastewater systems, at the beginning of the study. Twice-yearly, 70 households (≈400 people) were questioned to qualify water use, hygiene practices, health outcomes (diarrhoea, conjunctivitis, skin diseases). Samples of the water they consumed were collected for microbiological analysis. Works progress and sea water quality were assessed during the five-year period (WHO/UNICEF 2008 Esrey 1985, Esrey 1986, Esrey 1991, Fewtrell 2005).
Results In the pilot districts, the incidence of diarrhoea in children (-20%) and conjunctivitis (-34%) decreased in parallel with the improvement of the quality of the water consumed by households (correlated with improved access to drinking water and the reduction of storage practices). On the macroscopic scale of the city, the health indicators remain stable. Different non controlled parameters may explain this result. With the improvement of sanitation at the Tangier level, the quality of sea water in summer was significantly improved and since 2007 all beaches meet the Moroccan standards, for the indicators followed.
Conclusions The originality of the project relies on its two-scale approach and its size: a 5-year health monitoring of the population of a large city on the Mediterranean coast. Results interpretation faces difficulties in estimating the population growth Tangier. An individualized monitoring methodology permits to exclude some confounding factors.
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URINARY LEVELS OF ARSENIC, LEAD AND MERCURY AMONG CHILDREN AND NEUROBEHAVIOURAL TOXICITY: AN EXPLORATORY STUDY

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Background: Diet and living near to chemical/metal industries are a potential source of environmental exposure to metals such as lead, mercury and arsenic, which are recognized causes of neurological disorders in children. Our objective was to explore the relationship between urinary levels of arsenic, lead and mercury, and neurobehavioral performance (subclinical effect) in children aged 9-11.
Methods: Spot urine samples were obtained from 79 children recruited from cities representative of five different environmental scenarios in Andalusia (Spain): 14 from urban/residential, 34 from urban/industrialized, 7 from mining, 14 from rural, and 10 from rural/industrialized. Neurobehavioral performance was satisfactorily assessed in 37 boys and 36 girls by the Behavioral Assessment and Research System (BARS) using Spanish instructions. Multielemental ICP-MS was used to quantify urinary levels of arsenic, lead and mercury. General linear models were used including age, gender, social class, global physical activity, and shore fish consumption as covariates, plus the exposure variable (log transformed urinary levels of each metal separately) to predict each of 14 neurobehavioral outcome variables.
Results: Higher levels of mercury were associated with a worse performance of the Alternate Hand Finger Tapping (AHFT) test (measures “coordination”) (p=0.03), of the Digit Span Forward test (measuring “attention”) (p=0.08) and of the Errors on Simple Reaction test (measures “response speed”) (p=0.02); and with better performance of the Continuous Performance Hit Latency test (measures “attention”) (p=0.001). Children with higher arsenic levels scored better on the Continuous Performance False Alarm Latency test (p=0.08), and tended to score worse on the AHFT test (p=0.10). No statistically significant associations were observed for urinary lead, although children with higher levels tended to perform better with the AHFT test (p=0.09), and worse with the Continuous Performance Correct Rejections test (p=0.15).
Conclusions: Our results suggest that urinary levels of mercury are related with poorer neurobehavioral performance among children.

PBDE 153 AND THYROID FUNTION IN HEALTHY PREGNANT WOMEN

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Background and Aims: Prenatal exposure to environmentally relevant levels of PBDEs may impair normal brain development by interfering with adequate maternal thyroid function, which is essential to fetal brain development.[1, 2] Our objective was to examine the relationship between prenatal exposure to PBDEs and maternal thyroid function among a cohort of women with normal thyroid function.
Methods: We recruited 314 pregnant women from prenatal clinics in New York City. Eligible subjects were free from clinical thyroid disorders and reported no history of thyroid cancer. We measured concentrations of 12 PBDEs congeners, free thyroxine (FT4) and thyroid stimulating hormone (TSH) in maternal blood samples collected in the first and second trimester of pregnancy (range 5-23 weeks gestation). The association between maternal thyroid function and prenatal exposure to PBDEs was evaluatedusing linear and logistic models controlling for potential confounders including parity, maternal age, education, income and gestational age at thyroid function testing.
Results: The majority of women (81%) demonstrated normal thyroid function, 9% of women had subclinical hypothyroid (elevated TSH, normal FT4), 7% hypothyroxinemia (normal TSH) and 3% overt thyroid disease. All 12 PBDE congeners were detected in maternal plasma (detection frequencies ranged from 6.7% to 98.4%). Congeners 47, 100, 99 and 153 were detected with the greatest frequencies (99%, 91%, 83% and 98.4%, respectively). PBDE 47, 99 and 100 were highly correlated with each other ($r > 0.8$, $p < 0.05$). PBDE 153 was not correlated with any other congeners. Though not statistically significant, PBDE 153 was inversely associated with the FT4 levels dichotomized at the lowest 5%, OR (95%) CI 1.44 (0.89 to 2.32) $p = 0.13$ after adjustment for lipids, triglycerides, parity and gestational age at thyroid function testing. No other PBDE congeners were associated with maternal FT4 or TSH levels.
Conclusions: Our results suggest prenatal exposure to PBDE 153 may be inversely associated with circulating FT4.
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EXAMINING THE ASSOCIATION BETWEEN LEVELS OF ARSENIC, LEAD AND MERCURY ON NEUROBEHAVIORAL PERFORMANCE AMONG METAL, CHEMICAL AND MINING INDUSTRY WORKERS

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Background: Diet and working in the chemical, mining and metal industries are important sources of exposure to metals such as lead, mercury and arsenic, which are recognized causes of neurological disorders, among other human diseases. Our objective was to explore the relationship between cumulative exposure of arsenic, lead and mercury and neurobehavioral performance (subclinical effect) in a group of workers exposed to metals, and a group of workers unexposed to metals.
Methods: We obtained results of cumulated metal levels in toenails and neurobehavioral test in 56 chemical/metal industry workers and 38 service workers unexposed to metals. A neurobehavioral battery consisting of 14 tests was administered. Multielemental ICP-MS was used to quantify toenails levels of arsenic, lead and mercury. General linear models were used including age, gender, and worker exposure group as covariates, plus the metal levels variable (log transformed toenail levels for each metal separately) to predict each of 14 neurobehavioral outcome variables.
Results: We found a suggestion of an association between increased toenails levels of arsenic with a worse performance of the “Tapping with Alternating Hands” test (measures “coordination”) (p=0.17), and of the “Symbol Digit” test (related with “mental function) (p=0.11). Also, a suggestion of worse performance was observed between lead and the “Symbol Digit” test (p=0.087), the “Tapping with the Preferred Hand” test (related to “coordination”) (p=0.17), and the “Digit Span Reverse” test (related with “attention”) (p=0.126). Mercury levels were associated with a worse performance of the “Simple Reaction Time Total Error” test (related with “response speed”) (p=0.04), and showed a suggestion of an association with a better performance of the “Continuous Performance False Alarm Latency” test (p=0.13).
Conclusions: Our results suggest that cumulated exposure to mercury, and to a lesser extend arsenic and lead, are related with poorer neurobehavioral performance among exposed workers.

Long-range Transported Air Pollution from Wild-fires and Cardiorespiratory Hospitalisations

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Background and aims: Large amounts of particulate air pollution (PM) are emitted yearly from wild-fires around the globe. Previous studies suggest that acute exposure to PM from wild-fires is associated with respiratory symptoms and even hospitalizations. However, litte is known about possible cardiovascular effects of long-range transported wild-fire smoke. Our aim was to evaluate the association of fine particles (PM2.5; diameter <2.5 µm) measured during episodes of long-range transported wild-fire smoke with cardiovascular and respiratory hospitalizations.
Methods: Data on total cardiovascular and respiratory hospitalisations was obtained for the Helsinki Metropolitan Area (around 1 million inhabitants) from the national hospital discharge register. Outdoor PM2.5 was measured at an urban background and a rural measurement station. Days when PM2.5 levels were simultaneously elevated (>25 µg/m3) at both stations were categorized as episode days of long-range transportation. Episodes were further divided between episodes from wild-fires and other sources based on backward air mass trajectories, remote sensing of fire hot spots, and dispersion modeling of smoke. Case-crossover study design and logistic regression models were used to analyse the data. Models were adjusted for temperature, relative humidity, coarse particles, influenza, and pollen. Control days were selected for each individual as the same weekdays within the same month as the event day.
Results: There were 14 episode days linked with long-range transported wild-fire smoke in 2001–2005. The smoke typically originated from large fires in Eastern Europe. Daily mean PM2.5 concentrations were 7.9 and 26 µg/m3 during non-episode and episode days, respectively. Risk of cardiovascular hospitalization was increased 33 % (95 % confidence intervals 0.1%-77%) per 10 µg/m3 increase in PM2.5 during wild-fire episode (1-day lag). PM2.5 from wild-fires was also associated with 39% (-2%-96%) increase in same-day respiratory hospitalisations.
Conclusions: During and right after episodes of long-range transported air pollution from open biomass-burning both respiratory and cardiovascular hospitalizations seem to be increased. Therefore, adverse health effects of wild-fires on populations are not limited to the immediate vicinity of fire areas.

INVESTIGATING COLD EFFECT IN TEMPERATURE-MORTALITY ASSOCIATION STUDY

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Background and Aims: Numerous epidemiological studies have been conducted on the impact of temperature to health. However, distinguishing between the seasonal and temperature effects on mortality are controversial. The objective of this study is to investigate whether these effects influence the daily mortality in major cities at South Korea.
Methods: We used daily death counts and meteorological data, from 1992 to 2009, of 4 major cities in Korea; Seoul, Daegu, Busan, and Incheon. Then, we compared the local-weighted scatterplot smoothing models (Lowess/Loess) and generalized additive models (GAM) to analyse the association between the daily mean temperature and mortality. For controlling for time trends, we gave the number of observation years for degrees of freedom. We adjusted the effects of secular trends and other cyclical factors, day of the week, humidity, and air pressure. To separate the two effects: temperature and seasonal effects, we stratified the data sets by seasons, 12 months and examining the data. For our analysis, we used the R statistical software.
Results: The year-controlled and crude models revealed different features. We observed a V-shaped smoothing spline curves on the crude models of the four major cities. In the year-controlled models, however, the V-shaped curves disappeared and mortality linearly increased with temperature. Seasonal stratified data in the LOESS model indicated a higher mortality during the winter. In contrast, the GAM model had no relative relationship with mortality and temperature during the winter. Monthly stratified model presented a strong positive temperature-mortality relationship in July and August. On the other hand, the curves during the winter months showed inconsistent results of the four cities.
Conclusions: When we controlled the year and season, the temperature effects disappeared during the winter months. However, our month-specific analysis showed dissonant patterns in each city. We need to consider both local and regional effects for further investigation.
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SULFITES CONCENTRATION LEVELS COMPARED TO ALCOHOL AS A BASIS TO ESTIMATE THE MAXIMUM RECOMMENDED DAILY INGESTION OF WHITE WINE

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Background: The WHO recommendation for daily alcohol consumption is 40 grs in men and 32 grs in women. For total daily sulfites, the corresponding figure for both sexes is 49 mg. The maximum concentration of sulfites allowed in white wine is 210mg/L. To date, most health professionals recommend a maximum amount of white wine intake based on its alcohol concentration, however, depending on the amount of alcohol and sulfites levels of wine beverages, the maximum recommended amount of wine to be ingested might depend on the sulfite concentration instead of that of alcohol.
Methods: One hundred and forty one randomly selected samples of white wine from the quality monitoring process of the 'Condado de Huelva' appellation vineyards (campaign 2006/7) were measured for sulfite concentration levels using the Ripper assay. Each sample was obtained from a different container with at least 500L of wine intended to be bottled for public consumption under the 'young wine' category of the 'Condado de Huelva' appellation, which requests a volume percentage of alcohol between 10-12%, and a maximum 20ºC temperature during the aging process.
Results: The median of sulfite concentration in the 141 samples was 105mg/L (5-95 percentiles: 66-244mg/L). Assuming a scenario were all daily alcohol ingestion is due to white wine with 12% of alcohol, the recommended maximum ingestion of white wine results in 290mL in women and 363mL in men. The concentration of sulfites in white wine that would provide 49mg of sufites/day drinking 290mL/day and 363mL/day are 172mg/L and 137mg/L, respectively. Both of such concentrations are below the maximum allowed 210mg/L of sulfites in white wine. 30% of the samples analyzed had sulfites levels above 137mg/L, and 20% above 172mg/L.
Conclusions: Sulfites concentrations below the current allowed limit should be taken into account for maximum white wine daily intake recommendation.

THE ROLE OF SCIENTIFIC EXPERTS IN ASSESSING UNCERTAIN RISKS

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Background and Aims Environmental health problems are often complex, large-scale and uncertain. Examples of such "systemic risks" are electromagnetic fields (EMF) and ultra fine particles. The uncertainties inherent in systemic risks provide leeway for different appraisal of risks. This raises the question how experts interpret uncertainty and how this affects their policy advice. Research on different expert perspectives has remained largely theoretical. We present a preliminary study which explores whether specific expert roles exist in practice and how these compare to ideal typical ones proposed by Weiss and by Pielke. We explored this for the areas of EMF and particulate matter.
Methods Q methodology was used to evaluate two typologies on different expert roles. Data collection was conducted with the web-based program FlashQ, among scientific experts in the Netherlands. For EMF, 26 experts participated, and for particulate matter 21 experts. Experts ranked 48 statements. Responses were analyzed using factor analysis in the PQMethod program.
Results The experts perceive EMF as a relatively certain risk and particulate matter as an uncertain risk. Three different expert roles are tentatively identified for each sub-domain. For EMF these roles are: The Autonomous Scientist, The Realist and The *Laissez-faire* Expert. For particulate matter, these are: The Engaged Expert, The Instrumental Expert and The Deliberator. These roles are considered hybrids of the expert roles by Pielke and Weiss.
Conclusions The preliminary results of this study indicate that different expert roles exist among scientists who provide policy advice on environmental health issues. These results will be further elaborated in order to identify and deal with the effects of the personal attitudes of scientists, policy makers and other stakeholders on the way they, respectively, advise on, develop and act on policy interventions.

HAVE SHORT-TERM EFFECTS OF ENVIRONMENTAL EXPOSURE ON PNEUMONIA MORTALITY BEEN UNDER-ESTIMATED BECAUSE HOSPITALISATION IS IGNORED?

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Background & Aims: Short-term associations have been demonstrated between air pollution and respiratory mortality including pneumonia. Studies typically assume exposure depends only on place of residence, yet many are in hospital prior to death. This study explores lag length and test the hypothesis that the effect of 'black smoke' is greater when restricted to pneumonia deaths in the community - Community Acquired Pneumonia (CAP).

Methods: A case-crossover design using conditional logistic regression estimated the daily percent increase in risk for pneumonia mortality in relation to 'black smoke' in the previous 30 days. Cases were pneumonia deaths in Edinburgh 1981-1996. Multiple 'control' periods, were defined using the same weekdays for the same month as the case death. Lag structure was investigated by stratified lag model with five 6-day periods and by distributed lag models. Hospital admissions data, defined a CAP death as being someone who had not been in hospital in the 30 days before.

Results: Of 14,346 subjects who died from Pneumonia, 7,536 were CAP subjects. Larger estimated increases in risks were seen in the CAP group for all lag periods. Both stratified and distributed lag methods suggested positive effect estimates for 18 days and negative thereafter; the average percent increase per day across the 18 days was 0.70% (95% C.I. 0.29-1.14) for CAP subjects and 0.30% (95% C.I. 0.03-0.59) for all subjects.

Conclusion: Studies which fail to adjust for hospitalised subjects may underestimate exposure effects as stronger pollution effects on mortality were evident in community based subjects

LEAD AND CADMIUM EXPOSURE AMONG A COHORT OF PREGNANT WOMEN IN CALI-COLOMBIA: THE GEMA STUDY

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Background and aims: Industrialization and inadequate waste disposal have increased exposure to heavy metals. Our studies in Cali-Colombia show that women of low socioeconomic position are exposed to heavy metals during reproductive age. This study aims to characterize high-risk exposure behaviors and its relationship to blood cadmium and lead levels in pregnant women of urban Cali.

Methods: An ongoing prospective cohort study is developed. We included 386 pregnant women between 18-35 years of age, living at one of the poorest areas of Cali. Patients were recruited at 11-13 weeks of gestational age and answered a questionnaire on sociodemographic characteristics, parents' occupational history, smoking habits and other risk behaviors of exposure to lead and cadmium. Additionally, concentrations of lead and cadmium in maternal blood were determined by using atomic absorption spectrometry coupled to graphite furnace.

Results: 386 blood samples were evaluated at enrollment. Medians of cadmium and lead were 0.115ug/dl(<0.014-4.26) and 1.013ug/dl(<0.002-16.18), respectively. Among pregnant women 32.9% had Cd levels ≥0.4ug/l and 4.15% had Pb levels ≥5ug/dl(CDC recommendations). Only 7(1.8%) of pregnant women showed high levels of both lead and cadmium, but 129(33.4%) had at least one blood metal concentration above recommended levels. We evaluated several practices and exposure sources, and determined an increased risk of lead levels ≥5ugl/dl for those women living <4km of the Navarro dump(OR:6.2; CI95%1.7-21.7) and those living <2 blocks away of battery-handling commercial sites(OR:8,33;CI95%1.01-82.8). An increased risk of cadmium levels >0.4ug/l was also observed among women living <4km of the dump, but it was not significant(OR:2.1;CI95%0,63-7.5). Individual risk practices were also identified.

Conclusion: A third of these pregnant women are exposed to significant levels of heavy metals in blood. We evaluated several sources of exposure and found that residence near a former waste disposal site and battery-handling sites were independently associated with maternal blood lead levels

SPATIAL RELATIONSHIPS BETWEEN AIR POLLUTION AND TRAFFIC NOISE FROM ROAD AND RAIL IN OSLO, NORWAY

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Background and Aims: Epidemiological studies have reported associations between cardiovascular outcomes and traffic-related air pollution and noise, but correlation between these pollutants may lead to mutual confounding of associations. We evaluated the spatial relationships between residential air pollution and noise at most and least noise exposed façade, separately for road and rail traffic noise.
Methods: Addresses of the participants in "The Oslo Health Study" (HUBRO) were assigned residential road traffic noise (N=13 764), rail noise (N=3 475) and nitrogen dioxide (NO_2) levels. The noise indicators L_{den} (A-weighted day-evening-night noise level) and L_{night} were calculated using the Nordic Prediction Method for Road and Railway Noise, on 5 x 5 m^2 grid. NO_2 was calculated by the EPISODE dispersion model on 1 km^2 grid and at receptor points representing a higher exposed subpopulation (N=2 599 for road traffic and N=901 for railway noise).
Results: All pollutants have large spatial variation. The correlation between road traffic noise and NO_2 was 0.4 at most exposed and 0.1 at least exposed façade, with similar correlations in the higher exposed subpopulation. In the rail noise population, these correlations were 0.5 and 0.0, respectively, and 0.2 between rail noise and NO_2. The rail noise levels were on average 9 dB(A) lower than the road noise levels.
Conclusions: The moderate correlation between road traffic noise at the most exposed façade and NO_2 suggests a potential to separate their cardiovascular effects. Despite the weak correlation between rail noise and NO_2, road traffic noise dominates this population, and rail noise may not contribute additionally to disentangle effects of traffic-related air pollution and noise in our urban population. The negligible correlations at the least noise exposed façade, which is often the bedroom's façade, may aid in separating effects of night-time noise from air pollution.

EVALUATING ENVIRONMENTAL RISKS IN CHILDREN DIAGNOSED WITH SOLID TUMORS: SINGLE INSTITUTION STUDY

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Background and aims: The determination of impact of environmental exposures in the epidemiology of childhood cancers is especially challenging but crucial in the twenty first century. Although cure rates in children's cancers are rising (particularly those of acute lymphoblastic leukemia) there are several pediatric cancers such as brain tumors, neuroblastoma and acute myelogenous leukemia which are only 50% curable or less. Especially alarming is fact that the diagnosis of childhood cancers is slightly increasing and that proportionally hard to treat tumors of the central nervous system are rising in numbers. This study examines the incidence of possible toxic environmental exposures in a cohort of children diagnosed with a solid tumor at the Children's Hospital of Pittsburgh from 1995-2010.
Method: The author used oral interview with families/caregivers to examine preconception, in utero and early childhood exposures to pesticides, other chemical exposures, non ionizing and ionizing radiation including medical radiation, electro magnetic fields and proximity to nuclear power installations.
Results: The caregiver interviews yielded that there were multiple exposures particularly in utero and in early childhood. Highest among these exposures were to pesticides and medical radiation as part of diagnostic workups.
Conclusions: The study reports that there were multiple exposures to possible carcinogens in this cohort of children diagnosed with solid tumors including tumors of the central nervous system. Further study of the results and the extension of the study to previous decades (1970-1995) would enable the author to better link these exposures to diagnosed children retrospectively.

RACIAL/ETHNIC DISPARITIES IN AIR POLLUTION EXPOSURE AND ASTHMA OUTCOMES

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Background and Aims: In the U.S. asthma disproportionately affects those with low socioeconomic status, such as racial/ethnic minorities. For example African Americans often have higher emergency department visits for asthma than whites. Using California Health Interview Survey (CHIS) data, which is representative of California's non-institutionalized population, we aim to determine whether racial and ethnic minorities have higher air pollution exposures and whether air pollution exposures might contribute to disparities in asthma outcomes.
Methods: We mapped CHIS 2003 residential addresses for all respondents and calculated criteria air pollutant and traffic density exposures for each respondent using statewide traffic and air monitoring data. We examined levels of pollution exposure and prevalence of asthma outcomes such as emergency department (ED) visits, daily/weekly asthma symptoms, and daily medication by race and ethnicity. We also ran logistic regression models to test for associations between air pollutant measures and asthma outcomes while controlling for other potential confounders.
Results: Rates of ED visits were higher for Hispanic and African-American children and adults than whites. African American adults and all minority children except Asians are more likely to take daily medication to control their asthma. Mean traffic density appears to be higher for Hispanic, African American, Asian, and multi-race children and adults than white children and adults. Annual average pollutant exposures for traffic-related pollutants, such as NO_2 and PM, appear to be higher for minorities than whites. Additionally, higher pollutant exposures, such as higher traffic density near homes, increase the odds of ER visits after adjusting for age, gender, race/ethnicity and income level.
Conclusions: In California's population racial/ethnic minorities are more highly exposed to air pollution and traffic, which may help explain the disparities found in asthma outcomes. Efforts to reduce pollutant exposures in low socioeconomic communities may help address existing asthma disparities.

CELL PHONE USE AND RELATED SYMPTOMS AMONG ADOLESCENTS: A SURVEY OF 2150 STUDENTS IN IZMIR, TURKEY

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Background and Aims: There is no large community-based study on cell phone (CP) use and symptom frequency in Turkey. Adolescents are an important risk group (Heinrich et al 2011). The aim of this study was to find out the CP use patterns and related symptom frequencies of high school students in Bornova.
Methods: All high school students in Bornova (20,493 students in 26 schools) comprised the target group of the survey. A sample size of 2530 students was calculated with p=50%, d=3%, design-effect=2 and 20% non-response. Systematic random sampling was applied to choose 87 classes out of 704, to obtain a cluster sample stratified according to schools. A 77-item questionnaire was applied. SAR values were obtained according to the model and brand of CP. 2150 students were included in the analyses. EMF magnitudes were measured at each school.
Results: The mean age of the participants was 15.6±1.3 and 52.2% were female. Among participants, 92.8%(n=1991) were using CP and 91.5%(n=1954) had his/her own CP. The ratio of CP users and owners significantly increased with increasing school grade (X^2 trend p<0.001 both). 14.0% had CPs with SAR>1.00W/kg, 53.9% had 1-4 calls/day, 4.6% had over 10 calls/day, the total duration of calls/day were <5min. for 29.0% and >30min for 11.7%, 27.3% sent/received ≥200 sms/day, 10.8% connected to the internet, 71.8% were registered to promotional campaigns. They were unaware of their CPs' SAR values and 64.1% never used earphones. Among the 23 symptoms surveyed, 21 increased with increasing call durations, 14 with number of calls, 13 with number of instant messages, 6 with increasing SAR values (X^2 trend p<0.05). Registration to campaigns significantly increased the presence of 12 symptoms (X^2 p<0.05).
Conclusions: CP ownership rate was high. Students mostly used their CPs for sms, a less risky attitude in terms of EMF exposure. Some students frequently spoke on their CPs. The use of earphones and other protective attitudes must be improved.

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ENVIRONMENTAL AND LIFESTYLE FACTORS AFFECTING BIOMONITORING OF BENZENE UPTAKE AMONG RESIDENTS NEARBY A PETROCHEMICAL PLANT

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Background and Aims: Biomonitoring urinary excretion of benzene, we inquired into factors affecting benzene uptake in a general population sample living nearby a petrochemical plant.
Methods: Our study population included a random sample of 143 subjects: 33 workers of a petrochemical plant (W), 30 residents within 2 km from the plant (2kmR) and 26 residents from 2 to 4 km from the plant (4kmR), and 54 large city residents 25 km apart (25kmR). Exposure to benzene was evaluated by personal air sampling and urinary benzene (BEN-U) monitoring (specimens collected before and at the end of air sampling).
Results: Median air benzene exposure was 25, 9, 7 and 6 $\mu g/m^3$ benzene among W, 2kmR, 4KmR, and 25kmR respectively, with the highest levels in W and no difference among the other groups. Median BEN-U was 3 to 10-fold higher in smokers compared to non-smokers; among non-smokers BEN-U was the highest in W (median 236 ng/L), and lower in 2kmR (48 ng/L) and 4kmR (63 ng/L) than in 25kmR (120 ng/L). Among non-smoking general population individuals the inverse association between BEN-U and distance of residence from the petrochemical plant was significant ($p<0.001$), and possibly related to urban traffic increasing with the distance from the plant. A multiple linear regression analysis performed among non-occupationally exposed subjects showed that up to 73% of BEN-U variability was accounted for by active smoking, air benzene, urinary creatinine and distance from the plant (for each $p\leq0.002$); marginal influences of personal characteristics and environmental tobacco smoking were also observed ($p\leq0.074$).
Conclusions: Our study showed that benzene uptake is the highest among petrochemical workers. Among subjects non-occupationally exposed, smoking and urban traffic currently contribute to benzene exposure more than living in the proximity of a petrochemical plant.

PROSPECTIVE INTEGRATED ASSESSMENT OF CANCER RISK ATTRIBUTABLE TO PESTICIDES IN EUROPE

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Background and Aims: The main climate change policy expected to influence agricultural patterns and, consequently, the need for pesticide use in Europe is the introduction of bio-energy in the domestic energy production mix. Over the next 40 years this will depend on land availability and the need to curb C emissions. Two different scenarios for climate change up to 2050 (a BAU based on 2000 trends and an aggressive emissions abatement scenario limiting temperature change to 2 C) have been assumed.
Methods: The changes in agricultural land use patterns and productivity have been estimated combining CORINE land cover/use data, Eurostat agricultural statistics and the IMAGE and ATEAM models to account for climate change impact on agriculture. The result was mapped on a 50x50 km grid. Using Monte Carlo the changes in land use were distributed stochastically within the grid cells. The areas dedicated to energy crops were calculated taking into account the current state of knowledge regarding yield and the energy demand assumed to be fulfilled by energy crops by the TIMES energy-economic model.
Results: Pesticide use maps were prepared at the same resolution and aggregated at the country level accounting for the spatial allocation of agricultural land for food and energy production. Gradual substitution of active substances with less toxic ones was modeled based on the last twenty years trend and the current regulatory framework. Dietary, inhalation and dermal intake were considered. For inhalation, both long-range transport of pesticides and short-distance exposure due to direct application were accounted for.
Conclusions: Results showed that dietary ingestion is the main route of exposure to pesticides; short-distance inhalation exposure affects primarily farm workers and bystanders. Thus, spatial cancer risk analysis has been undertaken at a finer (100x100 m) resolution, showing significant variations across Europe even within agricultural areas of the same country.

ROAD TRAFFIC NOISE, AIR POLLUTION AND HYPERTENSION IN OSLO, NORWAY

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Background and Aims: Epidemiological studies have reported associations between aircraft noise and hypertension, whereas the relationship between road traffic noise and hypertension is more uncertain. Road traffic is the main source of noise and air pollution, and air pollution has also been linked to cardiovascular outcomes. However, the knowledge about the relative importance of noise and air pollution in developing cardiovascular diseases is limited. We investigated the relationship between residential road traffic noise, air pollution and hypertension.
Methods: We identified hypertension as measured systolic blood pressure above 140 mmHg, measured diastolic blood pressure above 90 mmHg or self-reported use of antihypertensive medication in the population-based "Oslo Health Study" (N=8,921). The participants were assigned residential road traffic noise at most exposed façade and NO_2 levels. L_{den} (A-weighted day-evening-night noise level) and L_{night} were calculated on 5 x 5 m^2 grid, using The Nordic Prediction Method. NO_2 was calculated by the EPISODE dispersion model mainly on 1 km^2 grid
Results: The correlation between road traffic noise and NO_2 was 0.4. Preliminary results showed an odds ratio (OR) of 1.03 for hypertension [95% confidence interval (CI): 0.97-1.09] per interquartile range (IQR) higher level of traffic noise (L_{night}) adjusted for age, gender, body mass index and education. We found no associations between NO_2 and hypertension. Adjusting for NO_2 did not change the OR of traffic noise. In men we found an OR of 1.06 [95% CI: 0.97-1.15] per IQR increase of traffic noise (L_{night}), and OR=0.99 [95% CI: 0.91-1.08] in women.
Conclusions: Residential road traffic noise may not be related to hypertension among participants in "Oslo Health Study". The association was somewhat stronger in men than women, but did not reach statistical significance. These associations are probably not affected by traffic-related air pollution in Oslo.

For a designated ethics discussion session on EMF exposure

Benefits and Barriers to Sharing Electromagnetic Field (EMF) Exposure Research Findings with Participants

On one side of the debate, some studies have supported exposure to electromagnetic fields (EMF) and association with cancers (such as childhood leukemia), reproductive dysfunction, neurological disorders, birth defects and Alzheimer's disease. For example, for the power line issue, results have fueled debate in communities with calls for closing of schools in proximity to power lines. On the other side of the debate, some studies have not found evidence of an association of exposure to EMF and health effects which has provided support for some utility companies to claim that the science is insufficient to confirm an association and no action is warranted.

Given the often equivocal findings in environmental studies, investigators have to weigh the benefits and costs to share study results with study participants. Institutional requirements, typically from the Institutional Review Board (IRB), can cost the investigator considerable time and resources which may not have been considered in the budget. Sharing study results with participants can encourage their continued interest in research by giving them something back. However what does the data mean at the individual level? EMF exposure at the individual level, particularly from insidious exposures, does not have clear toxic cut points. Consequently, explaining results of estimated exposure levels with participants without definitive answers regarding risk is challenging. These issues as well as other benefits and costs of sharing study results with study participants have ethical implications that will be explored among the session participants.

Introducing urban street configuration for improvements in air pollution land use regression models, using 3D building data

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Word count: 293

Background and aims

Land use regression (LUR) has become a valuable tool to estimate spatial variability of air pollutants within cities. However, in many urban built-up areas, tall buildings along narrow streets obstruct the free flow of air, resulting in higher pollution levels, which are difficult to predict by current LUR models. We describe an approach to calculate indicators of the urban canyon effect for improvement of spatially resolved LUR models using 3-dimensional building data.

Methods

Concentrations of NO_2 and NO_X were measured at 68 sites in the Netherlands, and LUR models were computed for both components using predictors such as population density, land-use and nearby traffic intensity. We used ArcGis10 and python scripting to calculate two indicators for canyon effects at each site: (1) the maximum aspect ratio (building height/width of the street) between buildings on opposite sides of the street, and (2) the mean building angle, which is the angle between the horizontal street level and the line of sight to the top of the nearest building. For each site, we calculated 360 building angles in 1-degree steps centered horizontally around the site, and these angles were then averaged. We evaluated whether the two indicators added to the explained variance of the LUR models.

Results

Explained variance of the original models was 89% for NO_2 and 83% for NO_X. A higher mean building angle was associated with an increase in NO_2 and NO_X concentration and improved the explained variance of both the NO_2 and NO_X LUR model (to 91% and 85%, respectively). The maximum aspect ratio did not significantly improve the models.

Conclusion

Original LUR models explained large percentages of spatial variability in NO_2 and NO_X. Preliminary results suggest that performance of LUR models can be further improved by taking into account buildings obstructing free air flow.

Sequential exposure to biological and chemical contaminants: a new *in vitro* model on human respiratory cells

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Background and Aims:
Humans are permanently exposed to numerous pollutants of different types. The effects of the association between chemical and biological compounds on human respiratory health, and especially asthma, are still unclear. In order to clarify these effects, toxicological evidence is needed in addition to epidemiological observations.
Our aim was to develop an *in vitro* model of exposure using two types of pollutants. The individual or combined *in vitro* effects of a chemical pollutant and a biological contaminant, known to be found in domestic environment and deleterious to respiratory health, were assessed *in vitro* on epithelial respiratory cells using a unique exposure device and stringent conditions of exposure.

Methods:
Human alveolar epithelial cells (A549) were sequentially exposed during 30 min, each at the air-liquid interface in an Vitrocell exposure module to FA at an environmental level (50µg/m^3) then to viable spores of Asp (8.10^8 spores/m^3, sampled at the inflow level). Controls comprised sequential exposures to each agent alone or to ambient filtered air. After 10h post-incubation, cellular viability (XTT and LDH assays) was assessed. Biomarkers of local inflammation, IL-8 and MCP-1 were assayed by ELISA in the medium removed from apical face of cells, and their mRNA expression was quantified by RT-PCR.

Results:
Using this protocol, sequential exposure to air, FA or Asp did not impact cellular viability. Single exposure to FA or Asp and sequential exposure to FA then air did not induce significant changes of production or expression of inflammatory cytokines. However, sequential exposure to air then Asp tended to induce IL-8 production and expression. When combined, FA followed by Asp exposure increased IL-8 production and MCP-1 expression.

Conclusions:
These results show that a combined exposure to different types of environmental pollutants can be modelled in vitro.

LOCAL AND REGIONAL SOURCES OF UFP IN URBAN STREETS

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Background and Aims: Ultrafine particle (UFP) numbers show large short-term and small scale variation, making strategies to assess personal exposure to UFP in urban environment potentially very costly. Better insight in the role of local and regional processes, can give rise to methods to estimate UFP using correlated pollutants and regional indicators (Can et al 2011).
Methods: UFP and NOx were measured simultaneously in Antwerp (Belgium) at three locations in a single street in Summer 2009, and in four different streets in a 1 km grid in Winter 2010. Different size fractions were compared to traffic counts and meteorological data. Regional contributions to various size fractions were assessed using night time number concentrations and air mass back-trajectory techniques.
Results: In-street spatial variability of total particle number was rather low. UFP concentrations in four different streets showed a remarkably similar temporal trend on top of which the local component is added.
Total particle number correlated poorly with traffic intensity. Mainly the 20 – 50 nm fractions are correlated with traffic intensity. The morning traffic peak leads to a distinct peak in total particle number, but this is not the case for the afternoon rush hour. Analysis of diurnal UFP concentrations for different size bins shows that both processes of agglomeration and condensation and meteorological conditions explain this decoupling of traffic and total particle number. Elevated total night-time UFP was mainly related to larger size fractions (50 - 100 nm). Higher concentrations of the larger size bins were associated with slow moving air masses.
Conclusions: Although short-term variation in UFP number counts at urban traffic locations largely depends on local sources, similar temporal trends result both from regional processes and similar underlying traffic patterns. This study illustrates the potential to extrapolate measured UFP concentrations to similar locations using correlated pollutants and regional indicators.
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EXPOSURE AND RISK ASSESSMENT OF VOLATILE ORGANIC COMPOUNDS AND CARBONYLS IN INDOOR ENVIRONMENTS IN EUROPE

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Background and Aims: The study paper summarizes the existing cancer and non-cancer risks posed by indoor exposure in dwellings and public buildings in European Union (EU) countries, due to the occurrence of major organic compounds (benzene, toluene, xylenes, styrene, acetaldehyde, formaldehyde, naphthalene, limonene, α-pinene and ammonia, classified by the European Commission's INDEX strategy report as the priority pollutants to be regulated).
Methods: The indoor air quality data used in the study where obtained from the literature of the last decade, including the results of large-scale European projects (e.g. EXPOLIS, AIRMEX), as well as the ones from individual investigator groups. Cancer potency factors and exposure limits (for estimating cancer risks and Margin of Safety respectively) where obtained from different regulatory bodies (EPA-IRIS, OEHHA), aiming to identify the differences in pollutants prioritization imposed by the relevant approaches.
Results: The review process indicated that significant differences in indoor air quality exist within and among the countries where data were available, indicating corresponding differences in sources and emission strength of airborne chemicals, identified or not. Conservative exposure limits were not exceeded for non-carcinogenic effects, except for formaldehyde; for carcinogenic agents the estimated risks were up to three orders of magnitude higher than the one (10^{-6}) proposed as acceptable by risk management bodies. Prioritization between formaldehyde and benzene depends more on the cancer potency factors assumed than the levels of existing concentrations.
Conclusions: The risk assessment evaluation process faces crucial difficulties, either due to the relative paucity of indoor air quality measurements in many EU countries, or by the lack of sampling consistency in the already existing studies, indicating the need for additional measurements of indoor air quality following a harmonized sampling protocol. Additionally, uncertainties embodied in the cancer potency factors and exposure limit values impose further difficulties in substance prioritization and risk management.

FUTURE RE-EMERGENCE OF INFECTIOUS DISEASE DISTRIBUTION IN THE MEDITERRANEAN AREA: HOW LIKELY THEY ARE?

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There is currently a long list of climate-sensitive diseases potentially capable of re-emerging in the Mediterranean areas under ongoing and future global warming. But, how likely those scenarios and projections are? Answering such an important question for our people and societies in the region, requires of an integrated approach to this complex issue, far from the simple risk assessment exercises that have recently steered reasonable public debates on their degree of validity.
Directions of projected changes for the Mediterranean region are quite clear, at least for the next decades and despite reasonable associated uncertainties. What it is not so clear is how, the facilitating effect of climate can play a role in approaching the sylvatic cycles of some of those highly relevant diseases, to the human cycles in a sense that the spill out or leakage of the former can represent a serious threat to the amplification of disease incidence in humans. The role of climate in all this interplay, will be weighed against other sources of changes, perhaps more important than climate itself, such as land-use and land-cover changes, population changes and policies developed by country stakeholders.
Understanding the underlying mechanisms mediating those associations reveals key to derive sound and useful results that may be used as tools for developing early-warning systems for some of the most relevant diseases in the region. An example for cutaneous leishmaniasis will be used to highlight important aspects of this controversial topic, that might be of use also for a whole range of other serious diseases which may be imported to the region.

THE FREQUENCY OF METHEMOGLOBINEMIA IN CHILDREN AND THE CONTEXT OF ITS OCURRENCE

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Background and Aims: Starting from the premise there is a higher rate of methemoglobinemia in some regions of Romania, the aim of the study was to identify the frequency of methemoglonimenia and context of its occurrence.
Methods: Were included diagnosed cases with methemoglobinemia in children under 1 year age from Olt county during 2005-2009 (N = 90).
Results: The number of cases was decrease from 29 cases in 2005 to 4 cases in 2009. Most of the cases was formula (47 cases) and mixed (42 cases) feed. The age average was 2,7 months.
A significant impact was noted for collective wells (22.22%), but most residents and ensuring water from own fountains. Only one was provided with protection, 95% being located closer than 10 m from latrines. In over half (14/20) of them depth was below than 10 m., and only one had a depth over 20 meters. Of the individual wells, 18.84% are provided with protection, 15.71% being located at a distance over 10 m. from latrines, and 15.71% had over 20m. depth.
Theoretically, depth brings less risk of nitrate poisoning and increase the safety of drinking water, but in our study we observed high concentrations in deep wells. In all samples collected from wells with depth over 20 m. the nitrate concentrations was above 100 mg / l, unlike samples from wells with depth 10-20m, where concentrations above 100 mg / l. were identified only in 79.43% of the samples, respectively 69.23% of samples from wells with a depth below 10m.
Conclusions: Although, a clear decrease of frequency of methemogloinemia was noted, they remain a public health problem. Major problems remain the age, artificial feeding, collective wells, and in areas with heavy pollution, the well depth does not have the guarantee of safe water.

HEALTH IMPACT ASSESSMENT OF INDOOR AIR POLLUTION FROM COMBUSTION SOURCES IN HOMES

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Background and Aims: In a large European study (HEIMTSA) and a local study (IAPAH) based in Ireland and Scotland, we developed and applied methods for estimating the health impact of indoor air pollution from combustion sources in homes. We considered two approaches: using a simple binary exposure (presence/absence of the indoor combustion source) or using exposure to $PM_{2.5}$.
Methods: Both approaches involved linking exposure estimates with demographic data, health risk functions and background rates of morbidity to estimate total health burden attributable to combustion-derived air pollution from indoor sources. IAPAH included one 24-hour measurement of $PM_{2.5}$ in each of 100 homes selected for different types of biomass fuel (wood, peat, coal, gas), or environmental tobacco smoke (ETS). Information regarding household and occupant activities was also collected. These and other published data were used to derive estimates of average annual $PM_{2.5}$ exposures, by exposure source. Assessment of ETS used both approaches; biomass combustion used exposure to $PM_{2.5}$ only. Risk functions in $PM_{2.5}$ (for ETS and biomass) were derived from relationships for outdoor air pollution, by scaling functions in background concentrations for use with personal exposures. The ETS binary approach used risks from epidemiological studies of "living with a smoker".
Results: Preliminary results suggest that (i) using binary exposures, the greatest health burden from ETS is from coronary heart disease in adults and (ii) ETS concentrations of $PM_{2.5}$ greatly exceed those from biomass fuel. Health burdens from ETS and biomass, in terms of $PM_{2.5}$, will be presented and, for ETS, compared with impacts using the binary approach.
Conclusions: Discussion will consider strengths and weaknesses of the two approaches, for burden of disease and for evaluating impacts of policies; and the public health implications of the various domestic sources, especially ETS in homes, whose estimated impact is substantial.

LEAD EXPOSURE AND TELOMERE LENGTH IN ELDERLY MEN: THE NORMATIVE AGING STUDY

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Background and Aims: Telomeres, repeated DNA sequences at the ends of chromosomes, are important for genomic stability. Telomere shortening has emerged as a marker of cellular aging and increased risk of early mortality. Recently, exposure to traffic pollution has been associated with shortened telomeres.
This study examined the associations between measures of lead exposure and telomere length in a cohort of aging men.
Methods: In the Veteran's Affairs Normative Aging Study, cumulative baseline lead exposure was measured by K-Shell X-Ray Fluorescence microscopy of tibia and patella bones between 1991-2002 ($n_{subjects}$ = 589) and acute blood lead exposure by GFAAS ($n_{subjects}$=701). Telomere length was determined at up to four repeated study visits between 1999-2007 (n_{visits} = 1183) by the ratio of telomere sequence repeat to single copy gene (T/S ratio) from real time PCR of whole blood DNA. The first visit cross-sectional effect of lead and other exposures on log(T/S ratio) was determined by generalized additive modeling. Mixed models with repeated telomere measurements and fixed effects of lead were also generated. Potential confounders included smoking, alcohol ingestion and metabolic parameters.
Results: Median telomere T/S ratio at the first visit (aged 55-100) was 1.22 (IQR: 0.503) and at the fourth visit was 1.07 (IQR: 0.712). Lead exposure measured by tibia, patella, and blood lead had no relationship with telomeres cross-sectionally, but was associated with longer telomeres in repeated measures mixed effects models. Telomere measures were inversely associated with age (p-value <0.0001), current smoking status, ischemic heart disease status and body mass index. Higher attained education was associated with longer telomeres.
Conclusions: Telomere length shortens in elderly men with age. The degree of shortening is influenced by smoking status, body mass index, education level, and ischemic heart disease diagnosis. In contrast to previous research on traffic exposure and telomere length, lead exposure was associated with longer telomeres. Possible explanations will be discussed.

ASSOCIATION BETWEEN SERUM CHOLESTEROL AND PLASMA PFOA AND PFOS LEVELS IN A MIDDLE-AGED DANISH POPULATION

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Background:
Perfluorooctanoate (PFOA) and perfluorooctane sulfonate (PFOS) are used in a variety of industrial and consumer products and have been detected worldwide in human blood. Recent studies - mostly based on highly exposed populations - have indicated that PFOA and PFOS may affect serum cholesterol levels. Elevated cholesterol levels are associated with increased risk of cardiovascular diseases.

Aims:
The aim of the present study is to investigate the association between serum cholesterol and plasma PFOA and PFOS levels in a middle-aged Danish population.

Methods:
The study population is 724 individuals (635 men and 89 women) from the Danish Diet, Cancer and Health cohort. Blood samples were donated by the cohort members at the time of enrolment between 1993 and 1997 and stored in a biobank at -150°C. For the study group plasma levels of PFOA and PFOS and serum levels of cholesterol have been determined. None of the 724 individuals takes cholesterol reducing medication. The association between PFOA and PFOS plasma levels and serum cholesterol levels will be analysed by regression techniques. The regression analyses will be adjusted for potential confounders. Also, we will investigate whether gender, body mass index and prevalent diabetes modifies the association between cholesterol and PFOA and PFOS.

Results
The study population of 724 individuals is 50-65 years of age with a mean serum cholesterol level of 231.5 mg/dL. Mean plasma PFOA and PFOS level are 7.1 ng/mL and 35.9 ng/mL, respectively. Results of the regression analyses will be obtained in spring 2011 and will be presented at the ISEE conference in September 2011.

Conclusions: Conclusions will be presented at the ISEE conference in September 2011.

EXPOSURE TO PARTICULATE MATTER AND ITS RELATIVE EFFECT ON HEART RATE VARIABILITY FOR DIFFERING PHYSIOLOGICAL STATES WITH IMPLICATIONS FOR COMMUTER MODAL CHOICE

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Background and Aims: Links between particulate matter (PM) exposure and decreased heart rate variability (HRV) have been documented in studies of older, susceptible individuals, those with existing cardiovascular conditions (Gold et al 2000; Brook et al 2010) and also in young healthy adults (Vallejo et al 2006). HRV is a marker of the risk of sudden death from cardiac events in humans and $PM_{2.5}$ has been shown to be a cause of sudden death in humans. The objectives of the study comprises the measurement of HRV and personal exposure to $PM_{2.5}$ in cyclists, pedestrian, private car commuters and public transport commuters in Dublin City. This will assess the relative variation in HRV with particulate matter (PM) exposure of these groups performing differing levels of physical activity and having differing physiological states.
Methods: Healthy individuals who commuted to and from work or college during peak traffic times were studied. HRV was continuously monitored in subjects using an Actiheart unit over 24 hours. PM exposure over the same time period was measured using an ambulatory device.
Results: The uptake of pollutants was higher for cyclists due to higher breathing rates. This higher uptake led to larger decreases in heart rate variability indices in comparison to subjects using other modes of transport.
Conclusions: Exposure to PM was found to be linked to decreased HRV among healthy subjects. Differing modes of transport, these in turn leading to differing physiological states, led to varying percentage decreases in heart rate variability in response to PM exposure. The results of this study have definite implications for commuter modal choice.
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COULD ENDOCRINE DISRUPTING CHEMICALS ALTER PARTNER PREFERENCE IN HUMAN? A DEBATE FOR BISPHENOL A

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Background and Aims: The higher and increasing rate of men who sex with men in industrialized countries might be due to industrialization per se, in parallel to the increase in the production volume of endocrine-disrupting plastics. We hypothesize that endocrine disruptors like bisphenol A (BPA) might alter partner preference of men.
Methods: We searched the literature related to the effects of BPA as endocrine disruptors.
Results: There is a critical period in development during which testosterone or its metabolites organize both the brain and behavior of male rats. Testosterone can have its effects by acting directly on the androgen receptor, or by being metabolized into dihydrotestosterone by 5α-reductase and into estradiol by aromatase. Sexually dimorphic nucleus (SDN), is believed to be related to sexual behavior in animals. It is a cluster of cells located in the preoptic area of hypothalamus of the brain. The volume of SDN in medial preoptic area is modified by hormones, among which testosterone is proved to be of much importance. The larger volume of male SDN is correlated to the higher concentration of fetal testosterone level in males than in females. Also, there is evidence that testosterone acts during specific prenatal period to organize the development of aromatase-expressing neurons into the male-typical SDN. There is extensive evidence that BPA is an estrogen-mimicking chemical, although recent findings have revealed that BPA is a selective estrogen receptor modulator (SERM), since BPA and the potent endogenous estrogen 17 beta-estradiol (E2) do not always show identical effects, and in some studies BPA has been shown to antagonize the activity of E2.
Conclusions: Considering the wide and increasing use of plastics in our daily lives, we hypothesize that endocrine disruptors like BPA might alter partner preference of men by acting on the preoptic area in hypothalamus in men and by acting as SERM.

CHARACTERIZATION OF PREGNANT WOMEN EXPOSURE TO CD AND PB IN TAP WATER AND FRESH-FOOD IN CALI - COLOMBIA

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Background/aims: Previous studies have suggested that heavy metals could be associated with perinatal health effects among pregnant women in Cali-Colombia. Among pregnant women we characterized concentrations of Cd and Pb in water and local foods.
Methods: A sample of 60 women was selected out of 385 pregnant women included in a cohort study designed to evaluate the effects of environmental exposures on fetal growth. Tap water samples were monthly collected from the drinking water network and at women households during 11 months. Food samples were collected according to the frequency of consumption during the first and third trimesters of pregnancy for a group of local foods with potential bio-accumulation capacity: fresh-vegetables eaten raw (lettuce and cabbage), fish and some cow entrails (liver and kidney). In-sample Cd and Pb concentrations were determined with Atomic Absorption spectrometry coupled to Graphite Furnace. The Hazard Quotient (HQ) to estimate non-carcinogenic risk was calculated with data of height, weight and frequency of consumption collected via a questionnaire.
Results: Cd or Pb were detected in > 90% of 66 water samples, and 11% of them had lead levels above WHO limits. Among 122 food samples, 6% had Cd; and 27%, Pb. Among them, 67% and 28% exceeded FAO Limits for Cd and Pb, respectively. HQ estimations for Cd and Pb, in both water and food, were sometimes >1, suggesting risk of adverse effects in this population.
Conclusions: Our findings show that this population of pregnant women in southeastern Cali is exposed to Cd and Pb in water and food, and sometimes concentrations exceed the recommended EPA and FAO limits. This non-carcinogenic risk may affect fetus development.
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A TIERED APPROACH FOR AGGREGATE EXPOSURE ASSESSMENT

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Background and Aims: The study describes the tiered aggregate exposure assessment methodology followed in the TAGS project, as a response to CEFIC-LRI call regarding the issue of realistic estimation of exposure to substances from multiple sources.
Methods: The overall developed methodology focuses on the development of guidance and criteria to inform when an aggregate assessment is triggered, the identification of data types/data gaps and quality required, exposure determinants and modifiers identification, development of strategies so that a verification of the models is possible and the completion of a range of case studies. The approach initially lies on a deliberate and extensive review of existing data, models and methodologies, aiming to compile a new overall methodology, adding the necessary elements for an as much realistic exposure assessment. The tructured methodology is built upon a computational platform that links existing (e.g. EUSES, SHEDS) and additional in house developed aggregate exposure models, to databases (e.g. Expofacts, EXPOLIS), aiming to exposure assessment refinement and data assimilation.
Results: Elevation from lower tiers to the higher ones is based on the Risk Characterization Ratio (RCR) derived in each tier; If RCR is higher than one, a refinement of the assessment is required, imposing the use of more refined data (e.g. contamination levels distributions than worst case estimates), models (probabilistic assessments, use of more accurate environmental fate models), as well as assimilation of complex data (e.g biomarkers data and use of toxicokinetic models).
Conclusions: A crucial stage of the refinement is the minimization of uncertainties embodied in the several stages of the full chain assessment, Bayesian Hierarchical modeling being an imperative tool for the exposure assessor. The applicability of the overall methodology is tested in three distinguished case studies, dealing with classical (benzene) and emerging pollutants (PBDE and BPA).

CLIMATE CHANGE AND PUBLIC HEALTH ADAPTATION PROGRAM: CANADIAN PERSPECTIVE

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Background : The impacts of climate change can place significant demand on health, particularly among vulnerable populations and regions. The need for adaptation strategies to prepare for, and address, the risks and impacts of a changing climate has been widely recognized. Public health professionals play an essential role in knowledge translation and transfer of science-based information and development of integrated education, surveillance and response systems to reduce health risks. This project will address gaps and identify public health adaptation strategies to address the impacts of climate change on vector-borne and water-borne infectious diseases in Canada.
Methods: The climate change and adaptation program consists of two components: university research and community/regional based pilot projects. The university research projects are developing tools to assess community vulnerability to water-borne and/or vector-borne diseases. The community/regional based pilot projects have undertaken activities to examine infectious disease risks and adaptation associated with climate change in their regions. .
Results: Tools for public health (i.e. risk maps, forecasting models), resulting from the university research, are being produced to identify the predicted risk of water-borne and vector-borne (specifically Lyme disease and West Nile virus) diseases now and in the future with from a changing climate. From the pilot projects a synthesis report of the findings, lessons learned and “best practices” was created to provide information on how health regions and departments in Canada can prepare for and adapt to infectious disease threats from a changing climate based on the experience and activities of the pilot regions.
Conclusions: Through tool development by academic research and knowledge translation and transfer, public health capacity to anticipate and respond to emerging vector-borne and/or water-borne infectious diseases will be increased through the development of appropriate adaptation strategies.

Title: Exposure Assessment to Air Pollution of Children Living in the High Risk Area of Milazzo – Valle del Mela (Sicily): a Bayesian Kriging Approach.

Authors:

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Background and aim: To estimate the exposure to ambient gaseous air pollutants at individual residential addresses by a Bayesian kriging approach to be used in studying the relationship between lung function and air pollution in asthmatic subjects living in the high risk area of Milazzo – Valle del Mela (Sicily, Italy).

Methods: ISAAC questionnaire was administered to parents of all 2,506 children attending primary schools of the Milazzo – Valle del Mela area. 154 children that scored positives for any asthmatic symptoms were enrolled in a panel study. The study period was from November 2007 to April 2008. Every two weeks respiratory function and bronchial inflammation was assessed, while parents filled in a diary with daily activities, symptoms and drugs taken by the child during follow-up.
Ambient gaseous air pollutants (SO_2, NO_2, BTX) concentrations were measured by passive dosimeters located at 21 sites at each school-yard during the week preceding each examination (weekly averages). Children's residential addresses were geo-referenced and Bayesian kriging was used to obtain an estimate of pollutants concentration at children's home for each week of monitoring. Exposure assessment was completed by time-activity patterns obtained from daily diaries.

Results: A large geographical heterogeneity in air quality was recorded suggesting complex exposure patterns. In some locations we recorded higher levels of sulphur dioxide (with one or more weekly averages over 20 mcg/cm) and some others showed higher level of NO_2 (with an overall weekly average in the study period over 40 mcg/cm). The spatial distribution of SO_2 concentrations showed the typical shape of a point source with a plume effect. The areas at higher exposure are located along the prevalent wind line. For the period 2007-2008, official data confirmed episodes of SO_2 concentration above 100 mcg/cm.

Conclusions: Our findings suggest that Bayesian kriging may provide better estimates than monitoring values alone since it accounts for the spatial heterogeneity of individual-level exposures.

QUALITY OF LIFE AND THE RELATIONSHIP WITH EARLY COMPLICATIONS OF BREAST CANCER TREATMENT IN BRAZILIAN WOMEN

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Background and Aims: The assessment of quality of life (QOL) in women with breast cancer before treatment allows a more comprehensive assessment these patients. Some initial complications are a major cause of morbidity in the postoperative period. The aim of this study was to evaluate the association between quality of life before treatment of breast cancer and early complications in National Cancer Institute-Brazil (INCA).
Methods: Participants were women with unilateral breast cancer, requiring oncological attention in INCA between June/2009 and March/2010. To assess quality of life before treatment was used EORTC QLQ-C30 and the BR23 module. Information about early changes (axillary web syndrome, pain and subjective symptoms related to early edema in the upper limbs) were obtained by physical examination 30 days after surgery and were collected in a standardized form of the medical records. Bivariate analysis of dichotomous variables and independent variables and the odds ratio, with CI 95%, were analyzed.
Results181 women were evaluate and were observed that women who reported good health overall, showed a protection of 57% for early subjective edema (OR=0.43 95% CI 0.20 -0.96). Symptoms scale of BR23 is negatively associated with pain (OR=0.11 95% CI 0.21-0.73). Patients with good functionality-C30 showed protection of 66% (OR=0.34 95% CI 0.15-0.75) for pain. Were not found statistically significant results when evaluating axillary web syndrome and does not indicate the presence of association.
Conclusions: These results suggest that good quality of life is predictor to evaluated early complications in women with breast cancer in the period before starting cancer treatment.

RESIDENTIAL EXPOSURE TO POLYBROMINATED DIPHENYL ETHERS (PBDE) AND RISK OF CHILDHOOD ACUTE LYMPHOBLASTIC LEUKEMIA

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Background: Residential dust can be a major source of exposure to PBDEs, which are often found at high levels in U.S. homes, particularly in California. Limited evidence suggests that PBDEs may cause perturbations of the immune system. We estimated the risk of childhood acute lymphoblastic leukemia (ALL) in relation to PBDEs using levels in carpet dust as exposure indicators.
Methods: We studied 167 ALL cases 0-7 years of age and 214 birth certificate controls matched on age, sex, and race/ethnicity from the California Childhood Leukemia Study in 2000-2006. We sampled carpets in the room where the child spent the most time using a high volume surface sampler (HVS3), or we took dust from the home vacuum. We measured concentrations (ng/g) of 14 PBDE congeners that we grouped by Penta- (28, 47, 99, 100, 153, 154), Octa- (183, 196, 197, 203) and Deca-BDE (206-209) formulations. Odds ratios (ORs) were calculated using logistic regression adjusting for demographics, year of dust collection, and sampling method.
Results: BDE-47, 99, and 209 were the congeners found at the highest concentrations in homes (median [ng/g], interquartile range [IQR]: 1173, IQR 473-2175; 1579, IQR 633-3358; 938, IQR 531-1682, respectively). Comparing the highest to the lowest quartile, we found no association with ALL risk for the sum of BDE congeners in the Penta- (OR=0.7, 95% confidence interval [CI] 0.4-1.3), Octa- (OR=1.0, 95% CI 0.6-1.9), or Deca-formulations (OR=1.0, 95% CI 0.6-1.8). However, comparing homes in the highest tertile to those with no detections, we observed significantly increased risks for BDE196 (OR=2.1, 95% CI 1.1-3.8), 203 (OR=2.0, 95% CI 1.1-3.6), and 207 (OR=2.0, 95% CI 1.0-3.8).
Conclusion: We found no association with ALL for most common BDEs in residential dust, but observed positive associations for specific octa- and nona-BDEs. Additional studies with repeated sampling and biological measures will be informative.

MULTIPARAMETRIC ASSESSMENT OF AMBIENT AIR PM IMPACT ON RESPIRATORY HEALTH

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Background and aims: The present study aims at examining the relationship between green areas and health in four EU cities, investigated the association between air pollution, meteorological conditions and daily respiratory hospitalization for the population of Athens (Greece) from 2003 to 2005.
Methods: To this aim we applied two different statistical approaches: one that makes use of General Linearized Models (GLM) and one based on Artificial Neural Networks (ANN). For both we used time series data for the followings covariates: ozone, PM10, nitrogen dioxide sulphur dioxide, carbon monoxide, temperature, humidity wind speed, wind direction and a dummy variable to account for the seasonality.
Results: Results showed that both models performed adequately with consistent outcomes: PM is the dominant parameter related to hospital admissions, followed by O_3 and the other atmospheric pollutants (CO, NO_2 and SO_2). Meteorological parameters also play a decisive role in the formation of air pollutant levels affecting public health. ANN, in particular, gave a higher contribution to the meteorological parameters, capturing more efficiently the combined effect of chemical (air pollution) and physical (temperature and humidity) stressors on health outcome and so showing a better adaptation in complicate environmental issues results in improved modelling predictions compared to the GLMs.
Conclusions: A major finding of the study regards the flexibility and the adaptation of the methodological approach for assessing non-linear problems and specifically the effect of non-linear parameters, such as air temperature. Thus, the mathematical tool we developed successfully captures the direct impact of the meteorological parameters (temperature and humidity) to health outcomes. Besides the assessment of the significance of the environmental stressors affecting hospital admissions, the ANN approach demonstrated its higher capacity in predicting days with higher morbidity risk. This feature of the model makes it a valid policy-maker tool to support decisions on preventive measures.

OBESITY AND METABOLIC SYNDROME: RISK FACTORS FOR AIR POLLUTION RELATED ASTHMA HOSPITAL ADMISSIONS

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Background and Aims: Obesity has been shown to be associated with the presence of asthma in children and, to a lesser extent, adults. Additionally, acute exposure to elevated ambient air pollution has been demonstrated to increase the risk of respiratory hospital admission. However, the effect modification of obesity and metabolic syndrome on the association between air pollution and asthma hospital admissions has yet to be determined.
Methods: Data for unscheduled hospital admissions in New York City with a primary diagnosis of asthma was obtained for the years 2003-2006. A poisson generalized linear model was used to determine the association of a distributed lag model of ambient air pollution exposure with asthma hospital admissions for children (under 18), adults (18-64) and older adults (over 65). Additional analyses were conducted for children with a secondary diagnosis of obesity and adults with multiple secondary diagnoses corresponding with metabolic syndrome (i.e. hypertension, diabetes, hyperlipidemia, and obesity).
Results: After controlling for meteorological variables, temporal trends, and other possible confounders, short-term changes in ambient fine particle, nitrogen dioxide, and ozone concentrations were significantly associated with an increased risk of asthma hospital admissions in all age groups. A significant increase in risk of asthma hospitalization due to elevated pollutant concentrations was also observed in children with a secondary diagnosis of obesity, as compared to non-obese children. Also, a significant increase in risk of hospitalization was observed in adults and older adults with at least three of the secondary diagnoses that constitute metabolic syndrome as compared those individuals without metabolic syndrome.
Conclusions: Obesity in children and metabolic syndrome in adults are significant risk factors for air pollution related asthma hospital admissions. The identification of this susceptible subpopulation indicates an ongoing public health risk due to the increasing prevalence rates of both child obesity and metabolic syndrome in adults.

INTERACTION BETWEEN ARSENIC CONCENTRATION IN DRINKING WATER AND GSTT1 GENE POLYMORPHISM IN TOENAIL ARSENIC CONCENTRATION OF CHILDREN

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Background and Aims: Chronic arsenic (As) exposure through drinking water might pose a greater risk of various cancers in children. However, relationship between drinking water As exposure and the internal dose has never been clarified in healthy children. Thus, we aimed: 1) to quantify the dose-response relationship between As exposure through drinking water in children and adolescents; 2) to test interaction of drinking water As and toenail As concentration by *GSTT1, GSTP1*, and *GSTM1* genotypes.
Methods: In Pabna, Bangladesh, a prospective longitudinal biomonitoring study of As exposure was conducted among individuals with no symptoms of arsenic-induced diseases. Among 248 participants, children and adolescents • 18 of age (n = 59) are included in the present analysis. A baseline demographic questionnaire and blood sample was collected. Subsequently, samples of urine, toenail, and water samples were collected once every 3 months.
Results: Mean daily As intake ranged from <1 to 449 μg. Both tubewell water concentration and estimated daily dose in the children remained stable over the 4 year study period (both intraclass correlation coefficients > 0.95). In a multivariate regression model, 10% increase in As intake from the home tubewell drinking water was associated with 2.4 % increase in toenail As concentration (95% CI, 1.8 – 3.0%). At baseline, adolescents (age 14 – 18) had a 0.2% (95% CI, 0.0 – 0.3 %) higher level of As in their toenails, compared to the pre-adolescent children (age • 13 yrs). However, those with a *GSTT1-null* genotype had a 1.4 % lower toenail As concentration (95% CI, -2.8 – -0.1%) compared to those with *GSTT1-wild type* per same unit exposure in drinking water As exposure.
Conclusions: Despite lower range of exposure, children appear to be more sensitive to As exposure from drinking water than the adults. In particular, the children who have *GSTT1-null* genotype metabolize As differently from the adults.

2010's HOT SUMMER AND MORTALITU IN THE RUSSIA'S EUROPE: PREMILIMINARY ASSESMENT

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Background and Aims: In 2010 European Russia experienced extreme heat in summer: high temperature for over 1,5 months exceeding the established long-term average norm by more than 5ºC in 43 regions. Moscow, for example, experienced an unprecedented wave of continuous heat for 53 consecutive days, during extreme heat, maximum concentration CO up to 30mg/m^3 and PM_{10} - 1 500 µg /m^3, daily average PM_{10} levels reached 431-906 µg /m^3.

Methods: Based on official monthly governmental reports, a preliminary assessment of the phenomenon in European Russia can be undertaken.

Results: Now the analysis shows that cumulative excess mortality in July and August of 2010 was 54 thou deaths in the regions affected by extreme heat, compared to the same period in 2009. The relative increase in monthly total mortality rates was 50-60% in some regions. The greatest increase in cause-specific mortality was considered to be a result of cardiovascular (31,500 additional deaths), respiratory (1,500) and some external (1,700) causes.

In Moscow yet in July and August of 2010 it increased by 11,000 deaths (60% to that of 2009). It included 5,951 deaths from cardio-vascular diseases, and 339 deaths from respiratory diseases. In August these became the greatest increase of respiratory cases, that could be attributed to the forest and peat fires. All external causes increased mortality by 1,100 cases, including 101 suicides (a relative increase of 77%); mortality from infectious diseases increased by 61,5%, and mortality from cancer increased by 70.2%, possibly due to postponed surgical interventions, and lack of air conditioning in post-operation rooms. A time-series analysis of daily data on cause-specific mortality will be available only in end 2011.

DAILY CHANGES IN AIR POLLUTION AND LUNG FUNCTION IN THE FRESNO ASTHMATIC CHILDREN'S ENVIRONMENT STUDY: USE OF INDIVIDUAL-LEVEL EXPOSURE ESTIMATES OF AIR POLLUTANT CONCENTRATIONS

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Background/Aims: Exposure measurement error should be reduced when estimates of ambient air pollutant exposures account for spatiotemporal variations in concentrations and time/location/activity. We investigated the relationship of daily concentrations of nitrogen dioxide (NO2), nitrate (NO3), ozone, elemental carbon, PM2.5, coarse fraction of PM10, and both FEV_1 and $FEF_{25-75,}$ in a cohort of 315 asthmatic children in Fresno, CA, followed from 2000 to 2008.
Methods: Pollutants were estimated using measurements at a USEPA supersite (SC) within 20 kilometers of all households. Individual estimates of daily ambient exposure (IEADE) were modeled based on concentrations at the supersite, measurements at schools and homes, and a time/location/activity sub-study Pulmonary function was measured each morning with a programmable spirometer (EasyOne®, ndd, Zurich, Switzerland) for 14 days, up to 3 times a year. Effects of 0- to 7-day lags and 2- to 7 day moving averages for a change in interquartile range were investigated.
Results: After adjustment for height cubed, African American race and asthma diagnosis before the age of 2, NO2 was the only pollutant associated with declines in pulmonary function (both FEV1 and FEF25-75), when SC were used to estimate exposure. However, with IEADE, both NO2 and NO3 were associated with decrements in FEF_{25-75}. NO2 lag 1 was associated with a 43.2 ml/s decline in FEF_{25-75} (95 CI=10.3-76.1 ml/s declines for a 12ppb increase) with SC and a 69.5 ml/s decline in FEF25-75 IEADE (95% CI= 14.3 to 125 ml/s decline, 4.2 ppb increase). For NO3 lag 1, declines increased from 9.2 to 107.3 ml/s with use of IEADE (95% CI=-23.2 to 4.8, for a 5.1 µg/m3 increase in SC and -14.3 to 125 ml/s for a 0.9 µg/m3 increase in IEADE respectively.
Conclusion: IIEADE were associated with greater impacts on pulmonary function in asthmatic children, possibly due to reduction of exposure measurement error.

THE MODIFYING EFFECT OF SOCIOECONOMIC STATUS ON THE ASSOCIATION BETWEEN HOSPITALIZATIONS FOR ACUTE MYOCARDIAL INFARCTION AND AIR POLLUTION IN SANTIAGO, CHILE

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Background and Aims: Many studies have reported the association between acute myocardial infarction (AMI) and air pollution, but has been little explored the modifying effect of socioeconomic status (SES) on Chilean morbidity data. Thus, the objective study was to examine whether the association between hospitalizations for acute myocardial infarction and air pollution (PM10, PM2.5 and O3) is modified by SES.

Methods: Daily counts of hospitalizations for acute myocardial infarction (ICD-10: I21-I22) from Santiago, Chile (years 2002-2006) were considered. Patients were grouped into the following age ranges: All, 18-64, 65-74 and ≥75 years old. To study the association between AMI and air pollution (PM10, PM2.5 and O3), a time-stratified case-crossover approach was applied, controlling for temperature and dew point, using natural splines. Separate analyses by SES were performed by income groups, according to individual health insurance: private (higher-SES), and public (low-SES) and within this, by four sub-groups: no income; minimum-wage workers, low-income, and medium income. Lags 0-7 and moving averages were evaluated.

Results: 9,665 AIM records with 8,446 by SES were available (mean 64 years old). Means for PM10, PM2.5 and O3 were 69.9 µg/m3, 32.2 µg/m3, and 33.2 ppb, respectively. A significant association ($p<0.05$) was observed in adults 18-64 years old only (hospitalizations increased by 3.1%(0.48-5-79%), per 10 µg/m3 PM2.5, lag2). According to analysis by SES was observed an association for adults 18-64 years old belonging to low-income (hospitalizations increased by 6.4%(0.45-12.7%) PM2.5, lag 0, with increased risk for lag2), medium-income groups (15.8%(1-32.8%), per 10 ppb of O3, with increased risk for lag4), and for higher-SES people (6.28%(0.43-12.5%), PM2.5, lag2; and besides for people 65-74 years old at 28%(6.1-55.4%), O3, lag0). The figures for PM10 were qualitatively similar for PM2.5

Conclusions: This analysis suggests that socioeconomic status modifies the association between AIM hospitalizations and air pollution in Santiago, Chile.

THE ASSOCIATION BETWEEN SOCIAL ENVIRONMENT AND EARLY COMPLICATIONS IN WOMEN WITH BREAST CANCER IN A REFERENCE CENTER IN BRAZIL

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Background and Aims: The social environment in which each individual is inserted may be represented for the social support. Studies suggest that the presence of good social support have association with lower complications of treatment in patients with breast cancer. The aim of this study is to evaluate the association between social support prior to oncology treatment and early complications after surgery (pain and subjective symptoms related to early edema in the upper limbs) in women with breast cancer.

Methods: The participants were women with breast cancer and that demanding attention at the Brazilian National Cancer Institute between June/2009 for March/2010. Medical Outcomes Study-Social Support Survey was used to assessment of social support before the oncology treatment. The information about early complications was obtained by physical examination 30 days after surgery and was collected in a standardized form for medical register. Bivariate analysis between dichotomous outcome and selected independent variables and relative risks, with CI 95%, were ascertained.

Results: 181 eligible women were evaluated and revealing that those with good emotional and affective support showed reduction of 76% (OR= 0.24 95% CI 0.10-0.57) and 62% (OR=0.38 95% CI 0.12-0.64) in pain, respective. The better material support reduced in 73% the pain (OR= 0.27 95% CI 0.11-0.623). Were not found statistically significant results when evaluating early edema.

Conclusions: The results suggest that social support would be a predictor of early complications after surgery in patients with breast cancer. This study suggests that the good social environment of the patients would act as a protection factor for the development of those complications.

A NEW COMPUTATIONAL PARADIGM FOR ASSESSING ENVIRONMENTAL HEALTH IMPACT OF POLICIES

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Background and aims: Present problems in assessing the environmental health impact of policies include the multitude and complexity of exposure pathways, data paucity and mechanistic understanding of the interactions across the chain from policy down to health impact and economic costs associated. Many models of different complexity exist. They are currently applied to address parts of the full-chain but their full integration in a single comprehensive system poses additional difficulties.
Methods: This work introduces the concept of a multi-layered distributed computational platform consisting of an integrated set of stand-alone ('loosely-coupled') modules, designed to be linked together seamlessly, in order to demonstrate the impact of a range of policies on health. It covers emissions of all relevant substances into air, water and soil with multi-media modeling capabilities to capture the fate of chemicals across environmental media and micro-environments that could significantly alter actual exposure profiles to toxicants. Combining the information from environmental fate modeling, biokinetics/dynamics and epidemiologically-derived data the impact on human health could be estimated. Linking the latter to the societal economic cost through the introduction of DALYs and/or monetary valuation functions the societal cost of the policy measures considered is reckoned.
Results: The system harnesses the power of cloud computing through a distributed architecture in order to maintain a high level of precision in results and the necessary sophistication of the models employed. Thus the models addressing each part of the full-chain are operated as a seamlessly interoperable system, even though they are spread all over Europe. The individual modules are linked via fast internet based data exchange protocols.
Conclusions: This integrated assessment system allows for a full exploration of trade-offs and synergies of individual policy options. The paper concludes by giving specific examples of successful implementation of the complexity analysis paradigm delineated above.

A PREDICTION MODEL OF THE DISTRIBUTION OF NO2 THROUGH THE LAND COVER, TRAFFIC, AND OTHER EVIRONMENTAL VARIABLES

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Background And Aims: The geographic distribution of air pollutants can not always be measured directly, so it is necessary to create models that approximate its distribution. On the other hand, variables linked to land cover, traffic, the perception of people about their own exposure to pollution, among others might be readily available. The aim of this study was to make a prediction of NO2 pollution through such variables in the city of Seville, capital of the region of Andalusia, southern Spain

Methods: We considered the census tract as the unit of analysis. Through a campaign of passive diffusive samplers (measuring NO2), values were interpolated spatially by a krigging technique and assigned to each census tract the average estimated value. Predictors considered were land cover variables (percentage of soil built, percentage of vegetation, etc), distance to traffic infrastructures (according to different traffic intensities) and perception variables form the Spanish Census (perception of levels of contamination, noise, odors, etc). To these independent variables was applied a factor analysis to reduce the number of variables to consider. We created a linear regression model. We compared the actual NO2 values (kriging) with those estimated by the model

Results: The components of factor analysis were: distance to main roads, perception of environment, land cover and other ecological characteristics of the residence area. The model had an adjusted R2 of 0.34 and the percentage of model error was about 3% (sMAP)

Conclusions: Given the difficulty of obtaining measurements in space geographically sufficient to characterize pollution levels, other available variables may be used; from our study, the use of estimates as described in this paper combining self-perception variables with land use and traffic might approximate valid air pollution distribution

EVALUATING THE IMPACT OF GPs SURVEILLANCE ACTIVITY ON SUMMER MORTALITY AMONG ELDERLY IN ROME

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Background and aim: Since 2006, a heat prevention program has been operating in Rome; the main component is the active surveillance of at risk population subgroups by General Practitioners (GPs). Regional guidelines recommend GPs to monitor patients a priori classified at medium/high risk through an indicator based on administrative data. GPs surveillance activities during summer include telephone calls and home visits.
The study evaluates the impact of GPs surveillance on summer mortality among elderly (65+ years) residing in Rome in the period 2007-2010.
Methods: Data on all-cause mortality were obtained from the Municipal Mortality Registry. A Poisson regression model was applied to estimate the Relative Risk (RR) of dying during heat wave days among subjects included and not included in the surveillance program stratifying by level of the susceptibility indicator.
Results: Out of 2550 GPs working in Rome, 19% in 2007 and 14% in the following four years participated in the program. GPs monitored about 11,000 patients each summer, 2% of residents. Among patients included in the surveillance the proportion classified at medium/high risk was low throughout the four-years (about 20%). Among medium/high risk subjects, an excess mortality during heat-waves was observed in those not included in the programme in 2007 and 2008 (+32% and +34% respectively), whereas no excess was observed among surveilled patients. In summer 2009, no reduction in mortality among patients under surveillance was observed. An updated mortality analysis will be presented including summer 2010 and stratifying by urban heat island.
Conclusions: Preliminary results showed temporal heterogeneity in the impact of the GPs programme on elderly mortality. Since GPs surveillance represents a challenging and resource-consuming activity, the evaluation of its effectiveness for the prevention of heat-health effects represents a relevant public health issue. Results will be discussed considering specific characteristics of both the programme and subjects included.

Background and aims: The purpose of this work was to describe PON1 activity in a group of Brazilian subjects, analyze its phenotype distribution, to compare PON1 activities between groups of subjects with different lipid profiles, search for associations between these profiles and paraoxonase activity; and to investigate whether diet and lifestyle might affect this activity.

Methods: Subjects groups included a total of 94 volunteers, age range of 18-60. Variables studied included basal and salt stimulated PON1 activity and arylesterase activity according to Eckerson's method. Serum cholesterol, HDL, LDL, VLDL and triglycerides were also analyzed. Other variables such as energy consumption and nutrients intakes were assessed from a validated food consumption frequency questionnaire. Lifestyle variables were also assessed. Correlation analysis, T test and ANOVA were used for statistical analysis.

Results: Results indicated that three variables were important to show differences between normal and dislipidemic groups: PON1 salt stimulated activity, % of stimulation of PON1 activity and PON1/arilesterase ratio. Our results also show that whenever we compared B phenotype with other phenotype group (even in combination A + AB) it was demonstrated significant or closely significant differences between groups in relation to HDL and LDL levels. Increased LDL levels in B phenotype group and a reversed relationship concerning HDL levels were observed.

Conclusions: PON1 activity may be an important biomarker to assess risk of diseases associated with individual lipid status and diet may also affect PON1 activity. Our results also point out the need of more studies concerning paraoxonase polymorphism since little is known about environmental interactions with PON1 gene polymorphism in the multiethnic Brazilian population.

PHTHALATES IN BREASTMILK OF WOMEN EXPOSED DURING INVASIVE MEDICAL PROCEDURES

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Background: Phthalates are a group of chemicals distributed ubiquitously in the environment potentially harmful for children. Maternal exposure during medical procedures could also expose the newborn via human milk elimination. We measured four primary phthalates metabolites (FMHE, FME, FMB and the FMO) in breast milk of women who underwent different medical procedures.
Methods: The study was conducted in an obstetrics hospital located in the city of Toluca, Mexico. Milk samples were obtained from two groups of women: (1) 30 women hospitalized in the intensive care unit (ICU) and (2) 30 women with uncomplicated delivery. Milk samples were collected two days after birth, and processed by GC-MS.
Results: Concentrations of all the studied phthalate metabolites were higher in women hospitalized in the neonatal ICU (means total phthalates = 0.193 mg/l) than those from the women with uncomplicated deliveries (means total phthalates =0.082mg/l). Kruskal Wallis test for the difference between the total of metabolites was $p = 0.06$
Conclusions: This study is the first of its kind conducted in Mexico. Although, differences in concentration levels were found between groups, these were not statistically significant, and the reasons may be due to the sample size. Also, the unexposed population has medical interventions that contain phthalates (IV access).

CLEARSKY: ESTIMATING CO AND PM2.5 EXPOSURE VARIATIONS FROM TRAFFIC SENSORS

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Background and Aims: Traffic sensors are pervasive in urban environments. Used to monitor traffic congestion, roadway sensors can be re-purposed for opportunistic sensing of roadway air pollution emissions. Further integration of emissions with meteorological systems and dispersion models can allow for real-time estimates of air pollutant concentrations near major roadways. In development of the ClearSky project, we demonstrated near real-time and historical exposure assessment based on traffic sensing in the San Francisco Bay Area in California, United States. We discuss the role of ClearSky in informing equity for health impact assessments related to land use and transportation planning.

Methods: For ClearSky, an information system was developed that integrated data from roadway traffic sensors (PEMS), mobile emissions factors (EMFAC), meteorology (Weather Underground), and line source dispersion model (CALINE) to estimate CO and PM2.5 concentrations near major roadways in Alameda County, CA. As a demonstration, the system was used to document the variability in exposures over a 2-day live trial period. Concentrations were assigned to census blocks to assess the relationships between exposure variation and several vulnerability factors, such as age, poverty, and race/ethnicity.

Results: The demonstration illustrated data quality and computational challenges that needed to be overcome to make the system publically available. In the region, 20% of the population lives within 500m of a freeway. The initial trial, illustrated disparities in exposure, particularly for low income populations and populations of color, for which more than a quarter of the population lived in areas with the highest quartile exposures. While no disparities in exposure were found by age, roughly a quarter of children in the county lived in the highest quartile exposure.

Conclusions: The ClearSky project demonstrated both challenges and opportunities for integrating sensing and information systems to inform equity-focused health impact assessments of land use and transportation projects.

ONSET AND CESSATION LAGS FOR THE EFFECT OF $PM_{2.5}$ ON MORTALITY - A REVIEW

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Background and Aims: The choice of lag times is crucial for quantifying the benefits of reducing long-term exposure to fine particles. This is difficult to study given everyone is exposed to some degree, there is no clear start and finish to exposure and past and current exposures are correlated. There is a need to make use of evidence from a range of studies and to consider mechanistic data and inference from other fields.
Methods: References were collected from searches on PubMed on particulate matter, mortality and long-term, chronic or cohort and on key authors in the field. Further publications were obtained from reference lists. The scope was limited to $PM_{2.5}$ and all-cause mortality, the effect most often used in health impact calculations. A PubMed search was also done on smoking cessation. This was supplemented with information on cause-specific mortality and from review papers on mechanisims.
Results: A range of lags were suggested from the effect mostly occurring within the first year (e.g. Laden et al 2006) through to around 40% in the first 5 years with the remainder tailing out to 30 years and beyond (analogy with smoking cessation literature). The 'average' of the suggested lags had around 60% of the effect in the first 5 years, 90% by 20 years and the remaining 10% spread up to and beyond 30 years (Walton, 2010). This pattern had a greater proportion of the effect at longer lags than the pattern suggested by the EPA (EPA 2010). This 'average' has no extra validity – it is based on very different options. This uncertainty can be represented by a range from lags from 0 to 30 years around the 'average'. Mechanistic evidence was compatible with either short or long lags.
Conclusions: A reasonable proportion of the effect occurs within 5 years but there may be a long tail to at least 30 years. An 'average' pattern can be used supplemented by sensitivity analysis from 0 to 30 years.
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Metals, arsenic and selenium and risk of pancreatic cancer

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Background and Aims: Limitations in knowledge on the etiology of exocrine pancreatic cancer (EPC) hamper primary prevention interventions. Although scarce, there is some evidence supporting associations between trace elements and EPC. The aim was to evaluate the association between concentrations of twelve trace elements in toenails and EPC risk.
Methods: We studied 118 EPC cases and 399 hospital controls with available toenail samples. Levels of trace elements were determined by inductively coupled plasma - mass spectrometry. Odds ratios (OR) and 95% confidence intervals (CIs) were calculated using logistic regression, adjusting for potential confounders.
Results: Significantly increased risks of EPC were observed among subjects presenting the highest concentrations of arsenic ($OR_{upper\ quartile}$ = 1.90, 95%CI 1.02-3.53; P-trend = 0.015), cadmium ($OR_{upper\ quartile}$ = 3.43, 95%CI 1.79-6.57; P-trend = $6x10^{-6}$) and lead ($OR_{upper\ quartile}$ = 6.17, 95%CI 2.67-14.27; Ptrend = $5x10^{-5}$). Higher concentrations of selenium ($OR_{upper\ quartile}$ = 0.05, 95%CI 0.02-0.14; P-trend = $3x10^{-11}$) and nickel ($OR_{upper\ quartile}$ = 0.26, 95%CI 0.12-0.56; P-trend = $2x10^{-4}$) were inversely associated with EPC risk.
Conclusions: These novel findings, if replicated in independent studies, suggest an important role of trace elements in EPC risk and pancreas carcinogenesis, and the potential benefits of policies aimed at decreasing population exposure to arsenic, cadmium and lead.

EVOLUTION OF TESTING AND ASSESSMENT METHODS IN CHEMICALS POLICY PROGRAMS AND IMPLICATIONS FOR EPIDEMIOLOGY AND CHILDREN'S HEALTH

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Background and aims: Policies for safety of industrial chemicals and chemicals used in products are receiving attention. The European Union (EU) is implementing its comprehensive chemicals management program, known as REACH. The United Nations is coordinating the Globally Harmonized System for labeling and classification. In the United States (US), the Congress has debated amending the Toxic Substances Control Act, and many states have enacted elements of chemicals policy reform. With this discussion is increased scrutiny of methods for chemicals testing and assessment. Both the US and the EU are engaged in processes to move chemicals testing and assessment from methods largely based on the use of animal models and epidemiology to methods based largely on assays and "high throughput" methods. The US National Academy of Sciences recommended such approaches in 2007. This is an analysis of the trajectory of this process and its implications.

Methods: The documentation for testing and assessment requirements for REACH, the GHS, and US programs was reviewed with regard to hazard traits. Literature regarding the development and evolution of new methods available from the US Environmental Protection Agency (US EPA), the National Institute of Environmental Health Sciences (NIEHS), and REACH was reviewed.

Results: The US and European processes are evolving differently, with the EU focused on substitution of new methods for older methods and the US focused on mechanisms of toxicity and markers. Neither has defined a set of goals that would encompass significant concerns for children, particularly developmental neurotoxicity, immune effects, or lung development. Though the management regimes refer to use of epidemiological data, the approaches to new methods do not seem to be incorporating epidemiology into validation or verification approaches. Methods for interpretation of data in policy contexts are also not yet well developed.

Conclusions: Additional attention is needed in these areas.

THE NIEHS/EPA CHILDREN'S ENVIRONMENTAL HEALTH AND DISEASE PREVENTION RESEARCH CENTERS: MORE THAN A DECADE OF INNOVATIVE RESEARCH ON IMPORTANT CHALLENGES IN ENVIRONMENTAL EPIDEMIOLOGY

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Background and Aims: The US Environmental Protection Agency (EPA) and the National Institute of Environmental Health Sciences (NIEHS) have supported the Children's Environmental Health and Disease Prevention Research Centers (Children's Centers) program since 1998, forming a successful and collaborative research network.
Methods: These multidisciplinary, translational research centers are investigating the role of environmental exposures such as air pollutants from traffic, pesticides, endocrine disruptors and social factors in adverse birth and health outcomes including asthma, autism, developmental delay and childhood leukemia and are using approaches such as epigenetics to find novel biomarkers of exposure, early developmental and pubertal effects. Community engagement is an important part of the program.
Results: Findings include: (1) Higher levels of organophosphate (OP) pesticide metabolites in mothers' urine during pregnancy are associated with attention problems in children; (2) Children with certain polymorphisms in the PON1 gene may be at higher risk from exposure to OPs; (3) Children with high prenatal exposure to PAHs from traffic-related air pollution had lower cognitive development tests at age 3 and lower IQ scores at age 5; (4) Research shows an association between increased prenatal LMW phthalates and poorer parental rating of childhood behavioral domains; (5) Children living within 75 meters of a major roadway have an increased risk of developing asthma; (6) variation in several genes in the nitric oxide (NO) synthesis and inflammatory pathways are associated with exhaled NO and asthma and children with variants of glutathione regulation genes may be protected from increased asthma risk; (7) Children with autism have a high incidence of mitochondrial dysfunction, which may affect developing brain cells.
Conclusion: Research from the NIEHS/EPA Children's Centers program is having a significant impact on the field of children's environmental health and provides a foundation for studies such as the US National Children's Study.

ASSOCIATION OF PLASMA CHOLINE AND BETAINE WITH ARSENIC METHYLATION

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Background and Aims: Roughly 140 million people worldwide are exposed to arsenic (As)-contaminated drinking water at concentrations exceeding the WHO standard of 10 µg/L. Metabolism of inorganic As (InAs), which facilitates urinary excretion, involves two methylation steps; both utilize S-adenosylmethionine (SAM) as the methyl donor. SAM biosynthesis relies on B vitamins including folate, but other nutrients, including choline and betaine, also contribute to the methyl pool. Folate and betaine are interdependent; they are the two complementary methyl donors used in the remethylation of homocysteine to methionine, a crucial step in SAM production. Betaine is obtained from the diet or produced endogenously from choline oxidation. The aim of this study was to investigate the associations of plasma choline and betaine with the methylation of As and to determine whether these associations differed by folate status.
Methods: We conducted a cross-sectional study of 378 Bangladeshi adults between the ages of 23 and 60 who were exposed to a wide range of As concentrations in drinking water. Plasma choline and betaine were measured using liquid chromatography tandem mass spectrometry (LC-MS/MS). Total As and As metabolites were measured in urine and blood.
Results: There were no statistically significant associations between plasma betaine or choline and urinary As metabolites among the folate-sufficient participants (n=266). Among the folate-deficient (n=112), plasma betaine and choline were inversely associated with the proportions of total urinary As excreted as InAs (betaine: • = -0.16, p=0.05, choline: • = -0.02, p=0.0004) and monomethylarsonic acid (betaine: • = -3.11, p=0.03, choline: • = -0.39, p=0.005), and positively associated with the proportion excreted as dimethylarsinic acid (betaine: • =5.75, p=0.01, choline: • =0.80, p=0.0004). Similar patterns of association were observed with blood As metabolites.
Conclusions: These findings suggest that two nutrients, choline and betaine, are favorably associated with As methylation, particularly among folate-deficient individuals.

FUZZY SET IN VECTORIAL ANALYSIS OF BODY IMPEDANCE

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Background and aims: Vectorial analysis of body bioimpedance suggests patterns of body composition (Piccoli et al. 2002). However, limits defining these patterns are uncertain and Fuzzy Logic Theory (Zadeh, 1965) has shown to be adequate for dealing with uncertainty inherent to this complex phenomena. The aim is to create hypothetical linguistic model based on fuzzy rules for studying human body composition.
Methods: Fuzzy rules were defined by experts on body composition using Nhanes III dataset as a guide for checking the biological plausibility. Input variables were resistance/height and reactance/height. Output variables were edema, dehydration, caquexia, athletics, thinness, obesity, eutrophic and each of them presented five categories of intensity (from 0.10 – definitely not - until 1.00 – definitely yes). Fuzzy rule base was composed by fuzzy propositions as "if reactance high and resistance high, then dehydration is definitely yes, athletics uncertain, thinness uncertain and so on. Takagi-Sugeno was the inference method. An individual presenting 207 Ω/m resistance/height and 39Ω/m reactance/height was selected for applying the linguistic model.
Results: Fuzzy model produced seven superficial graphics, which corresponded to each pattern of body composition. Membership degrees of individual selected for dehydration, athletics, thinness, eutrophic, obesity, caquexia and edema were, respectively, 0,27; 0,53; 0,16; 0,59; 0,88; 0,30 e 0,61. The highest category of intensity was obesity, which bests represented his current body composition. As an additional contribution provided by a fuzzy model, information about intensity of edema was also important for choosing a better therapeutic strategic, for example. In addition, fuzzy model allows quantifying the intensity of each patter for individuals, which were made, until now, by visual inspection of vectorial graphic.
Conclusions: Potential of fuzzy approach in expanding knowledge of body composition of individuals was presented. Overcoming binary classifications as yes/no pertain to a group may be reviewed in health science as strategy for expanding scientific knowledge**.**

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AIR POLLUTION AND REPEATED ULTRASOUND MEASURES OF FETAL GROWTH IN MEXICO CITY

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Background and Aims: Fetal growth may be affected by maternal air pollution exposure. Among a cohort of pregnant women in Mexico City, we obtained repeated fetal biometry ultrasound data to examine associations between maternal air pollution exposure in early pregnancy and changes in fetal growth.
Methods: Information on factors known to impair fetal growth was collected by physical exams and questionnaires in 2010. Repeated ultrasound scans during gestation were performed to measure biometric parameters of the developing fetus [head circumference (HC), abdominal circumference (AC), femur length (FL), and biparietal diameter (BPD)]. Gestational age was estimated from these ultrasound measurements. Using 2009-2010 air pollution data from the city's atmospheric monitoring network, first trimester citywide averages of $PM_{2.5}$ were calculated for each individual. We applied linear regression to calculate individual-specific slopes for the four growth parameters. These slopes were used as the outcome in four multivariate linear models with predictors being individual-specific first trimester concentrations of $PM_{2.5}$; mother's age and education, and fetal sex.
Results: Data were analyzed for 42 women. The average (SD) rates of increase (centimeters/gestational week (cm/wk) for fetal parameters (HC, AC, FL, and BPD) were: 1.01 (0.08), 1.04 (.12), 0.25 (0.02), and 0.28 (0.03) respectively. Point estimates for the association were positive for both HC (.083 cm/wk, p = 0.17, per 10 $\mu g/m^3$ increment in exposure) and FL (.014 cm/wk, p = 0.43). Reductions of -.005 cm/wk for BPD (p = 0.82) and -.170 cm/wk for AC (p = .06) per 10 $\mu g/m^3$ were observed.
Conclusions: Fetal parameters may respond to maternal air pollution exposures uniquely, and this response may vary by pollutant and timing of gestational exposure. This analysis of repeated ultrasound measures and first trimester $PM_{2.5}$ concentrations supports the need for further work examining changes in fetal parameters associated with other pollutant exposures.

WORKING CONDITIONS AND PSICOSOCIAL EFFECTS OF MUSCULOSKELETAL DISORDERS IN A CALL CENTER AND NURSES IN COSTA RICA

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Background and aims

Musculoskeletal disorders in upper and lower limbs affect many workers and represents important working and economic losses. Its relation with repetitive motions and psychosocial conditions at work are being suggested as risk factors. We report preliminary results from a survey performed in Costa Rica in two working populations: call center operators (C-C) and nurses. This study belongs to a multicenter study of Southampton Hospital.

Methods

A sample of call center workers (N=237) and nurses from the social security service (N=250) were assess through a questionnaire, with personal data, current working conditions, health status, upper and/or lower limb discomfort during last 12 months and past month, and was applied to both populations. Psychosocial conditions at work were assessed by ISTAS-21: psychological demands, active performance, employer' social support and compensation. Data was analyzed separately by department, location of disability for both populations.

Results

Women represented 64% in both populations. Media of age was 25 years for both populations. Women report more limbs`disabilities and also more years of continuance in the organization in both populations. Repetitive motions are reported frequently in both genders and populations (64 and 65%). Possibility on assignment of own tasks were reported in 48% (C-C); and 20% (nurses), impossibility for decision on own recesses: 44% and 80% respectively. Hand and wrist disabilities were reported more frequently among youngers, while shoulder and elbow in older workers in C-C. Back and shoulder disabilities were reported more frequently among young nurses, while back and knee problems were more frequent among older nurses. Results on psychosocial effects and comparison of other variables between both populations are in process and will be presented.

Conclusions

Prevalence of disabilities is more frequently reported in women, which could be related to longer continuity on work organization and cumulative exposures. Analysis of extra-work (family) factors is needed.

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ASSOCIATION OF FINE AND COARSE PARTICLES WITH EMERGENCY HOSPITAL ADMISSIONS FOR RESPIRATORY DISEASES IN CANARY ISLAND

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Background and Aims: Most of the studies differentiating the effect of PM sized fractions have been carried out in cities where fine particles ($PM_{2.5}$) levels were higher than coarse particles ($PM_{10-2.5}$). These studies have shown the effect of $PM_{2.5}$ on health, but there is limited evidence that $PM_{10-2.5}$ is associated independently with health. The citizens of the Canary Islands are exposed to particulate matter highly influenced by mineral dust ($PM_{10-2.5}$ levels are higher than $PM_{2.5}$) because their proximity to the African Continent. Our objective is to assess the short term association between $PM_{2.5}$ and $PM_{10-2.5}$ and hospital admission for respiratory diseases.
Methods: From 2001 to 2005 the association between daily changes in each of PM sized fraction and daily emergency hospital admissions for respiratory diseases was assessed using Generalized Additive Poisson models, controlled for potential confounders. Unconstrained distributed lag models (DLM) (lags 0 to 5) were estimated.
Results: An increase of 10 $\mu g/m^3$ in $PM_{2.5}$ levels was associated with a 11.4% (5.5, 17.7%) and a 3.6%(-2.5, 10.11) increase in risk of respiratory admissions in Santa Cruz de Tenerife and Las Palmas de Gran Canaria respectively, across concurrent and subsequent 5 days. A 5.0% (-0.0, 10.4) and a -2.0%(-6.9, 3.0) increase of admissions were associated with $PM_{10-2.5}$ in these cities.
Conclusions: We found a robust short term impact of $PM_{2.5}$ on emergency hospital admissions for respiratory diseases in Canary cities along with the evidence that these associations spread over several successive days. $PM_{10-2.5}$ may play a relevant role in harmful particulate effect on respiratory mortality. These findings suggest that it may be necessary to establish new air quality standards for coarse particles.

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EFFECTS OF PRENATAL AND POSTNATAL TOBACCO SMOKE EXPOSURE ON THE DEVELOPMENT OF ASTHMA AND WHEEZING: A POPULATION-BASED SIX-YEAR COHORT STUDY

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Background: Exposure to tobacco smoke products has been associated with many harmful effects in children. Previous studies have suggested that maternal smoking during pregnancy has stronger impact on a child's respiratory health than postnatal tobacco exposure, but few studies have assessed potential synergistic effects. This study aimed to assess the independent and joint effects of maternal smoking during pregnancy and postnatal exposure to tobacco smoke on doctor-diagnosed asthma and wheeze in children.
Methods: A six-year population-based cohort study was conducted in Espoo, Finland. The study population included 1984 children. Information was collected using parent-completed postal questionnaires at baseline and follow-up on the child's personal characteristics, environmental exposures (including tobacco smoke) and respiratory health. The health outcomes were current asthma, new asthma and current wheeze at follow-up. Adjusted odds ratios were used as measures of effect.
Results: Maternal smoking during pregnancy had the strongest effect on current asthma at the follow-up (adjusted OR 1.76, 95% CI 1.02-3.04), new asthma (adjusted OR 1.74, 95% CI 1.00-3.03) and current wheeze (adjusted OR 2.19, 95% CI 1.05-4.56). The effects of postnatal exposure to second-hand smoke (SHS) and the joint effect of prenatal and postnatal exposure to tobacco smoke were weaker.
Conclusions: The adverse effects of tobacco smoke exposure on asthma and wheeze are strongest when a child is exposed to tobacco in the prenatal period. The effects of postnatal exposure to SHS on asthma and wheeze are weaker, but such exposure is clearly harmful.

DISTRIBUTION OF AIR POLLUTION IN A HIGHLY INDUSTRIALIZED AREA

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Background And Aims: The area of Campo de Gibraltar (1528,6 km2 southern Spain) is a highly industrialized area, where PM10 have a high concentration of heavy metals. It consists of 7 municipalities, whose population is 264,620 inhabitants. The aim of this study is to characterize air pollution (PM10) in that area

Methods: Data were collected daily from 5 automatic stations measuring PM10 concentration, in addition to daily wind speed and direction at a meteorological station in the same area

Results: The nearest stations to the industries are showing higher mean values of PM10 concentrations (46.3 µg/m3 95%CI = [45.29-47.3] and 41.00 µg/m3 95%CI=[40.12-41.9]), while further away had the lowest (33.96 95%CI=[32.84-35.07] and 34.39 95%CI=[33.26 to 35.52]). Except for one case, the threshold of 50 µg/m3 was exceeded more than 35 times a year (all years and stations). Moreover, more frequent winds in the area are easterly winds followed by westerly winds. The frequency of other wind directions is very low. For all stations, PM10 concentrations are higher when the wind is blowing from East. The number of exceedances of the threshold value (50 ug/m3) is more than double when the wind blows from East than when blows from West (all stations considered)

Conclusions: PM10 concentration is higher near of the industries. Regardless the location, the pattern of PM10 concentration in the study area depends of the wind direction

INTEGRATING ENVIRONMENTAL HEALTH EQUITY CONSIDERATIONS IN RISK BASED DECISION MAKING: CHALLENGES AND OPPORUNITIES

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Background

The United States (US) presidential Executive Order No. 12898 mandates each Federal agency to make achieving Environmental Justice (EJ) part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its actions on low-income populations and minority populations in the United States. A 2005 US Government Accounting Office report noted that implementation of the executive order was limited in the development of air regulations. This study investigates the opportunities and challenges of integrating equity in risk based decision-making within the context of rule-making.

Methods

We developed an equity-focused risk-based decision-making framework, which includes the application of disproportionality functions to assess for social group disparities in environmental health (EH) outcomes. We subsequently demonstrated the application of the equity-focused framework to hypothetical regulatory analyses reflective of a sample of EPA regulations that are based on risk.

Results

Our study demonstrates that equity can be integrated into risk-based rule-making. To assess for disparities in EH outcomes, a variety of approaches can be applied. The choice of method depends on the data characteristics and the framing of analytical questions. A notable limitation of the equity-focused framework is the constrained applicability of analytical results to the policy decision given the statutory constructs of some of EPA's regulations.

Conclusions

The equity-focused decision-making framework allows for successful integration of equity in all steps of many risk-based EPA rule-making decisions. Continued collaborative efforts amongst risk assessors and managers are necessary to further advance the development of additional methods, to facilitate greater consideration of concepts such as cumulative risk disparities.

EXPOSURE TO HEAVY METALS IN A HIGHLY INDUSTRIALIZED AREA

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Background and aims
The area under study is one of the more heavily industrialized in southern Spain, with a population of almost 250.000 people. Particularly, cadmium, nickel, and chromium are present in the industrial emissions particulate matter. Also, surveys show that population in the area perceives that is being strongly affected by the industrial activity. Moreover, this area is within a cluster of Spanish provinces showing systematically higher mortality rates

Methods
Subjects were a random representative sample of the 5 to 69 years old individuals residents in this area. A total of 432 subjects selected were residents in the different municipalities and neighbourhoods of the area, which are at different distances of industrial complexes. A urine sample was collected from participants as well as questionnaires for diet, socio-demographic characteristics, occupational exposures, and other individual level characteristics behaviors. Other variables considered were wind direction and speed, distance to industries, and distribution of air pollutants in the area, according to automatic monitoring stations and to diffusive passive samplers

Results
Urine concentrations (μg/ g de creatinine) ranged from 0,67-0,82 for nickel, 0,42-0,82 for nickel, and 0,33-0,35 for chromium. There were significant differences for Cd and Ni, but not for Cr. Also, no significant differences were found when using the 95th percentile. Several individual factors were associated with significantly higher urine concentrations of metals. Also, the effect of ecological variables were explored in the analysis, such as wind direction, distance to industrial sources, and other

Conclusions
Explanation for results are that differences in environmental exposures between areas are small, not homogeneously distributed according to time or space, and some individual characteristics may be not well assessed by the methodology employed. Environmental exposure to selected chemicals in the study area were of low magnitude and not different to urban settings in the region

ASSOCIATION BETWEEN STAPHYLOCOCCUS AUREUS IN THE HOME EVIRONMENT AND DECREASED LUNG FUNCTION IN ASTHMATIC CHILDREN IN BARBADOS

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Background and Aims. *Staphylococcus aureus,* a gram-positive bacterium, can survive in the environment for weeks to months. While asthma is a known risk factor for nasal colonization with methicillin-resistant *Staphylococcus aureus* (MRSA), less is understood about potential associations between *S. aureus* environmental exposure and asthma symptoms. We adapted culture methods for MRSA and methicillin-susceptible *S. aureus* (MSSA) to the household setting and estimated associations between measures of lung function in asthmatic children and household *S. aureus* environmental positivity.
Methods. We sampled surface dust from a subgroup of 19 children enrolled in a pilot childhood asthma study in Barbados during July 2010. Children and their families recorded twice-daily FEV_1 measures using a personal PIKO instrument for five days. Concurrently, we sampled a common room surface and the child's pillow in each home using sterilized dry electrostatic cloths, which we cultured using single-enrichment (MSSA) and double-enrichment (MRSA) protocols. We confirmed suspect *S. aureus* colonies by real-time PCR methods for *femA* (MSSA), and *mecA* (MRSA) gene presence.
Results. Eight of 19 households (42%) were positive for MSSA (4) or MRSA (4). Pillows were the location most often positive (7 of 8 households). Average child age was 11 years (range: 6-17). Mean FEV_1 was 1.60 [95%CI: 1.15-2.06], accounting for within-child correlation. *S. aureus* household positivity was associated with a 0.43 unit decrease in log FEV_1 measures in asthmatic children, controlling for within-child correlation of measurements over time ($p=0.02$). Age was a significant confounder and attenuated the estimate to a 0.20 unit decrease ($p=0.07$).
Conclusions. Among children with asthma in Barbados, *S. aureus* in the home environment was associated with lower lung function. While this study did not assess *S aureus* nasal colonization in asthmatic children, future research using a larger cohort to investigate the link between *S. aureus* exposure and asthma outcomes is warranted.

META-ANALYSIS OF EXCESS MORTALITY DURING HEAT WAVES AND COLD SPELLS IN FOUR CITIES IN RUSSIAN SUBARCTIC REGION

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Background and Aims: Circumpolar region presents particular interest for epidemiologists because it will experience the greatest climatic changes. Epidemiological study in a small town is difficult for a statistician because the daily mortality counts are small; they are not normally distributed and do not fit the independence assumption. We accounted for these difficulties and assessed the impacts of extreme temperature events on mortality rates in four sites within Russian subarctic region: Archangelsk, Murmansk, Yakutsk and Magadan), and then conducted a meta-analysis.

Methods: Long-term distributions of daily mean temperatures were analyzed for identification of heat waves and cold spells during the study period of 1999-2007 at each location. We investigated daily mortality from all non-accidental causes, coronary heart disease, strokes, respiratory diseases and all external causes among age groups 30-64 and 65+. Statistical analysis was done in two steps. In Step 1, site-specific estimates of relative increases in mortality were obtained. At each location, separately estimated mortality risks for 'short' waves (5 to 7 days) and 'long' waves (8 days and longer). During Step 2, we obtained pooled estimates of cause- and age-specific mortality risks, and conducted meta-analysis of all site-specific information.

Results: The relationship between cold and mortality is stronger than between heat and mortality. Greater increases in mortality were observed during long cold waves than during short cold waves, but for heat waves the opposite was true. Age group 65+ was more vulnerable to cold than age group 30-64; but no age-specific differences were observed during heat waves. All increase in non-accidental mortality during cold waves was attributed to cardiovascular causes. Relative increases in mortality from all external causes during heat waves were commensurable with these from brain strokes. The proposed methodology can give fairly robust results only in towns with populations greater than approximately 100,000.

EFFECT OF HEXAVALENT CHROMIUM ON PULMONARY FUNCTION IN CHILDREN

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Background and aims: CrVI (Hexavalent chromium) is a known carcinogen when inhaled. Little information is available on its possible association with PEFR (Peak Expiratory Flow Rate), FVC (Forced Vital Capacity), FEV_1 (Forced Expiratory Volume in 1 sec) and asthma related symptoms in children. The study aims to examine the association between children residing in Oinofyta, an industrial, highly contaminated with CrVI, region in Greece and asthma. The role of additional risk factors will be examined and quantified. Children in Oinofyta, could be exposed to CrVI through inhalation, oral consumption, bathing or contact with contaminated ground.

Methods: Two socioeconomically comparable cohorts of children (150 children each), one exposed to CrVI and a control group will be studied. Aspirometry will be performed in all members of the cohorts. PEFR, FVC and FEV_1 will be measured and cohorts' parents will be interviewed concerning children's respiratory health, demographic and household characteristics, parental occupation and indoor air pollutants (including smoking). The study has been approved by the University Ethics Committee and the Ministry of Education. All parents are asked to sign an informed consent.

Results: So far, 66 parents have been approached and all agreed to participate. 66 children were examined, 14 out of which (21%) had a subnormal spirometry, as demonstrated by reduced PEFR, FVC and FEV_1, while the prevalence of asthma in Greece has been recently reported to be 5-10%. Furthermore, 12 from the 56 (21%) parents that completed the interview stated that their children had at some point obstructive airway symptoms. These results represent only a small part of the study. We expect to complete examinations and interviews in both cohorts by July 2011.

Conclusion: So far, it appears that exposure to CrVI influences pulmonary function and causes asthma related symptoms in children.

UNDERSTANDING INTRA-NEIGHBORHOOD PATTERNS IN FINE PARTICULATE AIR POLLUTION USING MOBILE MONITORING IN BRADDOCK, PA

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Background and Aims: Braddock, Pennsylvania, in the eastern suburbs of Pittsburgh, lies in a valley adjacent to the Monongahela River. An economically distressed area, Braddock is home to the Edgar Thomson Steel Works, one of the few remaining active steel mills in Pittsburgh. Braddock exceeds both the average annual (>15 µg/m3) and daily (>35 µg/m^3) National Ambient Air Quality Standards (NAAQS) for particulate matter ($PM_{2.5}$), and is situated in a federal $PM_{2.5}$ non-attainment area.

Methods: A mobile monitoring design was used to explore the within-neighborhood spatial and temporal (within-day and between-day) variability in $PM_{2.5}$ and PM_{10}. Our sampling route consisting of 25 designated stops, of 3- to 5-minute intervals, sampled in summer and winter months, during morning and afternoon hours, in 2010-2011. Ambient weather data was obtained from Pittsburgh International Airport, and examined to identify inversion events.

Results: The $PM_{2.5}$ and PM_{10} mobile monitoring data display some spatial variation between stops, and substantial temporal variations across days. Concentrations also differed substantiailly between morning and afternoon runs. The $PM_{2.5}$/ PM_{10} ratio was generally high (0.8 to 1), suggesting a predominance of fresh combustion particles in our sampling area. For morning sampling runs, mean $PM_{2.5}$ concentrations ranged from 31 to 55 µg/m^3 (SD = 1.53 and 4.92 µg/m^3, respectively), and mean PM_{10} concentrations ranged from 30 to 70 µg/m^3 (SD = 1.64 and 7.68 µg/m^3, respectively). During summer months, afternoon concentrations were significantly lower than in the morning for both $PM_{2.5}$ and PM_{10}, owing to morning inversions in the river valley. During the winter, concentrations were generally lower than during summer, but showed lesser diurnal variability, with no inversion events.

Conclusions: These pilot data reveal significant diurnal and spatial variability in both $PM_{2.5}$ and PM_{10} concentrations within Braddock. Results will inform the design of a stationary monitoring network, to be implemented and maintained as part of a longitudinal study on childhood asthma exacerbation in Braddock.

DIFFERENCES IN AIR QUALITY PERCEPTION PATTERN BETWEEN INDUSTRIALISED AND URBAN AREAS IN SOUTHERN SPAIN, AND ITS RELATIONSHIP TO MODELLED AMBIENT NITROGEN DIOXIDE

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Background and aims: Annoyance due to environmental stressors impairs well-being, and is being recognised as an adverse health effect itself. This impact is meant to be greater in highly industrialised areas where the issue of outdoor air quality generates ongoing controversial debates. However, individual perception has not being always consistently related to actual central site measurements of air pollution. The objective of this study is to describe spatial pattern of public perception of air quality attending to characteristics of local settings (industrialised versus urban area), certain individual and social determinants, and its relationship to a GIS-based kriging nitrogen dioxide (NO_2) measurement.
Methods: Annoyance scores were extracted from a community health survey undertaken at the industrialised area of Gibraltar's surroundings (GS), based in population from Algeciras, La Línea, San Roque y Los Barrios (total n=360), and at the city of Seville (n=650). Respondents' exposure to NO_2 was estimated using a GIS-based kriging approach built over a passive diffusion tubes campaign. The associations were examined using multivariate logistic regression.
Results: The concentration (mean, standard deviation) of NO_2 in the GS (29.55, 5.39 $\mu g/m^3$) was significantly ($p< 0.05$) higher than in the city of Seville (28.29, 2.53 $\mu g/m^3$). Similar trend showed findings related to public air quality perception, with significantly ($p< 0.05$) greater concern among citizens from GS (71.35%) than those from Seville (30.05%). However, the relationship between public perception scores and NO_2 levels showed a very different pattern in the urban area of Seville (positively related) than in the industrialised setting of GC.
Conclusions: Personal and socio-demographic determinants of public air quality perception needs to be addressed independently depending on the local settings characteristics.

PRINCIPLES OF COMMUNITY- BASED PARTICIPATORY RESEARCH IN ENVIRONMENTAL CHILDHOOD RURAL ASTHMA INTERVENTION

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Background: The community groups served by Hawaii's Community Health Centers (CHCs) closely reflect the socio-demographic profile of those adversely affected by asthma in the state of Hawaii.
Methods: CDC-funded Childhood Rural Asthma Project, Phase V, coordinated by Hawaii Department of Health and Hawaii Primary Care Association, covered administrative district areas of Koolauloa and Waianae on Oahu, and Kona on Big Island, Hawaii. The total number of 89 children, with previous physician diagnosed asthma (ICD-9 493.00-493.99), were recruited by local CHCs in 2009-2010. The standardized logic program evaluation model based on one-group pre- and post-assessment of longitudinal in-home environmental and educational interventions was used to develop and to measure the program performance and outcome indicators.
Results: The data analysis revealed statistically significant change in pre- and post program outcome indicators, including increased competency, knowledge and skills on environmental triggers, clinical symptoms and treatment, and self-management of asthma; and reduced number of asthma symptoms, asthma-related physician and ER visits, and missed school days.
Conclusions: Sustainable long-term partnership between local community health organizations and community is a core element of community-based participatory research designed to address current health disparities and also to reduce the burden of childhood asthma in the state of Hawaii.

ESTIMATION OF THE OVERALL EFFECT OF PM10 ON HOSPITAL ADMISSIONS FOR RESPIRATORY DISEASES IN NINE CITIES IN THE METROPOLITAN REGION OF SÃO PAULO (MRSP), BRAZIL

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Background and aims: The MRSP has 39 municipalities in an area of 7.9 km2 and a population of 19.7 million inhabitants. This area has 22 air monitoring stations of air quality that measures PM10 across 9 cities. In these cities was conducted time series study to evaluate the impact of PM10 on hospital admissions for respiratory diseases and meta-analysis was performed for overall risk assessment for PM10 in the region to estimate the global risk.
Methods: Cities specific analyses were carried out using a common framework. The library ARES developed for R application was used to analyze the relation between admissions for respiratory illnesses and PM10. This analysis was done in generalized additive models Poisson regression. The models accounted for seasonality, secular trends and climate in the analysis of each city. City specific estimates were summarized by means of a meta-analysis.
Results: It was found positive and significant association between respiratory disease and PM10 in seven cities. The random effect estimates for respiratory disease and PM10 for the nine cities was 1.33% [95%IC 0.53; 2.14] change for 10 $\mu g/m^3$.
Conclusions: It was found overall significant risk for respiratory diseases and PM10 in the selected municipalities of the MRSP.

ENVIRONMENTAL FACTORS AND NON-HODGKIN'S LYMPHOMA IN DOGS: a survey.

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Background and Aims: Lymphomas are hematopoietic malignancies originating from lymphoid cells. According to literature, lymphoma in dogs is similar to non-Hodgkin lymphoma in humans. Some studies show that environmental factors increase the risk of developing lymphoma. This study investigated the correlation between environmental factors and the risk of developing lymphoma in dogs through an epidemiological survey applied to their owners.
Methods: An epidemiological survey was applied to 167 dog owners, corresponding to 84 control cases and 83 dogs diagnosed with Non-Hodgkin lymphoma. Cases and controls were collected in 5 different veterinary hospitals in the city of São Paulo, Brazil. The survey retrieved information about possible environmental contaminants such as passive smoking, contact with pesticides and herbicides and physical, chemical and biological contaminants in water, air and soil.
Results: Statistical analysis showed that dogs with a defined breed had a higher number of representatives with lymphoma when compared to mongrel dogs; multicentric form and stage 4 were the most observed and there was no sexual predisposition. Animals weighing more than 10 kg, living outdoors and close to an important avenue in the city of São Paulo (10 to 20 thousand vehicles and 1 to 1.3 thousand motorcycle per hour) had a higher risk for disease development (OR: 3.8, 95% CI: 1.8 - 8.0, $p < 0.001$ / OR : 3.7, 95% CI: 1.7 - 8.0, $p = 0.001$, respectively).
Conclusions: These results suggest that environmental factors, such as air pollution, may increase the risk for developing canine lymphoma. Further studies are necessary to quantify pollutants in the environment and biomarkers in dogs, in order to better answer this hypothesis.

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CHARACTERIZATION OF CHILDHOOD ASTHMA IN BARBADOS FROM A PILOT STUDY OF ENVIRONMENTAL RISK FACTORS

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Background and Aims: Recent global climate changes have been accompanied by an increase in asthma prevalence in Barbados, particularly among children. While changes in air quality and lifestyle likely contribute to disease burden, there is little published data about the asthma health of this population. We characterized the respiratory health of children with asthma in Barbados with the aim of relating their morbidity to potential environmental risks.
Methods: Twenty-six children with physician-diagnosed asthma were enrolled in a study investigating the impact of air quality on asthma health. Validated questionnaires (adapted from pediatric ATAQ, CHSA, PAQLQ) to measure asthma control, asthma-specific health status and quality of life were administered. Daily activity and symptom diaries were also completed.
Results: The mean age of subjects was 10 years (range 5-16) and the majority were boys (20/26). Although most children were on controller therapy with inhaled corticosteroids (23/26), subjects reported a median of 2.5 days (IQR 0-6) of respiratory symptoms (wheeze, cough, chest tightness), and 2.0 nights (IQR 1-2) of symptoms in the last 2 weeks. Symptoms of cough, in the absence of a cold, occurred for 2 out of 14 days. In this cohort, health care utilization was predominated by acute care facilities, with 46% reporting A&E visits and 39% needing overnight hospitalizations in a 3 month period; in contrast, only 15% sought care at a physician's office. Children were found to spend most of their day indoors; however second-hand smoke exposure was noted to be very rare.
Conclusions: Barbadian children suffer significant morbidity from their asthma, requiring frequent visits to acute care facilities, despite the use of controller medications. Future work is needed to identify triggers in the indoor and outdoor environments that could contribute to high disease burden and ways to shift acute care visits to the primary care setting.
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Background:

Knowledge of health risks associated to transport (air pollution, noise, injuries and physical inactivity) indicates that substantial health co-benefits are expected from low-carbon transport policies.

There is dearth of comparative analyses of health co-benefits from policies currently prescribed to reduce climate change in transport.

This limits policy makers' ability to chose among options benefiting health most, and of research bodies to extend knowledge in this domain.

Methods

WHO reviewed evidence on health impacts of recommendations on climate change mitigation for transport in the IPCC .Fourth Assessment Report, including:

- modified vehicles and fuels;
- land use factors;
- non-motorized transport or public transport.

Health impacts from those policies were classified as negative, insignificant or positive. The strength of evidence used in this analysis was judged as weak, strong or no evidence.

Results

When health is considered, the best transport interventions reviewed by the IPCC are travel mode shifts. This differs from the present emphasis on technological improvements in vehicles and fuels provided in the IPCC report.

There is also emerging evidence on how transport policies improve physical activity and related health outcomes:

- Active travel policies were associated with increased physical activity, reduced obesity and BMI.
- Public transport was associated with increased physical activity, less obesity and lower risk of road traffic injury.
- Increased car use was associated with less physical activity and more obesity.

Discussion

There is emerging research into the health impacts of actual transport interventions. Results from these studies allow health actors to advise on which transport policy options (among those being considered by panels such as the IPCC) are best for health. A new research agenda is proposed, directed at assessing the health performance of interventions in transport to mitigate climate change.

Gestational Mutations and Carcinogenesis

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Background and Aims: We present a mathematical formulation to evaluate the effects of gestational mutations on cancer risk.
Methods: The hazard or incidence function of cancer is expressed in terms of the Probability Generating Function (PGF) of the number of normal and mutated cells at birth. Using Filtered Poisson Process Theory, we obtain the PGF for several mechanistic models for the accumulation of gestational mutations. In particular, we develop expressions for the hazard function when one or two successive mutations could occur during gestation. We also calculate the hazard when the background gestational mutation rates are increased due to exposure to mutagens, such as prenatal radiation.
Results: To illustrate the use of our models, we apply them to colorectal cancer in the SEER database. We find that the proportion of cancer risk attributable to developmental mutations depends on age and that it could be quite significant when gestational mutation rates are high. The analysis of the SEER data also shows that gestational mutations could contribute to inter-individual variations in colorectal cancer risk.
Conclusions: Gestational mutations could have substantial impact on cancer risk if mutation rates are significant. Spontaneous mutations during gestation may be responsible for some of the heterogeneity of cancer risk in human populations. Our methodology can be used to estimate the effects of mutagen exposure during gestation on cancer risk. For adult onset cancers the largest risk of gestational exposure to mutagens appears to be conferred by exposure late during pregnancy.
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VALIDATION METHODOLOGY TO DETERMINE ETILENTIOUREA IN FILTER-PAPER DRIED UREA SPOT

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Background and Aims: Ethylenebisdithiocarbamates (EBDTCs) is used to eliminate pelages in the agriculture. Nevertheless, it is mixed with its metabolite Ethylenethiourea (ETU). The International Agency for Research in Cancer has evaluated the carcinogenic risk of ethylene thiourea
(ETU) to man and classified it as an antithyroid substance and as a suspect carcinogen, since this type of substance is believed to induce thyroid tumours through the suppression of thyroxin synthesis leading to hyperplasia of the thyroid gland.The methods utilized in its determination have high cost and monitored is restrictive; because is necessary major volume of sample, transport and storage. So is necessary to adapt a method for diagnostic more efficient.
To validity a methodology for the detection of ETU in sample in filter-paper dried urea spot.
Methods: 5 ml test tube with 2mL of urine adds 1 ml of water. The sample is keep ultrasonic-treated in water-bath for 60 min Later is mixed for 20 min a shaker it is filtered, evaporated to dryness and reconstituted with 100µL to water and injected to the chromatograph of liquids
Results: The limit of detection in samples liquidate (water and urine) was of 10µg/ml, we established curve of calibration with the concentrations 10, 20, 50, and 100µg/ml, of that one was obtained r2=0.94 of in water, and r2 = 0.87, in urine. The second phase is to embed samples of 2 ml of urine on filter paper to do the same extraction procedure in the process
Conclusion: The methodology in sample of desiccated in paper filter, resulted more efficient in the detection of ETU in urine human. Because, it methodology dimities cost and volume of sample. It assay could be used as environmental screening infantile, for detection of pesticides and it evaluate as endocrine disruptor and probable effect risk to the health.

THE ASSOCIATION BETWEEN EXPOSURE TO FINE PARTICULATE MATTER ($PM_{2.5}$) AND ADMISSIONS FOR ACUTE MYOCARDIAL INFARCTION IS MODIFIED BY COMORBID CONDITIONS IN SANTIAGO, CHILE

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On Behalf of the National Registry of Myocardial Infarction (GEMI) group.

Background and Aims: The association between acute myocardial infarction (MI) and particulate matter fine (PM2.5) is well-documented. However, it is interesting to understand better the role of comorbid conditions on susceptibility to MI. Thus, the study aim was to assess whether the association between exposure to PM2.5 and MI is modified by comorbid conditions such as diabetes mellitus, hypertension, hyperlipidemia, or obesity..

Methods: Medical records of MI patients were obtained from four hospitals of the GEMI Registry in Santiago, Chile (2002-2007). PM2.5 and meteorological variables were obtained from the MACAM monitoring network. A time-stratified case-crossover design was used to examine the association between PM2.5 and MI, controlling for temperature and dew point using natural splines. We estimated the effect separately among patients with comorbid (diabetes mellitus, hypertension, hyperlipidemia, and obesity) or total cholesterol level on admission (stratified by high ≥200mg/dL, and normal <200mg/dL). Lag and moving averages were considered.

Results: 3,176 MI patients were included (62 ± 13 years old). A 10 µg/m3 increase in PM2.5 levels was associated with increased admissions of MI patients with *diabetes mellitus* (9.0% (95%CI: 0.9-17.7%), 1-day moving average), with *hyperlipidemia* (9.1% (95%CI:0.7-18.1%), 3-day moving average to a 9.7% (95%CI:0.8-19.5%), 4-day moving average), with both *diabetes mellitus and hyperlipidemia* (18.2% (95%CI: 5.6-32.2%), 0-day lag), with *high-cholesterol levels* (11.1% (95%CI:1.3-21.7%), 4-day moving average to a 12.0% (95%CI:0.2-25.1%), 7-day moving average); and with both *hyperlipidemia and high-cholesterol levels* (13.5% (95%CI:0.3-28.5%), 3-day moving average to a 16.1% (95%CI:1.3-32.9%), 4-day moving average). No significant association was observed for MI patients with hypertension or obesity or normal cholesterol.

Conclusions: These results suggest that the association between exposure to PM2.5 and admissions for MI, is modified by comorbid conditions. Those at greater risk are patients with diabetes mellitus, hyperlipidemia or with high-cholesterol levels, thus are especially susceptible groups in Santiago, Chile.

PREVALENCE OF RESPIRATORY DISEASES AND ENVIRONMENTAL FACTORS IN THE CHILDREN IN CUIABÁ, SOUTHERN BRAZILIAN AMAZON

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Background and aim: Respiratory diseases are the main causes of child morbidity and mortality. The aim of this study is to analyze the prevalence of respiratory diseases, as well to identify domiciliary environmental risk factors in younger than 5 years, residents in Cuiabá, Brazilian Amazon.
Methods: Cross-sectional study was carried out by 700 children sampled in the 653 territorial divisions by census tracts in Cuiabá. This city is located in the Brazilian Amazon and presents an important seasonal variation of humidity and high levels of exposure to air pollutants and temperature. The study includes variables on the children's health and socio economic status, characteristics of pregnancy and birth. The dependent variable included children with presence of respiratory symptoms during two weeks before the interview that represents the current moment.
Results: The prevalence of respiratory diseases represents 57% in the study group. The maternal alcoholism (CAGE positive) shoed to be statistically associated with the occurrence de respiratory diseases ($\rho = 0.06$). The size of house smaller than 30 m² was associated to the prevalence of respiratory diseases ($\rho = 0.00$). Children with normal ($\rho = 0.049$) or precarious ($\rho = 0.008$) hygiene of the home environment showed higher probability to have symptoms of respiratory diseases.
Conclusion: The prevalence of respiratory diseases was approximately 2/3 of the children living in Cuiabá, which are associated to the conditions of the domiciliary environment.
Keywords: Respiratory Diseases, Prevalence, Environmental Factors

SOME APPROACHES TO MULTI-POLLUTANT EPIDEMIOLOGY: PRODUCTS OF COAL COMBUSTION AND SMELTER OPERATION, PRODUCTS OF INTERNAL COMBUSTION ENGINES, AND SOURCE CATEGORY CONTRIBUTIONS

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Background and Aims: Due to current interest in multi-pollutant approaches to various aspects of air pollution, pollutant concentrations in Phoenix, AZ (1995-1998) have been analyzed for associations with cardiovascular mortality. Both the ability to determine accurately the independent effects of single pollutants and to estimate the joint effects of groups of pollutants are considered.
Methods: A priori regression models were used based on previous analyses conducted in Phoenix. Subsequent sensitivity analyses give changes in beta from varying model parameters and thus an indication of the reliability of model results.
Results: As, Se, Hg, and Sulfate are poorly correlated at the Phoenix measurement site. The joint effect (by including concentrations of all pollutants in a joint statistical model) gives a total beta very close to the sum of the individual pollutant betas. Therefore, betas for individual pollutants are meaningful and relative toxicities can be estimated. NO2, CO, and EC are highly correlated. The sum of the betas from a joint model is about equal to the largest single pollutant beta. Thus, it is difficult to obtain reliable betas for individual pollutants, only for their joint effect. Because of the high correlation between many pollutants, statistical models were used to produce poorly correlated factors which can often be associated with source categories (Source Category Models). Individual and joint results for factors from two such models are reported in interquartile range (IQR) units.
Conclusions: It is difficult to estimate individual for highly correlated pollutants. Regression models using poorly correlated factors from Source Category Models (each factor including multiple pollutants) provide suggestions regarding the relative toxicity of source categories. Joint models using source categories yield an indication of the total effects of all identifiedsources acting jointly. (In making this presentation, Dr. Wilson is representing himself.)

EXPOSURE TO HERBICIDES IN HOUSE DUST AND RISK OF CHILDHOOD LEUKEMIA

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Background and Aims: Previous studies investigating the risk of childhood leukemia in relation to self-reported use of herbicides have produced mixed results. We measured herbicide concentrations in house dust–a reservoir for household chemicals--to estimate the association of childhood acute lymphoblastic leukemia (ALL) with exposure to these compounds.

Methods: A total of 269 ALL cases and 333 healthy controls (<8 years of age at diagnosis/reference date and residentially stable) from a case-control study in California (2001-2007) received a second interview with collection of carpet dust samples. Dust samples were obtained using a high-volume surface sampler or from the household vacuum cleaner. Herbicides were selected for analysis based on frequency of use in California and feasibility of laboratory quantification and included agricultural herbicides (alachlor, bromoxynil, simazine, and pendimethalin) and lawn and garden herbicides (trifluralin, MCPA, MCPP, 2,4-D, dacthal, and dicamba). Odds ratios (OR) and 95% confidence intervals (CI) were estimated using logistic regression. Models included log-transformed concentrations for herbicides detected in at least 50% of homes or binary variables (detect/non-detect) for herbicides detected in 5% to <50% of homes. All models included child's age, sex, race/ethnicity, household income, year and season of dust sampling, residence location (urban, suburban, rural), and residence type.

Results: Simazine, 2,4-D, and MCPP were the most prevalent herbicides (84%, 84%, and 73% detections, respectively). Dacthal was detected in 40% of case homes vs. 31% of control homes (OR=1.47, 95% CI 1.01, 2.14). Increasing dacthal concentrations were associated with a positive trend in risk among non-Hispanics but not other racial/ethnic groups. No other herbicides were associated with ALL risk.

Conclusions: In non-Hispanics, we observed increased risk of ALL associated with household exposure to dacthal, but no associations for other herbicides. A strength of this study is the use of household dust samples to estimate exposure to specific herbicides rather than self-reports.

THE OCCURENCE OF RESIDUAL ORGANOCHLORINE AND ORGANOPHOSPHORUS PESTICIDES IN THE AGRICULTURAL REGION OF TALTIZAPÁN, MORELOS IN MÉXICO

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Background and Aims: The presence of residual organochlorine and organophosphorus pesticides in agricultural soil and water samples from Tlaltizapan, state of Morelos, México at different periods of the sugar cane cultivation cycle was evaluated.
Methods: There were performed three monitoring of soil and water samples within an area of approximately of 63 Km ², the sampling were conducted in November 2208, November 2009 and April 2010.
Results The metabolite p,p´-DDE, γ-HCH, p,p-DDD and heptachlor were found in more of 95% of the sampling zones in the three monitoring performed along 2 years. The highest concentration detected (129.6 µg kg-1dry soil) was for α-HCH but its frequency of detection was ~5%. The low-detection frequency of α-HCH and the high-concentration values of γ-HCH indicate the repeated use of technical-grade HCH and Lindane (γ-HCH) in the region. Among the organophosphorus pesticides, the ethyl parathion was the compound with the highest soil concentration, ~2000 µg kg-1dry soil in first monitoring. However, this compound was detected in the second monitoring in a concentration of ~4 µg kg-1dry soil and it was not detected in the third one, indicating that is not accumulated in the environment. The heptachlor was the compound most commonly found in all water samples, in a range of 0.45-1.25 ng L-1.
Conclusions: The presence of this organochlorine compound in water samples indicates a possible migration from soil to water bodies due to soil erosion. There was not detected the presence of organophosphorus compounds in water samples; this can be attributed to the moderate persistence of these compounds and their consequent degradation before arriving the water bodies.

HIERARCHICAL APPROACH OF FACTORS RELATED TO INCOME, HOME ENVIRONMENT AND OCCURRENCE OF ASTHMA IN ALTA FLORESTA – BRAZILIAN AMAZON

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Background and aim: Asthma is the most prevalent chronic disease in childhood. The aim of this study is to analyze the influence of factors related to income, home environment and occurrence of asthma among students.
Method: Cross-sectional study using hierarchical approach of determinants of asthma among students residents in Alta Floresta, Brazilian Amazon. A questionnaire with information about the socio economic level, the living conditions and the health status was applied. Questions of the International Study of Asthma and Allergies in Childhood were applied. The variables were clustered in three levels: distal (socio economic variables), intermediate (smoking and the parent's educational level) and proximal (the student's characteristics).
Results: After the adjustment to the distal level the following variables presented statistically significance: Students living in houses with only one room (OR = 3.68; CI 95%: 1.34-10.10) and with missing waste disposal (OR = 2.43; CI 95%: 1.26-4.67). On the intermediate level mothers smoking during pregnancy (OR = 3.58; IC 95%: 1.47-11.30), even after the adjustment by variables of the distal level.
Conclusion: The occurence of asthma among children living in Alta Floresta is associated to the characteristics of the home environment and the environmental conditions to which the children are exposed.

Key-words: Asthma; Risk Factors, Environmental Variables

DISTANCE TO ROADWAY AND LONG-TERM SURVIVAL FROM ACUTE MYOCARDIAL INFARCTION

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Background and Aims: The relationship between exposure to traffic-related air pollution and long-term survival from myocardial infarction (MI) has not been thoroughly investigated. We investigated the association between distance between residence and major roadway and 10-year all-cause mortality after MI in the Determinants of MI Onset Study (Onset Study), hypothesizing that living closer to a major roadway at the time of MI would be associated with increased risk of mortality.
Methods: The Onset Study enrolled 3886 individuals hospitalized for MI in 64 centers across the United States from 1989-1996. Institutionalized patients, those providing only Post Office Boxes, and those whose addresses could not be geocoded were excluded, leaving 3263 patients eligible for analysis. Addresses were geocoded and the distance to the nearest A1/A2 roadway was assigned and dichotomized to > 100m or ≤100m, based on previous studies. All patients were followed for mortality through 2007. We used Cox regression to calculate hazard ratios (HRs) after 10 years of follow-up, adjusting for personal characteristics (age, sex, race, educational attainment, marital status, smoking, body mass index, comorbidities, medications), neighborhood-level characteristics derived from US Census block group data (median income, education, urbanicity), and clinical characteristics at the time of MI (thrombolysis, peak CK, development of CHF and/or ventricular tachycardia).
Results: There were 941 deaths at 10 years of follow-up. In crude analyses, living within 100m of a major roadway was associated with an HR of 1.35 (95% confidence interval [CI] 1.07, 1.70). In fully adjusted analyses the HR was 1.26 (95% CI 0.99, 1.60).
Conclusions: In this group of survivors of acute MI from across the United States, living close to a major roadway at the time of MI was associated with increased risk of all-cause 10-year mortality; this relationship persisted but lost statistical significance even after adjusting for individual and neighborhood-level covariates.

Title: BREAST CANCER INCIDENCE IS RELATED TO URANIUM PARTICULATE EXPOSURE IN A POPOULATION LIVING NEAR A URANIUM REFINERY

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Background and Aims: Ionizing radiation has been recognized as a risk factor for breast cancer in humans, but recently studies of mammary cell lines have noted that the heavy metals cadmium and uranium seem to exhibit estrogenic activity. We examined data from a longitudinal cohort to determine if breast cancer incidence was related to exposure to uranium and radiation in a population residing around the Feed Materials Production Center (FMPC), a uranium refinery in Fernald, Ohio.
Methods: The FMPC was part of the US Department of Energy (DOE) nuclear weapons complex, and produced uranium metal products from 1952-1989, with releases of soluble and insoluble uranium and ionizing radiation. The US Centers for Disease Control and Prevention (CDC) developed dose estimation models for exposures to individuals who lived within a 5-mile radius from the perimeter of the plant. We used these algorithms to estimate exposure for 4823 women enrolled in the Fernald Medical Monitoring Program (FMMP), of whom 184 were diagnosed with breast cancer during the 18 year tenure of the FMMP (1990–2008), and conducted life-table analyses, with appropriate covariates (age, family history of breast cancer, parity, age at first birth), to determine the relationship between uranium/radiation exposure and breast cancer incidence.
Results: The mean value of the uranium particulate exposure (ug/m^3-years) for women in the three exposure groups was 0.086, 0.354, 1.596, and for cases was 0.738 vs. 0.614 for controls. The risk of breast cancer in the highest exposure group compared to baseline was significantly elevated (HR=1.55, 95% CI 1.12, 2.15). In the subgroup with age at first exposure ≤15 years the HR for the highest exposure group was 4.56 (1.93, 10.77).
Conclusions: For women living within five miles of a uranium processing plant, degree of exposure to uranium particulates was related to risk of incident breast cancer.

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THE PARTICIPATORY DESIGN OF EXPOSURE ASSESSMENT APPARATUS

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Background and Aims: Sensor-equipped phones, handheld monitors, and instrumented bicycles are just three examples of the diverse forms of personal and microenvironmental monitoring equipment that could emerge from advances in increasingly affordable, digital, and real-time measurement technologies. Who participates in the design of this emerging set of technologies, how, and what effect does it have on exposure assessment and environmental health? What benefits could emerge from involving research participants more extensively in the design of instrumentation, as well as its staging and operation? What systematic approaches can guide broader participation in this activity? We present a process-oriented framework and method for eliciting and thinking through these problems as well as reflections and lessons learned.
Methods and Materials: We review the Participatory Design (PD) framework, a well-established tradition of theory and method for the user-centered design of persuasive digital technologies (Davis 2009), as well as recent case studies in community-oriented PD (DiSalvo 2008) and citizen sensing (Willett 2010, Dutta 2009). We extend the contributions of this work by describing an iterative, workshop-oriented approach for the participatory design of exposure assessment apparatus. Relying on small-group sketching and description, as well as intensive rapid prototyping, the method results in the construction of functioning artefacts as well as stories and demonstrations.
Results: Using commercially available, open-source components, we were able to construct several artefacts within a series of six workshops spread over three months. We identified four areas for future work to streamline and increase the value of such activity for exposure assessment stakeholders: (1) benchmarking and response characterization of low-cost, off-the shelf sensors; (2) modularization of components identified and described in multiple artefacts; (3) curricula and analytical techniques guiding the use and interpretation of measurements obtained from such artefacts; and (4) collaboration with the emerging maker and hacker subculture, from whom we drew examples, materials, and inspiration.
Conclusions: Low-cost and do-it-yourself (DIY) sensing platforms may offer innovative ways for professionals and non-professionals to expand participation by cooperating on the design of exposure assessment instrumentation. Workshop methods are time-intensive and require dedicated involvement from scientists, designers, and engineers; however, this might be ameliorated. Further exploration of the potential for Participatory Design methods in exposure assessment is warranted.

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CHLORINATION DISINFECTION BY-PRODUCTS IN CANADIAN DRINKING WATER AND BRAIN CANCER RISK

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Background and Aims: The etiology of brain cancers remains poorly understood. The studyof brain cancer and chlorination disinfection by-products (CDBPs) in drinking water with the best exposure assessment suggested increased risk of brain cancer associated with long-term exposure to CDBPs. Our aim was to replicate this high-quality study in Canada.
Methods: We conducted a population-based case-control study of 1009 incident cases of primary brain cancer and 5039 controls in eight Canadian provinces to assess the impact of chlorination disinfection by-products in Canadian drinking water on brain cancer risk. Mailed questionnaires were used to collect a lifetime residential history, source of drinking water, and other risk factors. We estimated the exposure to chlorination by-products in drinking water by combining questionnaire data with historical data on by-products levels for more than 600 water treatment plants. We included 684 cases and 3805 controls in the analysiswho had exposure information for at least 70% of the period 5 to 45 years period prior to interview.
Results: Risk was not related to lifetime average trihalomethane (THM) levels or years of exposure to THMs or to higher levels or longer duration of exposure to bromodichloromethane (BDCM). We observed no association with more years of exposure to THM at 3 levels: THM>20, >40 and >60 µg/l. The results for women and men were similar to that for both genders combined. Stratified analyses by histology subtype of brain cancer did not demonstrate any consistent relationship of brain cancer risk with either exposure to higher levels of THM or DBCM, or longer years of exposure to THM or DBCM, although increased risk was observed for some categories of exposure years for glioblastoma and astrocytoma tumors.
Conclusions: Our study does not support the hypothesis that chlorination disinfection by-products play a significant role in the etiology of brain cancer.

ASSOCIACTION BETWEEN AIRBORNE POLLEN AND ASTHMA EMERGENCY ROOM ADMISSIONS DURING SAHARAN DUST INTRUSIONS

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Background and Aims: A previous study reported larger mortality risk during Saharan dust days compared to non-Saharan dust days in Barcelona, Spain (Perez et al. 2008). No studies are available of potential interaction effects of Saharan dust with other environmental risk factors of natural origin on human health. Our objective is to investigate if the risk of asthma morbidity due to airborne pollen concentrations increases during Saharan dust outbreaks.
Methods: Data were collected on the daily number of asthma emergency room admissions, mean daily concentrations of the major pollen types with allergenic capacity: *Olea*, *Plantago*, Poaceae and Urticaceae, and Saharan dust intrusions from 2005 to 2007. Changes of effects between Saharan and non-Saharan dust days were assessed using Poisson regression models, adjusting for trend and seasonality and meteorological variables.
Results: During non-Saharan days the strongest associations for pollen types ranged from a lag of 2 to 6 days and showing risks of asthma lower than 2.5%, for an increase of 1 pollen grain/m^3. In the course of Saharan outbreaks the lagged effect of pollen types was shorter, of 1 day for all pollen types, and the risk of asthma much higher: 6% for Urticaceae, 13% for Poaceae, 16% for *Olea*, and 35% for *Plantago*, although estimates were only statistically significant ($p<0.05$) for Poaceae and *Plantago*.
Conclusions: Saharan dust outbreaks have strong acute respiratory effects. Further investigations are needed to understand the mechanisms that explain these observations.
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EFFECT OF PARTICLES ON DAILY CAUSE-SPECIFIC MORTALITY IN AN URBAN ENVIRONMENT WITH SAHARAN DUST INTRUSIONS

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Background and Aims: Winds from the Sahara desert transport large amounts of dust to Spain. The presence of high dust concentrations for long periods of time, and the interaction between dust and air pollution, raise concerns about adverse health effects and appropriate interventions by health authorities.
Methods: We investigated the short-term effects of particles (PM2.5 and coarse fraction (PM10-PM2.5)) on cause-specific daily mortality (circulatory, respiratory and cerebrovascular causes) in the city of Madrid (Spain), during days with and without Saharan dust intrusions, between January 2003 and December 2005. Changes of effects between Saharan and non-Saharan dust days were assessed using a time-stratified case-crossover design.
Results: During Saharan dust intrusion days an increase of 10 µg/m3 in the coarse fraction increased daily mortality by respiratory causes by 7.5% (95% confidence interval = 0.1% to 15%), with a lag of 3 days. In contrast, during non-Saharan dust intrusion days an increase of 10 µg/m3 in PM2.5 increased daily mortality for circulatory causes by 3.5% (0.1% to 7%) with a lag of 2 days. No effects of particles were found for cerebrovascular mortality.
Conclusions: Saharan dust outbreaks may have adverse health effects. Further investigation is needed to understand the role of fine particles and the mechanism by which Saharan dust could increase respiratory-specific mortality. In spite of that current air guidelines should be revised for Mediterranean cities with Saharan dust intrusions.

INDOOR PARTICULATE MATTER CONCENTRATIONS ARE HIGHER DURING AFRICAN DUST SEASON IN HOMES OF CHILDREN WITH ASTHMA IN BARBADOS

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Background and Aims: Childhood asthma is a significant public health problem in Barbados and air quality may be a contributing factor. Ambient particulate matter (PM) concentrations in Barbados are influenced by seasonal global transport of African dust plumes. Ambient and indoor concentrations can negatively impact respiratory health in susceptible populations. In a panel study to demonstrate feasibility of assessing asthma and the relationship to African dust exposure, PM was measured in homes of asthmatic children in Barbados during 2 seasons: low African dust (season 1) and high African dust (season 2).
Methods: Twenty-six asthmatic children in Barbados were studied for 5 days, January-February 2010 (season 1), and 19 children completed a second 5-day monitoring period in July 2010 (season 2). Home indoor environmental monitoring set-ups collected integrated PM samples and passive second-hand smoke/nicotine (SHS) for 5 days. Children completed daily lung function testing during the study period.
Results: Indoor $PM_{2.5}$ and PM_{10} concentrations were 26 and 21% higher during season 2 than season 1 (8.3 ± 3.2 versus 11.2 ± 5.7 ug/m^3, p=0.04 for $PM_{2.5}$ and 26.5 ± 10.0 versus 33.0 ± 11.4 ug/m^3, p=0.03 for PM_{10}, respectively). Increases in log$PM_{2.5}$ and logPM_{10} tended to be associated with decreases in percent-predicted FEV_1 (p=0.06 and p=0.16 respectively). Most SHS samples (78%) were below the LOD; those >LOD were low concentrations (0.007 - 0.1 ug/m^3).
Conclusions: To our knowledge, this is the first study to measure the relationship between African dust and indoor home environments in Barbados. Indoor PM concentrations in homes of asthmatic children were significantly higher during the African dust season and increases in PM were linked to decreased percent-predicted FEV_1. The findings of this pilot study support the need for research investigating effects of global transport of African dust on respiratory health in Barbados and other affected geographic locations.

LONG-TERM EXPOSURE TO AIR POLLUTION FROM TRAFFIC IN EUROPEAN CITIES IN RELATION TO PREGNANCY OUTCOME AS WELL AS AIRWAY DISEASE AND COGNITIVE FUNCTION IN CHILDREN: THE ESCAPE STUDY

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Background and Aims: Work package 3 of the European multicenter ESCAPE project focuses on quantitative assessment of the impact of ambient air pollution on adverse pregnancy outcomes (aim 1), development of asthma, sensitization, lung function and respiratory infections in children during the first twelve years of life (aim 2), and cognitive function development in children up to five years of age (aim 3). Biomarkers are used to assess some phenotypes, particularly with regard to allergy and sensitization.
Methods: A total of 18 birth cohorts are included from different parts of Europe, as well as Taiwan and Australia. All participating cohorts assessed the spatial variability of specific air pollution components within their communities based on the ESCAPE exposure protocol. City-specific analyses with subsequent combined analyses are performed as well as pooled analyses for some outcomes.
Results: A different set of cohorts is included for each specific aim. Thirteen cohorts contribute to aim 1 with 77,600 participants, 13 cohorts to aim 2 with 54,600 participants, and 6 cohorts to aim 3 with 18,500 participants. For aim 2 separate analyses are performed in the five oldest birth cohorts, including more than 18,000 children, and results will be presented at the ISEE conference.
Conclusions: The project adds to the existing knowledge on the impact of ambient air pollution on adverse pregnancy outcomes, childhood airway disease and cognitive function development. In particular, it is envisaged that the results will serve as a basis for estimation of exposure-response relationships and contribute to an understanding of the role of specific air pollution components.

PARTICIPANT EXPERIENCE IN THE U.S. NATIONAL CHILDREN'S STUDY, SALT LAKE COUNTY VANGUARD CENTER

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Background and Aims: Participant retention is important to the success of the population-based U.S. National Children's Study (NCS). In order to determine motivators and barriers to participation, participants are asked to complete a self-administered questionnaire about experience in the study. We report on responses from English- and Spanish-speaking participants in Salt Lake County Vanguard Center.
Methods: Study data collection visits to participants' homes occurred during the 1st and 3rd trimesters of pregnancy, and included biological and environmental sample collection, anthropometrics and questionnaires. We summarized results of self-administered Participant Evaluation Questionnaires on which women were asked to rate the importance of factors in their decision to take part in the study and to describe their study experience on a scale from mostly negative to mostly positive.
Results : In-home study visits with multiple modes of data collection typically were 2 to 3 hours duration in the Vanguard phase of the NCS. Among early participants who had completed two study visits, factors rated highest as contributors to a decision to take part in the study included "feeling as if I can help children now and in the future," identified as very important by 62 of 69 (93%), and "helping doctors and researchers learn more about children and their health," rated as very important by 64 of 69 (96%). 55 of 69 (83%) participants rated their experience with the National Children's Study as mostly positive. When asked which study activities participants liked the most, 23 participants mentioned an ultrasound.
Conclusions: Despite the significant time commitment, study participants who complete a first study visit are very likely to be retained in the study through the second and subsequent visits. A high proportion of participants reported motivating factors that align well with the goals of the study, i.e. helping children and learning about their health.

LONGITUDINAL FOLLOW-UP OF COAST GUARD DEEPWATER HORIZON RESPONDERS

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Background: Little is known about health effects from oil spills on response workers, despite the frequency of these events worldwide. The Deepwater Horizon (DWH) disaster was the largest oil spill in U.S. history. The response, led by the U.S. Coast Guard, involved over 7,000 Coast Guard workers, who carried out a wide range of clean-up activities. Of the few studies that have evaluated the human health consequences of oil spills, most have been cross-sectional. Respiratory symptoms, including cough and shortness of breath, and neurological, hematologic, psychological, genotoxic and endocrine effects have been reported. Benzene, a major component of crude oil, is a known hematotoxin and carcinogen, even at low exposure levels.
Methods: We have designed a study to follow up the cohort of Coast Guard DWH responders to elucidate the health consequences of oil spill exposures by capitalizing on existing, detailed data. The key sources of these data include an exit survey completed by each responder, which provides self-reported task, location, exposure, and health data; personal monitoring data on a subset of responders; and pre- and post-deployment clinical data from Coast Guard electronic health records and ICD-9 coded diagnostic data. The objective of our study is to identify clinical and subclinical health effects among Coast Guard DWH responders by analyzing the clinical and self-reported data and comparing pre- and post-deployment disease rates. This study will also lay the groundwork for future nested studies of selected outcomes and for targeted studies of biomarkers of adverse biological effect using banked pre- and post-spill serial serum samples available for all responders. By carefully following up this cohort, we may help to mitigate long-term health consequences among these workers and provide much-needed insight into the health effects from oil spills.

ASTHMATIC CHILDREN PERSONAL EXPOSURE AND INHALED DOSE OF AIR POLLUTANTS

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Background and Aims: The study presented focus on the determination of personal exposure and inhaled dose of air pollutants (PM, O3, NO2, BTEX and formaldehyde) in asthmatic children in Portugal. Association between exposure and dose of air pollutants and the respiratory health of children was investigated.
Methods: The ISAAC questionnaire has been applied to identify 60 asthmatic children that participated in the study. Personal exposure was calculated using a microenvironmental approach and inhaled dose was estimated according to different ventilation rates for each child, in each moment. Daily activity profiles for each child were established through personal questionnaires to parents and children and allowed the identification of the microenvironments (ME) frequented by those children and the activity level and time spent in each one. The air quality characterization of different ME (outdoor and indoor) was performed combining measurements and air quality modelling techniques.
Results: Results show significant differences in the contribution of the various ME to exposure and dose. Although exposure in ME where children have high activity levels may be low, the mass of pollutant inhaled there is high. Statistical association between health and air pollution data shows that children that have higher contact with air pollution have respiratory exams indicating lower health condition.
Conclusions: This study allowed the estimation of weekly personal exposures and inhaled doses of a set of pollutants, for summer and winter conditions. It reveals the importance of advancing in the chain of events that relate air pollution and health, showing that similar exposures can lead to quite different inhaled doses. The findings indicate the importance of controlling air quality in indoor sport facilities; children do not spend significant time in those environments, but it results in high inhaled doses.

METHOD VALIDATION BY GC-MS TO DETERMINE PYRETHROIDS METABOLITES IN URINE

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Background and Aims: Pyrethroids (PYRs) Pesticides are synthesized from prototype pyrethrins (naturally occurring toxin) derived from the flowers of *Tanacetum cinerariaefolium*, in order to increase their environmental stability and selective insecticidal properties. PYRS are widely used in agriculture, forestry, veterinary, nurseries, in textile industry, and in public health programs worldwide. PYRs are one of the most frequently and widely used class of insecticides.
The exposure to this classes of pesticides can increase the probability of developing Parkinson's disease[1], some of these PRYs may be endocrine disruptors and they have been listed as such by the Environmental Protection Agency (EPA) [2].
Human exposure to PYRs can occur via food intake, inhalation and dermal absorption[1]. Proper usage of PYRS is enforced, in part, by periodic monitoring PYRs in food samples in spite of their short life time [3] but more important monitoring PYRs organism. Can be assessed by measuring intact compounds or their metabolites in urine or blood, but due of rapid metabolism, urine analyses is more efficient [4].
The aims of this work were development of a reliable health risk assessment through the analysis metabolites of PYR pesticides in the population and development and validation method for analysis of metabolites of PRYs in urine samples by Gas Chromatography Mass Spectrometry (GC-MS).
Methods: Solid phase extraction (SPE) with Strata X cartridges, followed derivatization with 1,1,1,3,3,3-Hexafluor-2-propanol (HFIP) and N',N'-Diisopropycarbodiimid (DIIC) and finally quantification method with Termo GC ultra GC-MS equipped with a column ZB.XLB (30×0,25mm ID 0.25µm film thickness Phenomenex).
Results: Concentrations ranging from 0.5 to 10µg/L in studied urine previous spiked with 3 phenoxybenzoic acid (3PBA) and 2 Phenoxybenzoic acid (2PBA) as an internal standard. The quantification ions are: 135, 141,169,196,197 and finally 364. With this method were obtained a calibration curve with R=0,992.
Conclusions:
This method is a reliable method for detection of PYRs metabolites in urine samples
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DETERMINATIONS OF ENDOCRINE DISRUPTORS IN ENVIRONMENTAL USING SPE AND GAS CHROMATOGRAPHY- TANDEM MASS SPECTROMETRY

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Background and Aims: Endocrine disrupting compounds (EDCs) include a wide variety of pollutants, namely substances of different sources of contamination: domestic, industrial and agricultural e.g. pesticides estrogens, heavy metals and plasticizers. The ECDs are present in the environment at low levels of concentration and they can only be determined by using a preconcentration technique[1]. Gas chromatography/mass spectrometry (GC-MS) is commonly accepted as one of the most powerful techniques for the separation, identification and quantification of EDCs, even in the nanogram range[2].
Methods: Chromatographic analyses were carried out in a Thermo GC ULTRA Gas Chromatograph Mass Spectrometer equipped with a ZB-XLB. High-purity helium at a constant flow rate of 1.3mL/min was used as carrier gas. An AI/AS 3000 auto injector was used. Injections (1µL) were made in the split/splitless mode. Samples were analyzed using the following oven temperature programme: initial temperature 60 C (held for 1 min), increased by 20 C/min to 200 C (held for 1 min), increased again by 5°C/min to 245°C and held at this temperature for 40 min.
Results: We have optimized the method by determining the following ECDs; Atrazine-desethyl, HCB, Atrazine-deuterated, Atrazine, Simazine, Lindane, Vinclozoline, Alaclhor, Malathion, Aldrin, α-Endosulfan, p.p`-DDE, Dieldrin, DDD, Endrin, o.p`-DDT, β-Endosulfan, Methoxychlor, Bifentrhin, Fenpropatrhin, Iprodione, λ-Cyhalothrin, Permethrin, β-Cyfluthrin, Cypermethrin, Fenvalerate and Deltamethrine all present good linearity.
Conclusions: The limit of detection achieved allows the determination above the legal limits.
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EVALUATION OF DIFFERENT QUECHERS FOR DETERMINATION ORGANOCHLORINE PESTICIDES IN CARROT

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Background and Aims: The Organochlorine Pesticides (OCPs) due to their extensive use in agriculture and also because of their chemical stability and slow biodegradation became ubiquitous pollutants. Overall use has been restricted since the late 1970s[1]. However these biologically hazardous chemicals still persist and move throughout the biosphere[2].
Most of the OCPs are therefore included in the organic persistent pollutants which are characterized by exceeding long half-lifes in the environment[3] and to have potential biomagnification capacity through food chain[4].
To OCPs has been associated a range of both acute and chronic health effects, such as cancer, birth defects, neurological damage and in addition they are suspected to act as endocrine disruptors[5]
The aim of this study was to develop a method to evaluate OCPs in carrots**.**
Methods: The analyzed compounds include: HCH (α,β,δ), HCB, lindane, aldrin, 4.4'-DCBP, α-endosulfan, dieldrin, *p-p'*-DDE, endrin, β-endosulfan *p-p'*-DDD, *o-p'*-DDT and methoxychlor. The extraction was performed with QuEChERS. Gas chromatography with ECD was employed for the determination of pesticides.
Results: Five types of QuEChERS with different compositions were also tested. The chosen QuEChERS was composed of 4g MgSO4, 1g NaCl, 1g Na3Citrate 2H2O, and 0,5g Na2HCitrate 1 ½ H_2O.
With the chosen QuEChERS linear calibration curves were obtained for the 14 pesticides and the internal standard (IS). Concentrations ranging from 5 to 70µg/kg in carrots were studied**.**
Conclusions: The samples homogenization influences the results reproducibility therefore it can be a crucial step for the analysis.
The sample preparation procedures, QuEChERS, can be applied to carrots for OCPs analysis.
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IN UTERO EXPOSURE TO PERSISTANT ORGANIC POLLUTANTS (POPS) IN GIRLS: RELATIONSHIPS TO GROWTH, PUBERTAL DEVELOPMENT AND REPRODUCTIVE SUCCESS: NEW DATA

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Background and Aims: POPs have been shown to affect the endocrine system, particularly during critical windows of development. We examined the effect of *in utero* exposure to two different classes of POPs, polyfluoroalkylcompounds (PFCs) and brominated flame retardants (BFRs) on girls' childhood growth and pubertal development. The study of BFRs includes follow-up into the reproductive years.
Methods: The study of PFCs is a nested case control study within the Avon Longitudinal Study of Parents and Children (ALSPAC). Serum samples collected during pregnancy from mothers of earlier-maturing girls (n=218) and later-maturing girls (n=230) were assayed for PFCs by solid-phase extraction coupled to isotope dilution high-performance liquid chromatography-tandem mass spectrometry. The study of BFRs is a cohort study of Michigan residents who consumed contaminated meat and dairy products as a result of an industrial accident. Serum samples from women were assayed for BFRs by gas chromatography with electron capture detection. Their female offspring were followed prospectively (n=327).
Results: In the ALSPAC study PFC concentrations were associated with more rapid postnatal growth. A 1-unit increase in log-transformed PFCs was associated with a 0.02 increase in the rate of growth per month (weight-for-age SD score). Previously published work in this population found PFCs associated with increased odds of earlier menarche (OR=1.3), however, this increase did not reach statistical significance (Christensen et al, 2011). The study of BFR previously found earlier pubertal development among girls with high exposure in utero and through breastfeeding (Blanck et al, 2000). Continued follow-up has revealed a dose-related increase in the risk of spontaneous abortion among these, now adult, women.
Conclusions: Exposure to POPs during critical periods of endocrine development may have substantial long-term consequences.
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Title: EFFECT MODIFICATION BY INFLUENZA ON THE ACUTE RELATIONSHIP BETWEEN COLD TEMPERATURE AND CARDIOVASCULAR MORTALITY IN 67 U.S. CITIES

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Background: A better understanding of the effects of temperature on human health is needed to improve estimates of the health effects of climate change. Cardiovascular mortality (CVD) has been associated with periods of cold temperature and influenza epidemics. However, the manner in which these two exposures interact on the outcome of CVD has yet to be determined. We investigated a potential role of the intensity of influenza-like illness (ILI) on the relationship between cold temperatures on daily cardiovascular death.

Methods: The data available for this study includes 67 United States metropolitan areas from the fall of 2003 through the end of 2006. We used a Poisson time-series regression model to estimate the effects of temperature at its lowest quintile in each city in each year during the cold season (October – March) at lag 0 through 3 days, adjusting for temporal trends and day of week. In a second-stage random effects model, we included the annual ILI mean intensity for each city and each year, as well as other potential predictors such as average annual temperature, population density, and the percent of population over age 65.

Results: Of the effect lags considered, the 2-day laggedcoldest quintile of temperature showed the strongest and most significant association with increased CVD mortality, with an excess risk of 3.9% (95% confidence interval: 0.16, 7.70%). We found a significant
effect modification of the temperature effect by the influenza intensity, with an inter-quartile range increasing the excess risk by 31%.

Conclusions: These findings suggest that ILI rates may modify cold temperature effects on CVD mortality.

REGIONAL DIFFERENCE OF INDOOR ACTIVITY PATTERNS IN KOREA.

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Background and Aims: The information about time spent in microenvironments plays a critical role for personal exposure to environmental pollutants. While there are several large scale activity pattern studies in Western countries, comprehensive time activity pattern research for exposure assessment has not been readily available in Korea.
Methods: We analyzed residential indoor and transportation times of Korean population over 10 years old. The population based study collected time activity pattern of 31,634 Korean for two consecutive days. Impact of sociodemographic factors on time activity has been assessed using multiple linear regression models.
Results: The residential indoor times were 14.23 hours in weekday and 16.13 hours in weekend and shorter than those in Western countries. The transportation times were 1.75 hours in weekday and 1.68 hours in weekend. The residential indoor times were significantly longer in weekend than in weekday ($p < 0.000$). However, transportation distributions of weekday and weekend were similar. Korean population spent less time at home after the working hours. The time spent in residential indoor at 6 PM and 10 PM were about 37% and 75%, respectively. These residential indoor time were different from the results of about 67% (6 PM) and 90% (10 PM) in USA. The most significant factors on residential indoor time were employment status, age, monthly income and gender in weekday and employment status and gender in weekend. The factors on transportation were gender, employment status and monthly income in weekday and gender, employment status, age and marriage status in weekend.
Conclusions: Since there are substantial difference of Korean population activity pattern, this information can be critical for exposure assessment in Korea. Determinants of time activity pattern need to be taken into account in exposure assessment, epidemiological analyses, exposure simulations, as well as in the development of preventive strategies.

NON-HODGKIN LYMPHOMA MORTALITY TIME TRENDS IN BRAZIL, 1980-2008

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Background and AIMS: Non-Hodgkin Lymphomas (NHL) are part of a heterogeneous group of hematologic cancer originated at the lymphoid tissue, and represent more than 3% of cancer incidence worldwide. In Brazil there are few epidemiological studies on incidence and mortality of this neoplasmin the population. This paper aims to analyze the NHL mortality time trend in South and Southeast in Brazil, between 1980 and 2008.
Methodology: Information on NHL deaths was obtained from the Brazilian Mortality Information System, from 1980 to 2008, according the ICD 9 and 10. The total population and the stratification by age and sex were obtained from the Brazilian Institute of Geography and Statistics (IBGE), and the age-standardized death rates was obtained employing the 2000 world population standard. The joinpoint log-linear model, using Poisson regression, was employed to identify points where trend lines change significantly in magnitude/direction to verify trends, with a Confidence Interval of 95%.
Results: The Average Annual Percent Change (AAPC) in age-adjusted death rates due to NHL showed an statistically significant increasing trend in six of seven South and Southeast Brazilian States studied, ranging from 1,2% (Minas Gerais State) to 5.0% (Rio Grande do Sul State) per year from 1980 to 2008. The exception was Rio de Janeiro State, with no trends in the period. São Paulo State was the only one with an AAPC decrease trend of 2,21% per year, considering the 2000-2008 period. Considering the trends stratified by sex, the women had an higher AAPC increase than men.
Conclusions: NHL Mortality has been increasing worldwide and results of this research suggest that the same occurs in the South and Southeastern Brazil, but more analytical studies are needed.

EXPOSURE ASSESSMENT APPROACHES FOR ARSENIC IN DRINKING WATER

Background and Aims

Accurate retrospective exposure assessment is a major challenge in conducting epidemiologic studies of environmental factors and diseases with long latency, such as cancer. For example, bladder cancer is typically diagnosed clinically late in life, but has an etiological relevant exposure period of decades. The aim of this study is to compare and contrast exposure assessment methodologies in recent cancer studies which attempted to classify lifetime exposure of arsenic.

Methods

Two studies were in the USA, and the third in Eastern Europe. Case/control ascertainment was from 11 counties in Michigan, 3 states in New England (NEBCS), and from parts of the countries Hungary, Romania, and Slovakia (ASHRAM). Methods for locating residences of the study population prior to diagnosis inside and out of the ascertainment areas, for linking these residences to their drinking water supply, and for predicting the level of arsenic in their supply over a lifetime exposure period are compared in this presentation.

Results

Arsenic concentration specific to residential water supplies were estimated for 99%, 95%, and 80% of the cumulative exposure periods across all study participants in the Michigan study (64,040 Exposure-Years), NEBCS (173,361 E-Y), and ASHRAM (94,008 E-Y), respectively. Average residential mobility was approximately 9 residences over the exposure period in the Michigan study, 7 in NEBCS, and not reported in ASHRAM. Concentrations varied widely across the locations of current and past residences in all studies, especially in terms of water supply source: private wells versus public supply (only reported in USA studies).

Conclusions

Accurately locating past residences in epidemiological studies concerning waterborne contaminants and diseases with long latency is critical to exposure assessment. Recent cancer studies demonstrate achievement of this step allows for estimating contaminant concentrations over much of the exposure period, thus accounting for exposure misclassification that could result from study population mobility.

EMERGING METHODOLOGIES FOR EXAMINING ENVIRONMENTAL INFLUENCES ON CHILDREN'S EXPOSURE TO AIR POLLUTION

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Background and Aims: Air pollution is a critical environmental and public health issue. Children are especially vulnerable to air pollution in their surroundings as they have higher ventilation rates, spend more time outdoors, and are more constrained in their mobility than adults. Most research relating health-related outcomes (e.g., asthma) to environmental factors (e.g., land uses) identifies correlations, but stops short of understanding how individuals interact with their surroundings. For example, PM2.5 is traditionally assessed using fixed or 'passive' monitors which assume homogeneity in pollution distribution over large areas, and have consistently under-reported actual personal exposure.
Methods: We address methodological shortcomings by providing a fuller understanding of the daily spatial and temporal routines of children in the spaces they inhabit. Using an innovative suite of portable, high-precision, personal monitoring tools (air pollution monitors, accelerometers, and GPS) we are able to combine 'active' measurements of PM2.5 exposure, energy expenditure, and geographic location at 1-second intervals throughout a child's day; in turn, we can identify environmental influences on children's activities and exposure to PM2.5. These tools were used to continuously monitor 36 children in a Canadian city (London) for one week; time-activity diaries, questionnaires, and interviews were used to provide additional context. GIS was used to visualize and analyze spatial-temporal patterns.
Results: This presentation will describe the innovative protocol and preliminary findings on how variations in children's levels of exposure to PM2.5 varies in relation to spatio-temporal variations in their activities and characteristics of their everyday environments (e.g., land use patterns, greenspace).
Conclusions: This study highlights the importance of 'active' versus 'passive' monitoring for more accurate assessments of exposure to air pollution. A better understanding of the spatial and temporal aspects of children's exposure to air pollution and the environmental context provides necessary evidence for formulating interventions to promote the health of children.

INFLUENCE OF THE BUILT ENVIRONMENT ON PERSONAL EXPOSURE TO FINE PARTICULATE MATTER IN CYCLISTS DURING THE MORNING COMMUTE IN A CANADIAN CITY

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Background and Aims: The health impacts of exposure to fine particulate matter air pollution ($PM_{2.5}$) conflict with the health benefits of commuting by active transport. This is of special concern to commuting cyclists as they are often near air pollution generating traffic and respiring at an elevated rate. Long-term and short-term exposure to $PM_{2.5}$ has been implicated epidemiologically in numerous cardiovascular and respiratory ailments. Personal exposure studies are critical as single-site ambient monitors do not adequately capture environmental variations and consistently report lower pollution measurements.
Methods: Participants were equipped with a GPS and a portable device which measures $PM_{2.5}$ both recording at one second intervals. Five routes totalling approximately 50km were cycled during the morning commute for 5 days across the city bicycle network in a midsized Canadian city (London, ON). GIS was employed to spatially analyze over one hundred thousand pollution data points.
Results: This study found that mean individual exposure of 22.8µg/m^3 was significantly greater than mean hourly ambient measures of 12.88µg/m^3 ($p = 0.03$). Although atmospheric conditions such as wind direction ($r = 0.72$) were found to correlate with daily personal exposure to $PM_{2.5}$, intraurban variation was still present in the data normalized to control for temporal meteorological effects.
Conclusions: This study aims to be the first to incorporate elements of the built environment, such as the presence of street trees, traffic volume, traffic speed, urban morphology (e.g. block length, distance to nearest intersection), and land uses into a regression model in order to account for the variation and hotspots of $PM_{2.5}$.

Prolonged Respiratory Effect of Oil Spill Exposure on Children

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Background and Aims: : The aim of this study was to evaluate the effect of oil spill on pulmonary function and prevalence of asthma of children living close to oil spill area in the Yellow Coast of South Korea.
Methods: Of 662 eligible children, 436 (65.9%) subjects, who completed a questionnaire and finally agreed to participate in the study, were enrolled on June 2009. Modified International Study of Asthma and Allergies in Childhood (ISSAC) questionnaire (Korean version) was used as a questionnaire, and health examination included skin prick test, pulmonary function test, and methacholine bronchial provocation test. Study subjects were divided into high and low exposure group according to exposure level to oil spill.
Results: (Arial, 8pt, bold)
There were no statistically significant differences in characteristics such as age, sex, height, weight, and family history of asthma between high and low exposure group. FEV_1 was significantly lower in high exposure group than in low exposure group (high *versus* low exposure group; 82.6±10.8% versus 85.3±10.4%, P=0.011). Prevalence of asthma based on a questionnaire was significantly higher in high exposure group than in low exposure group (high *versus* low exposure group; 31.4% versus 19.5%, P=0.005). Prevalence of asthma based on a methacholine bronchial provocation test was also significantly higher in high exposure group than in low exposure group (high *versus* low exposure group; 18.2% versus 7.9%, P=0.001). In a binary logistic regression analysis, male gender, family history of asthma, and high exposure to oil spill were significant risk factors for asthma (Gender[Male/Female]; OR 2.54, 95% CI 1.31-4.91, P=0.006, Family history of asthma [Yes/No]; OR 3,77, 95% CI 1.83-7.75, P=0.00, Exposure group[High/Low]; OR 2.43, 95% CI 1.27-4.65, P=0.007)
. **Conclusions** This study suggests that exposure to oil spill can be a risk factor for development of asthma in children. Future longitudinal study will be needed to determine the relationship between oil spill exposure and asthma and should include biologic markers related to airway inflammation to reveal the mechanism about how oil spill exposure affects lung function and bronchial hyperreacitivity.

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CAPITALIZING ON AVAILABLE MONITORING DATA TO INFORM EXPOSURE ASSESSMENT IN THE GULF STUDY

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Background and Aims: The Deepwater Horizon disaster, which released approximately 5 million barrels of oil into the Gulf of Mexico, is the largest oil spill in United States history. Over 100,000 workers participated in clean-up efforts. These workers may have been exposed to a number of agents during clean-up activities, including volatile organic compounds such as benzene, toluene, ethyl benzene, and xylene (BTEX); semi-volatile compounds such as polycyclic aromatic hydrocarbons; 2-butoxyethanol; propylene glycol; particulate matter; and oil mist. The duration of the spill and subsequent clean-up operation, as well as the large number of workers involved, enabled collection of a large amount of monitoring data, including over 20,000 observations of workers or work areas. These data were collected primarily by BP contractors and government agencies. They will be used, together with other data, to estimate exposures for each job group/location/time scenario defined in the GuLF STUDY, a large, prospective study currently being conducted by the US National Institute of Environmental Health Sciences to investigate the health effects of clean-up related exposures among these workers. The majority of measurements were reported to be below the limits of detection; however, interpretation of these data are complicated by the large number of job group/location/time scenarios, differences in analytical methods and instrumentation employed, use of compliance-based rather than research-based sampling strategies, and severe and varied working conditions.

Methods: Exposure distributions will be examined across, and descriptive statistics presented for, various job group/location/time scenarios. Important exposure determinants will be identified and reported. Results will be interpreted in light of the sampling strategies and analytic methods/instrumentation used.

Conclusions: Despite their limitations, the monitoring data available for Deepwater Horizon clean-up workers provide a rare opportunity to clarify exposure scenarios and their determinants for this spill and may help inform monitoring and exposure mitigation efforts in future spills.

A HEALTH SURVEY FROM ARSENIASIS-ENDEMIC AREAS IN SOUTHWESTERN TAIWAN

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Background and Aims: Epidemiological studies shows that chronic exposure to arsenic in groundwater has associated with elevated risks for cardiovascular disease. This study investigated the prevalence of hypertension, hyperlipidemia, hyperglycemia, as well as biochemical indices in the Arseniasis-endemic areas in southwestern Taiwan.

Methods: Health screening survey was applied to the residents aged over 40 in the Beimen and Xuejia in Tainan County since July, 1997 to 2000. 1,963 out of 5,844 qualified residents from the 13 villages in the Beimen and from the 5 villages in Xuejia joined the survey.

Results: The prevalence of hypertension was 52.6% in Beimen, and 44.2% in Xuejia according to a systolic blood pressure ≧140 mm Hg and a diastolic blood pressure ≧ 90 mm Hg. The prevalence of hyperglycemia was 20.0% in Beimen and 17.4% in Xuejia. The abnormality rate of cholesterol, triglycerides and HDL in Beimen was 25.8%,20.9%, and 4.0%, respectively, while the same rate in Xuejia was 11.4%, 24.2%, and 0.7%, respectively. The positive rate of urine glucose, and urine protein was 7.7% and 25.7% in Beimen and 9.6% and 14.4% in Xuejia. The hematuria (blood in the urine) positive rate was 38.9% and 37.6% in Beimen and Xuejia respectively. The positive rate of HBs-Ag (the surface antigen of the hepatitis-B Virus) was 25.7% and 17.2% in Beimen and Xuejia. We find that the prevalence of hypertension, the abnormality rate of cholesterol, and HDL were significantly higher in Beimei than in Syuejia.

Conclusions: Data suggested that hyptertension, hyperlipidemia, and hyperglycemia in arseniasis-endemic area may have correlation with arsenic exposure.

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PHTHALATES IN RELATION TO AUTISM AND DEVELOPMENTAL DELAY: EXPLORATORY ANALYSES FROM THE CHARGE STUDY

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Background and Aims: Phthalates are used as plasticizers, solvents, and stabilizers common in household products with PVC plastic (toys, food containers, vinyl flooring) and in personal care products (fragrances, shampoo, lotion). Animal studies demonstrate developmental toxicity and endocrine disruption. Human research has linked phthalates to ADHD and behavior problems. Larsson et al. (2009) observed an association between autism and vinyl flooring.
Methods: Participants were 104 children from the CHARGE (Childhood Autism Risk from Genetics and Environment) Study, a case-control investigation of children aged 2-5 years with clinically confirmed autism/autism spectrum disorder (AU/ASD), developmental delay (DD) and typical development (TD). House dust was collected and analyzed for five phthalate compounds DMP (dimethyl phthalate), DEP (diethyl phthalate), DBP (dibutyl phthalate), BBP (benzyl butyl phthalate), and DEHP (di(2-ethylhexyl)). Multinomial logistic regression models were used to examine the association between phthalate concentrations in house dust and autism. Multiple linear regression was used to evaluate phthalates in relation to the Mullen's Scales of Early Learning, a test of cognitive skills. Mother's education was controlled in both analyses. We calculated 90% confidence intervals, in recognition of the exploratory nature of this project.
Results: Compared with TD controls, AU/ASD children tended to have higher household BBP (for each 1 unit increase in log[microgram/g dust], (OR=1.41 [90% CI 1.05-1.91]); and DEHP (OR=1.73 [90% CI 1.07-2.82]). Similarly, DD households, compared with those of TDs, had higher DEP (OR=2.42 [90% CI 1.23-4.76]). Concentrations of phthalates in house dust were also negatively correlated with cognitive scores: excluding those with DD and controlling for diagnosis (ASD vs. TD), DEP was associated with lower scores (beta=-0.04, p-value=0.07).
Conclusions: House dust represents a long-term reservoir for chemicals from products in the home. The higher phthalate levels in households of children affected by ASD and DD suggest that these compounds may interfere with CNS development.
Key Words: Phthalates, autism, autistic spectrum disorder, developmental delay, cognitive deficit, dust, exposure

HEALTH, WEALTH, DISASTERS AND ECOLOGIC FOOTPRINTS: TECHNOLOGIC FATIGUE?

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Background and Aims: The catastrophic effects of the Japanese nuclear disaster in 2011 and the British Petroleum disaster in the Gulf of Mexico raise two questions: 1. When does the quest for more energy jeopardize health and wealth? 2. Is a role for epidemiologists in prediction and prevention of such disasters sufficient in the light of the concept of the ecologic footprint**?**
Methods: We review the lessons learned from these disasters as to the role and adequacy of epidemiologists in prediction, prevention and precaution and protection in the light of the concept of the ecologic footprint**.**
Results: These disasters, like all others, were rare, but not random, and had their warning signs, including ignoring worker complaints, lessons from past failures and anticipating linked probabilities from multiple failures. Both Japan and the USA are in the upper quartile of countries in measures of wealth, public health and quality of life as measured by the Human Development Index. But their ecologic footprints are also high. (4 gha per person and 9.5 gha per person).
Conclusions: The catastrophic effects of the British Petroleum and Japanese nuclear disasters underscore the case for an obligatory role for epidemiologists and other public health experts in (1) assessing the potential impacts for mass disasters of new technologies and (2) assessing the operation of existing tecnologies. Fail safe systems presuppose an epidemiologic approach based on risk assessment and sentinel early warning signs. Even so, wealthy and relatively healthy countries energy hungry countries (e.g. Japan and US) with very high ecologic footprints may be unsustainable. We ask: does the ever growing world need for cheap energy create driving forces and pressures and high ecologic footprints of disasters which undermine health and wealth?
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POPULATION IMPACT OF CHLORINATION BY-PRODUCTS EXPOSURE ON INTRA-UTERINE GROWTH RETARDATION OCCURENCE

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Background and Aims: Chlorination By-Products (CBPs) exposure during pregnancy has been associated with intra-uterine growth retardation (IUGR). The objective of this study was to estimate the potential population attributable risk of CBPs in comparison to that of well proved causal factor, e.g. maternal smoking.
Methods: We conducted a population based case-control study in the Quebec City (Canada) metropolitan area. Five hundred and sixty seven term newborns with birthweight <10th percentile (small-for-gestational age- SGA) were compared with 1911 term controls with birthweight ≥ 10th percentile. The quality of drinking water serving the mother residences was monitored regularly for trihalomethanes (THMs) and haloacetic acids (HAAs) during the study. A phone interview of the mother was completed within three months after childbirth to evaluate maternal lifestyles, water consumption and risk factors for IUGR. Adjusted Odds Ratios (OR) of SGA according to different levels of CBPs were evaluated by means of an unconditional logistic regression with control of all potential confounders. Population attributable risk (PAR) was calculated using OR as an estimation of RR and the proportion of exposed among controls.
Results: The adjusted OR of SGA for a concentration of total THMs>80µg/l or the five main HAAs>60µg/l at the tap, during last trimester of pregnancy, was 1.30 (95% Confidence Intervals (CI): 1.03-1.65). The proportion of controls exposed to high levels of CBPs was 19.4% and the corresponding PAR for such CBPs exposure was estimated at 5.5%. In comparison, the OR of maternal smoking during the last pregnancy trimester was 2.07 (95%CI:1.56-2.74). The proportion of controls exposed to tobacco smoke was 9.8% and the corresponding PAR for maternal smoking was estimated at 9.6%.
Conclusions: If the relationship between CBPs exposure and SGA is causal, its impact on the occurrence of IUGR in this population would be non-negligible but lower that of maternal smoking.

Genome-Wide Interaction Study on occupational hazards and asthma, the European Community Respiratory Health Survey (ECRHS)

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Background and aims. Very few studies have addressed gene-environment (GxE) interactions in asthma at the genome-wide level and none in the context of occupational hazards. Our objective was to detect GxE interactions for asthma and job exposure in a population–based cohort.

Methods. Occupational exposures for 2205 adults from the ECRHS were assessed through job histories, an asthma-specific JEM and expert assessment. We performed a genome-wide interaction analysis for asthma as a whole and adult onset asthma by using 582,892 single nucleotide polymorphisms (SNP) and work exposure to high-molecular weight agents (HMW) and latex. Two analytical strategies were used to detect GxE interactions: 1) a global genome-wide analysis and 2) a two-stage approach.

Results. In the global analysis, a single SNP with marginal genome-wide significance (p-val<1.E-07) emerged to interact with latex for adult onset asthma. In the two-stage approach, SNPs associated with exposure (p-val<1.E-05) at the first step were then tested for association with outcomes at the second step. In this approach, two SNPs were detected to interact with HMW and four SNPs with latex for adult onset asthma (p-val<0.05). These SNPs were not among the top 30 SNPs in the global analysis. No interactions were found for asthma genes identified in a recently published large GWAS on asthma.

Conclusions. We found very few clues on GxE interactions. Results depended not only on exposure and outcome definitions, with slightly lower p-values for the more specific definitions (adult onset, latex) but also on the analytical strategy followed. Replication of these findings will be presented using two additional studies (EGEA and Sapaldia). With the exception of the evaluation of few prevalent exposures such as smoking, most studies evaluating GxE interactions are likely to be underpowered.

EXPOSURE ASSESSMENT APPROACHES FOR NITRATE INGESTION

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N-nitroso compounds, formed endogenously from drinking water and dietary sources of nitrate and nitrite, are potent animal carcinogens that cause tumors at numerous anatomic sites. Exposure to nitrate via drinking water occurs mostly in agricultural areas and levels are often highest in private wells. In the United States, private wells are not regulated; therefore, monitoring data are scarce making exposure assessment challenging. We describe exposure assessment approaches for nitrate in drinking water sources for two epidemiologic studies: a cohort of Old Order Amish in three counties in Pennsylvania and the Agricultural Health Study (AHS), a cohort of pesticide applicators and their spouses in Iowa and North Carolina. In Pennsylvania, we used well measurements (n=386) from the U.S. Geological Survey (USGS) to develop a standard linear mixed effects model that included variables for aquifer type, geology, transmissivity, and karst density using the well recharge area as the modeling unit. We evaluated the model by comparing predicted and observed nitrate concentrations on a separate dataset of well measurements (n=96). In the AHS, we have information on water source (public supply, private well, other), well depth, and whether the well ever tested high (above the maximum contaminant level of 10 mg/L nitrate-nitrogen). We are linking residence locations on public supplies (40% of participants) to public monitoring databases for nitrate. For residences with private wells, we will use available measurement data to develop regression models that include information about well depth, whether the well tested high, hydrogeologic characteristics of the well, and land use information. Ingestion of nitrate and nitrite from dietary sources can be estimated from food frequency questionnaires; exposure estimates from several studies will be presented. We will also discuss the importance of considering factors affecting endogenous nitrosation in the exposure assessment and data analysis stages of epidemiologic studies.

Medical exposure to ionizing radiation and brain tumour risk – analyses of data from five Interphone countries

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Background and Aims: Medical ionizing radiation represents an indispensable tool in modern medicine and it is the largest human-made source of radiation exposure. At moderate to high doses, ionising radiation is however a known risk factor for cancer and it is the only well established risk factor for brain tumours (UNSCEAR, 2008). Despite extensive knowledge of radiation risks gained through epidemiologic investigations and mechanistic considerations the health effects of low-level radiation exposure are still poorly understood (1). We therefore evaluated the risk of brain tumours in relation to reported medical radiation exposure.

Methods: This analysis is based on pooled datasets from five Interphone countries (Australia, Canada, France, Israel and New Zealand) information on all medical procedures involving ionizing radiation exposure during participant's lifetime was obtained by questionnaire, including year, anatomical region exposed and reason for examination or treatment for radiotherapy. Estimated dose to the brain was calculated for each procedure based on time and country specific average dose levels available in publications of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR)(2). Analyses are based on unconditional logistic regression, stratified on age, sex, country/region. All analyses are adjusted for socio-economic status.

Results: The analyses included 905 cases of glioma, 916 cases of meningioma, 423 cases of acoustic neuroma and 6840 controls. Odds ratios (ORs) and 95% CI (confidence intervals) will be presented by cumulative estimated level of medical radiation for each of these tumour types

Conclusions: Results from these analyses will contribute to the body of evidence on potential health effects of low level medical exposure to ionising radiation.

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MOBI-KIDS; STUDY ON COMMUNICATION TECHNOLOGY, ENVIRONMENT AND BRAIN TUMOURS IN YOUNG PEOPLE

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Background and Aims: Brain tumours are the second most common neoplasms in young people. Apart from exposure to ionizing radiation and genetic predispositions, little is known about risk factors for these tumours. Mobi-Kids will study effects of environmental factors on brain tumour risk in young people, with particular focus on electromagnetic fields from mobile phones and other communication technologies.
Methods: Mobi-Kids is a collaborative case-control study starting in 12 countries (Austria, Australia, Canada, France, Germany, Greece, India, Israel, Italy, Spain, Taiwan, The Netherland)s using a common core protocol. Cases are 10-24 years old patients newly diagnosed with a brain tumour. Controls are patients hospitalized for appendicitis within the participating regions, individually matched to cases on age, sex and region of residence. A face-to-face interview will be held with participants and their parents to assess lifestyle, residential and school history, use of communication technologies, exposure to environmental risk factors, medical history and family history of cancer. Particular attention will be paid to issues of potential selection bias related to the low response rates of population-based controls (by selecting hospitalised controls) and potential recall errors (by validating questionnaire responses on mobile phone use with user data from network operators). Improved exposure indices for RF will be derived taking into account spatial distribution of energy in the brain at different ages; ELF from the phones will also be considered, as well as other important sources of EMF and chemical exposures in the general environment of young people.
Results: Data collection has started in most participating countries.. The study is expected to include nearly 2000 brain tumour cases and twice as many controls during a 2.5-year study period.
Conclusion: MOBI-KIDS will generate novel insights in brain tumour aetiology among young people. In particular it will address the association with information technology.

THE GULF STUDY: METHODOLOGIC CONSIDERATIONS IN USING EXISTING ENVIRONMENTAL AND PERSONAL MEASUREMENTS FOR EXPOSURE ASSESSMENT USING QUESTIONNAIRE DATA

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Background and Aims: The Gulf Long-term Follow-up Study (GuLF STUDY) is investigating the potential short- and long-term health effects associated with clean-up activities following the Deepwater Horizon disaster in the Gulf of Mexico. The GuLF STUDY is characterizing workers' potential exposures to a number of chemical and physical agents associated with crude oil, dispersants, and other chemical and physical hazards arising from the spill or the clean-up work. Potential exposures varied not only by job task, but also spatially across the Gulf region and temporally. Reliable and valid exposure assessment is essential to evaluate and accurately characterize exposure-disease relationships. **Methods:** We have developed exposure scenarios for groups of workers who had potentially similar exposure distributions and performed similar tasks. To classify individuals into exposure scenarios, we are using a telephone interview to ascertain the tasks, locations, times, and work characteristics such as use of personal protective equipment and practices. We are using a variety of exposure assessment techniques that incorporate individual and environmental monitoring data, which include a large amount of censored data and cover a wide geographic area. **Results:** Data collected from the first six months of GuLF STUDY telephone interviews will be presented. Characteristics of different exposure scenarios and participant reporting will be presented to illustrate exposure reconstruction methods and estimation of exposures among the study participants. **Conclusions:** Robust exposure assessment requires accounting for the variety and quality of the environmental and industrial hygiene data and descriptive data collected during the oil spill clean-up response. Careful synthesis and analysis of these data will be critical for the correct interpretation of any epidemiologic findings.

USING CROSS-SECTIONAL BIOMONITORING STUDIES TO EXPLORE THE RELATIONSHIP BETWEEN HUMAN BODY BURDEN AND AGE

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Background and Aims: Cross-sectional data sets are a compilation of different individuals whereas the longitudinal body burden trends are for only one individual over their entire lifetime. Numerous studies have reported cross-sectional biomonitoring data of polychlorinated biphenyls (PCBs) with human body burdens increasing continuously into old age. This relationship has been previously interpreted to indicate the role of age on bioaccumulation. We propose that what has been interpreted as an increase in body burden with age is actually a result of the temporal relationship between the sampling period and the peak in emissions. The purpose of this research was to investigate which factors control the concentration versus age relationship.
Methods: Population cross-sections were generated from longitudinal calculations using the mechanistic model CoZMoMAN that links emissions to the environment with human body burdens. Body burden-age trends were generated from the longitudinal body burden calculations for human exposure to hypothetical chemicals with various partitioning and degradation properties. The influence of model assumptions and emissions peakedness are also examined.
Results: The temporal relationship between the emissions scenario time trend and the biomonitoring sample collection period is the most influential factor controlling the shape of concentration-age trends for population cross-sections. For chemicals with degradation half-lives of 1 year or less, the relative concentration-age trend is always the same. Published biomonitoring studies for PCBs and PBDEs are interpreted in the context of the relationship between emissions and metabolic degradation.
Conclusions: Bioaccumulation does not monotonically increase with age. The main predictors of cross-sectional body burden trends with age are the amount of time elapsed after emissions peaked and the chemical degradation rate.

CANCER RISK FROM *IN UTERO* EXPOSURE TO CHERNOBYL FALLOUT IN UKRAINE

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Background and Aims: - Iodine-131 (I-131), the major component of Chernobyl fallout and an isotope readily absorbed by the thyroid gland, has been clearly linked to a subsequent increase in thyroid cancer among those exposed in early childhood. The embryo/fetus could also be vulnerable given the small size of the gland, the proliferative activity of fetal thyroid cells, and the high rate of radioiodine accumulation from the maternal circulation after 12 weeks gestation. We evaluated risk of thyroid cancer from *in utero* exposure to I-131 and also explored the incidence of non-thyroid cancers.
Methods: We identified 2,582 mother-child pairs from the northern region of Ukraine in which the mother was pregnant at the time of the Chernobyl accident or the two months following when I-131 fallout was still present. Individual fetal thyroid I-131 doses were estimated from I-131 activity in the mother's thyroid (mean dose=72 mGy; range 0-3,230 mGy). From 2003-2006, the *in utero* cohort was screened using an in-depth, standardized clinical examination. To evaluate incidence of other cancers, we linked the cohort to the Ukrainian National Cancer Registry (UNCR) for the period 1997 (the earliest year for which electronic records were available throughout the study area) and 2008, and estimated the standardized incidence ratio (SIR).
Results: Seven cases of thyroid carcinoma and one case of Hurthle cell neoplasm were identified at the time of screening. The estimated excess odds ratio per Gray for thyroid carcinoma was markedly elevated (EOR/Gy=11.9) although not significantly so (P=0.12). Preliminary results of record linkage with the UNCR identified 6 cases of non-thyroid cancer, including 2 brain gliomas, 3 cases of Hodgkin disease, and 1 choriocarcinoma. The SIRs were 0.9 for males (95% confidence interval (CI): 0.11, 3.28) and 1.8 for females (95% CI: 0.49, 4.66). A subsequent linkage is currently underway.
Conclusions*:* The data suggest that *in utero* exposure to I-131 in Ukraine may have increased the risk of thyroid carcinoma 20 years after the Chernobyl accident. Given the young age of the cohort, the results for cancer incidence at other sites are based on small numbers and should be interpreted cautiously.

MORTALITY CAUSED BY HEAT EXPOSURE IN EUROPEAN CITIES AND THE IMPACT OF UHI MITIGATION POLICIES

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The objective was to evaluate current and future mortality caused by ambient heat exposure in densely populated metropolitan areas in Europe, and to assess the effectiveness of urban heat island (UHI) mitigation policies in reducing it. The evaluated policies were: 1) increasing urban vegetation by planting trees on open grassy areas and street curbsides, and 2) increasing city albedo by replacing impervious roof and street surfaces by light coloured surfaces. Heat exposure in cities was assessed based on EMEP grid data on urban population and weather conditions derived from hourly temperature and dew point data modelled with the Max Planck Institute for Meteorology Regional Model (REMO). Future exposure was evaluated for IPCC climate scenarios A1B and B1. The impact of UHI mitigation policies was modelled based on percentages of city surface area that could be redeveloped from one surface cover type to another and the unit cooling effects of these changes. Meta-analytical exposure-response functions for the effect of short-term heat exposure on natural mortality in European cities were used in quantifying the mortality impacts. Currently, almost 15000 deaths were estimated to be attributable to heat exposure in the European cities annually. By 2050, deaths were assessed to increase by 440% in the IPCC climate scenario A1B and 220% in B1. This increase is due to both warmer climate and aging population. The UHI mitigation policies were estimated to result in thousands of averted heat related deaths annually. Overall, vegetation policy reduced annual deaths by 4% and albedo policy by 11%. There are various uncertainties in the assessment. However, the simple methodology used does provide valuable insight into the potential magnitude of the health impacts of heat exposure in Europe and the effectiveness of different policies aimed at reducing them.

INVESTIGATING INTERGENERATIONAL DIFFERENCES IN HUMAN PCB EXPOSURE DUE TO VARIABLE EMISSIONS AND REPRODUCTIVE BEHAVIOURS

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Background and Aims: The atmospheric emissions of polychlorinated biphenyls (PCBs) have varied greatly since their introduction in the 1930s. Female reproductive characteristics have changed over the same time frame. Since both environmental chemical exposure and reproductive characteristics are expected to influence the human body burden, these concurrent trends may produce and/or enhance intergenerational differences in human PCB exposure. The objectives of this study were to determine the extent of prenatal, postnatal, and lifetime exposure of different generations and to evaluate the impact of reproductive characteristic on intergenerational differences in exposure.
Methods: The non-steady state mechanistic model CoZMoMAN was used to calculate human bioaccumulation of PCBs assuming both hypothetical constant and realistic time-variant emissions. The influence of age of childbearing, parity, and breast-feeding prevalence was evaluated for three epidemiological exposure endpoints (prenatal, postnatal, and lifetime exposure).
Results: The main determinant of exposure is an individual's year of birth relative to the emission history of PCBs. Reproductive characteristics can have a significant impact but this relationship also depends on the temporal relationship with contaminant emissions. All calculations indicated that the generation born around 1980 was exposed prenatally and postnatally to more PCBs than any other generation while the generation born in 1960 experienced the greatest cumulative lifetime exposure.
Conclusions: The reproductive characteristics of the mother had a greater influence on the prenatal and postnatal exposure of her infant than on her own cumulative lifetime exposure. Therefore, despite the production and use of PCBs being banned for over 40 years, the health repercussions can be expected to persist for several decades.

UNSUSPECTED DISCOVERY OF MERCURY POISONING IN BARBADOS

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Background : One remaining mercury exposure source of concern for humans is through the consumption of contaminated fish. Among populations of the world depending on fish as a major food source, Caribbean people are at risk of exposure. We measured mercury body-burden, in 46 individuals working in the fisheries in Barbados. The average hair mercury concentration was 4.65 µg/g. However, among the 20 women participants, 4 cases of exceptionally high hair mercury levels were unveiled: 361.08, 1404.21, 4012.04, and 5616.85 µg/g.
Objectives: The primary objective was to determine the source of exposure which led to the 4 cases of mercury poisoning. The secondary target was to assess mercury body-burden through urine analysis and conduct clinical neurologic assessment.
Methods: Spot urine specimens were collected from the 4 participants with elevated hair mercury levels. They were offered free clinical evaluation. Information sessions and open-discussions were organized for the concerned participants in the hope to discover the exposure source and increase public awareness about the health effects of mercury.
Results: Spot urine samples, for the 4 outliers (females aged 39-54) with hair levels: 361.08, 1404.21, 4012.04, and 5616.85 µg/g, revealed elevated urine mercury levels, respectively: 310, 350, 26, and 110 nmol/L. Mercury-containing skin-lightening creams were identified as the source of exposure. Of these, a bleaching cream manufactured in Jamaica contained 30,000 ppm of ammoniated mercury.
Conclusions: The high hair and urine mercury levels indicate that the use of mercury-containing cosmetics represent a significant exposure. Although the use of mercury in cosmetics is banned in many developed countries, no similar regulations exist in developing countries. Unsuspecting users might be at risk of health effects from dermal application of these creams. This study brings forth crucial information for public health policy makers to ban cosmetics containing mercury and for the promotion of public awareness aimed at dark skinned people.

INTEROCC STUDY: SOCIAL CLASS AND THE RISK OF GLIOMA BRAIN TUMOURS

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For the INTEROCC Study Group

Background and Aims: The etiology of glioma remains unexplained. There is inconsistent evidence as to whether social class influences risk of this brain tumour. In the context of a large international case-control study of brain cancer, we investigated the possible relationship between social class and glioma.
Methods: A set of case-control studies was carried out in seven countries. Overall, 1717 cases of glioma and 5099 controls were interviewed. Information was collected on highest attained education and lifetime occupational history. Different socioeconomic status (SES) measures were investigated, two based on highest attained educational level (of the subject and maximum of the subject and spouse) and two with the occupational history transformed to a prestige scale and income scale. These were assessed as possible risk factors for glioma, adjusting for age, sex, and study centre.
Results: None of the SES indices was associated with glioma in any consistent fashion. In the highest category of the education based SES the OR was 0.94 (95%CI 0.82 – 1.08).
Conclusion: There was no relationship between these SES indices and glioma. This could indicate that exposure variables associated with SES do not play a role in glioma etiology, or that different exposure variables associated with SES play countervailing roles whose net effect is null.

INTEROCC STUDY: SOCIAL CLASS AND THE RISK OF MENINGIOMA BRAIN TUMOURS

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Background and Aims: The etiology of meningioma remains unexplained. There is inconsistent evidence as to whether social class influences risk of this brain tumour. In the context of a large international case-control study of brain cancer, we investigated the possible relationship between social class and meningioma.
Methods: A set of case-control studies was carried out in seven countries. Overall, 1591 cases of meningioma and 4710 controls were interviewed. Information was collected on highest attained education and lifetime occupational history. Different socioeconomic status (SES) measures were investigated, two based on highest attained educational level (of the subject and maximum of the subject and spouse) and two with the occupational history transformed to a prestige scale and income scale. These were assessed as possible risk factors for meningioma, adjusting for age, sex, and study centre.
Results: The two education-based SES indices led to similar findings as did the pair of occupational-based indices. The lowest risks were seen among subjects in the highest education category (OR 0.71, 95% CI 0.61, 0.82) and among subjects in the highest occupational prestige category (OR 0.72, 95% CI 0.6, 0.85). When both education and occupation based SES indices were included in the same model, the relationships with risk persisted for both indices.
Conclusion
Risk of meningioma was related to both education-based and occupation prestige-based SES indices, with lowest risks among those in high SES categories. These risks may reflect the impact of lifestyle and occupational factors.

ADDRESSING THE CHALLENGES OF CLIMATE CHANGE TO NUTRITION SECURITY

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Background/Aim: More than one billion people are suffering malnutrition. Food and nutrition security have deteriorated and reductions in child malnutrition are proceeding too slowly to meet the Millennium Development Goal (MDG) target of halving hunger by 2015. Three major challenges threaten current and future efforts to overcome food and nutrition insecurity: climate change, the growing use of food crops as a source of fuel and the soaring food prices.
Methods: The analysis of the impacts of climate change of climate change and bioenergy on health, food and nutrition security is based on the four-dimensional food security framework defined by FAO's Food Insecurity and Vulnerability Information and Mapping Systems (FIVIMS) combined with a nutrition security framework which includes environmental health, house hold food access and maternal and child care practices. The paper provides a cross sectoral analysis of the adaptation strategies and policies to address climate change and bioenergy challenges.
Results: Climate change is projected to affect the health status of millions of people through increases in malnutrition. Climate change and variability exacerbates climate-sensitive impediments to sustainable development faced by developing countries particularly in Africa and SE Asia. Two case studies in Ethiopia and Bangladesh suggest that to address these challenges requires integrated approaches for adaptation, mitigation and sustainable development. Strategies include measures that would simultaneously reduce pressures on biodiversity and food and nutrition security and contribute to carbon sequestration.
Conclusion: Agriculture, health, and nutrition security policies need to be integrated onto national and international climate change agendas, in order to devise effective and pro-poor policies.
Efforts to improve food and nutrition security in the face of challenges, including climate change and bioenergy production should to place the achievement of the MDGs at the centre of human endeavour. In particular, it remains essential to accelerate progress in reducing poverty and malnutrition while protecting the environment in Sub-Saharan Africa and SE Asia.

CLIMATE CHANGE AND "ONE HEALTH": A CASE STUDY IN CALIFORNIA's GREEN ECONOMY

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Background/Aim : Climate Change has an impact on critical components of "One Health" such as human health, animal health, plant health and environmental health. Climate and environmental change also affects socio-economic determinants of "One Health" such as development, demographics, agriculture, animal production, global trade, food prices, poverty etc. The study aims to provide an analysis of the impacts of climate change on "One Health" and identify adaptation and mitigation strategies to address these impacts.
Methods: The analysis of the impacts of climate change and variability on "One Health" integrates the WHO Health Impact Assessment methodology with the FAO Biosecurity framework which includes human health (food safety), animal health, plant health and environmental health. The study provides a cross-sectoral analysis of the adaptation and mitigation strategies and policies to address climate change and variability challenges to "One Health" focusing in a case study in California's green economy.
Results: There are multiple pathways through which climate change may impact "One Health" including: changes in temperature and precipitation patterns, increased frequency and intensity of extreme weather events, ocean warming and acidification, changes in complex contaminants' transport pathways, and socio-economic and demographic factors among others. To address the challenges of climate change and variability to One Health is complex and requires trade-offs in a green economy framework. The case study in California addressing agriculture and environment sectors in show that decisions made in the agricultural sector impact environment, health and social factors and that health impact assessments are critical for policy change.
Conclusion: To address the impacts of climate and environmental change One Health in a green economy it is necessary to develop inter-sectoral adaptation and mitigation strategies that are integrated in resilient climate development plans. Approaches such as health promoting agriculture policies and green chemistry are critical to mainstream health across sectors in California's green economy. In this context health impact assessments facilitate decision-making and policy changes in a green economy since address socio-economic and development aspects.

NEIGHBORHOOD PERCEPTIONS, ACCESS TO RESOURCES AND PSYCOSOCIAL INFLUENCES ON PHYSICAL ACTIVITY: OPPORTUNITIES FOR IMPROVING THE BUILT ENVIRONMENT

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Background and Aims:
Physical activity can play an important role in prevention and management of disease. Many previous studies have looked at the role of the built environment in increasing physical activity but fewer studies have looked at psychosocial determinants and their relationship to physical activity levels. The goal of this study was to examine psychosocial influences on individual perceptions of neighborhood characteristics and resources within walking distance on physical activity levels in a general population sample.
Methods: The Survey of the Health of Wisconsin (SHOW) is an annual survey of representative samples of adult (21-74 years old) residents in Wisconsin. Modeled after the National Health and Nutrition Exam survey SHOW provides a unique opportunity to conduct multi-level assessments of the built environments impact on physical activity and chronic disease. Households are selected using two-stage cluster sampling; recruitment and initial interviews are done at the household; additional interviews and physical exams (including collection of blood samples) are conducted at permanent or mobile examination centers. Between 2008 and 2010, 1,550 participants have been recruited. Households are geocoded and linked with contextual data including objective audits of the social and built environment.
Results: Positive neighborhood resources are more predictive of physical activity than individual's perception of their neighborhoods as a place to be physically active. Depression, age and obesity modify these relationships. The percentage of SHOW participants reporting some physical activity compared to no physical activity is significantly greater when individuals report having interesting destinations within easy walking access. An estimated 86% report some physical activity when living within less than a 20 minute walk of a park. Similar trends are seen for recreational facilities, walking trails, and elementary schools.
Conclusions: Despite individual perceptions and mental health, increasing neighborhood resources within short walking distances may provide important opportunities to increase physical activity.

EXPOSURE MISCLASSIFICATION BIAS IN ENVIRONMENTAL EPIDEMIOLOGY: WITHIN-HOUSEHOLD RESPONSE CONCORDANCE ON HOUSEHOLD CHARACTERISTICS IN THE 2008-2010 SURVEY OF THE HEALTH OF WISCONSIN (SHOW)

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Background and Aims: Environmental exposure assessment often relies on survey data which can lend itself to misclassification and recall bias that can lead to null associations and unreliable exposure estimates. Large-scale studies such as NHANES randomly choose one participant from each household to obtain information about characteristics of that home. It is assumed that the answers given to basic household characteristic affecting health outcomes would be the same for all residents from that household. The goal of this study was to test the assumption to estimate the extent this leads to discrepant exposure and risk estimates..

Methods: In the SHOW study, the same household characteristic questionnaire was administered to multiple respondents within each household, allowing for analysis of variations in response patterns. The SHOW study consists of a series of annual surveys gathering health-related data on a representative sample of Wisconsin residents age 21-74. A total of 1,043 households have been enrolled in SHOW; of these, 494 households had two or more respondents.

Results: For this analysis, we focused on the following household characteristics (percent discrepant between respondents within household): report of peeling paint outside the house (24.6%), recent indoor pesticide use (21.6%), past radon testing (21.4%), black grout or caulk (19.4%), use of water filtration system (19.2%), mildew or mold odors (19.1%), outdoor weed killer/insecticide use (18.0%), water stains on walls or ceilings (17.4%), household smoking policy (16.1%), peeling paint in the home (13.4%), and source of water supply (4.0%).

Conclusions: Preliminary analysis indicates that agreement within households may be associated with concordance of individual education (p-value=0.03) and income levels (p-value=0.04) among respondents. For studies designed to look at household characteristics, these results indicate the need to rely on more than one respondent or the potential benefit of external verification of responses to improve exposure estimates.

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BICYCLIST BLACK CARBON EXPOSURE AND THE IMPACT OF ROUTES CHOICE AND BIKING FACILITIES, A SPATIAL ANALYSIS

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Background and Aims: Personal exposure to Black Carbon is strongly related to activity pattern and more specifically linked to the time spent in traffic related micro-environments. Enhancing bicycle use is a popular policy measure but has a risk of increasing exposure to air pollution.

Methods: A mobile measurement campaign was set up in the city of Ghent, Flanders to explore the spatial and temporal variability of Black Carbon (BC) exposure for bicyclists in urban and suburban areas. More than 100 commuting trips (>= 8 km)were cycled while carrying a micro-aethalometer over a time span of several months.

Results: The focus of the study is on the spatial and temporal variability of BC exposure and we investigate how the variation relates to geographic, meteorological and local traffic volume parameters. This analysis allowed showing that the exposure to BC can be significantly different when specific cycling facilities are used. Although, during the lowest exposure parts of the individual trips, a significant contribution from background concentrations as observed by the national air pollution monitoring network could be shown, our results clearly indicate that local sources are rather important and thus a cyclist can affect its exposure by careful route choice. Of particular interest are BC concentrations in the vicinity of highways where an influence of wind direction and screening by buildings and noise barriers was observed. Increased BC concentrations are also observed while passing through street canyons with high traffic loads, as expected.

Conclusions: The spatial and temporal evaluations are used to identify the potential relevant geographic parameters to build a general exposure model for bicyclists. In most cases stronger variations were found for the black carbon than was expected from known spatial variations of UFP en PM2.5.A geo-statistical analysis is performed to support these preliminary findings.

THE EFFECT O F STATINS ON HOSPITALIZATION OF SUBJECTS WITH INFLUENZA A H1N1: CASE-CONTROL POPULATION BASESTUDY FROM MEXICO

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Background and Aims. To assess the effect of consumption of statins in hospitalization of subjects with influenza A H1N1.

Methods. The study included patients with diagnostic of pandemic influenza A H1N1 (pH1N1), who were diagnosed with the disease during the pandemic (July 2009-September 2009) in the Mexican Institute of the Social Security. During this period there were 4233 cases with pH1N1. The cases were all the inpatient subjects above 18 years old for pH1N1 (N=604). The controls were outpatient subjects higher than 18 years old with diagnostic of pH1N1 (N=1812), the controls were matched by state of residence. For this report we just had information of 383 cases and 727 controls. A questionnaire where information about consumption of atorvastatin, simvastatin, pravastatin, lovastatin, rosuvastatin, fluvastatin, cerivastatin and bezafibrate was included; pregnancy and chronic diseases were included too. The logistic regression was realized, odds ratio (OR) with 95% confidence intervals (95%CI) were reported.

Results. The frequency of consumption of pravastatin was of 2.1% and 2.2% for benzafibrate, the others statins had a frequency below of 0.5%. The effect on hospitalization for pH1N1 of pravastatine was of 0.24 (95% CI 0.03,1.97), to bezafibrate was of 0.47 (95% CI 0.06,3.40). The pregnant women had a risk of hospitalization for pH1N1 of 2.91 (95% CI 1.25,6.81) and the subjects with diabetes had a risk of 3.33 (95% CI 1.42, 7.83).

Conclusions These are preliminary results but the consumption of pravastatin and/or bezafibrate would prevent the hospitalization in infected subject for the pH1N1. The project was supported by the Fondo Sectorial de Investigacion en Salud CONACYT.

INTERACTION BETWEEN THE SUSCEPTIBILITY TO DEVELOP ACUTE LEUKEMIA IN CHILDREN AND PATERNAL SMOKING

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Background and Aims. It has been suggested that acute leukemia (AL) can be the result of the interaction between inherited susceptibility to the disease and exposure to different carcinogenic factors. The present study evaluates the interaction between the susceptibility to develop acute leukemia and paternal smoking as a risk factor.
Methods. A Case-control study with selection by the susceptibility was realized; we had two types of cases and controls: 47 children with Down syndrome (DS) and AL who are known to be highly susceptible to develop AL, 423 children with AL without DS from the same population-base, a group of 207 children with DS without AL, and another group of children neither AL nor DS. The interaction was assessed with logistic regression. The results were adjusted by different variables. In our data there was not interaction between susceptibility for developing AL and paternal smoking.
Results. The paternal smoking prior to the conception had an odds ratio (OR) of 5.9 (95% confidence interval, CI, 2.3, 15.8) when entire population was analyzed. In the population with DS the OR was 0.8 (0.4, 1.7) and in the group without SD was 5.4 (1.9, 15.1). With the postnatal paternal smoking the ORs were 2.6 (1.1, 6.5), 0.4 (0.2, 0.8) and 2.6 (1.1, 6.43), for entire population, children with DS and children without DS, respectively.
Conclusions. The results did not show an interaction between the susceptibility for developing AL and paternal smoking. However the risks for paternal smoking before and after the conception were very high in the population without DS. The project was supported by the Fondo Sectorial de Investigacion en Salud CONACYT.

RIESGO DE DESARROLLAR LEUCEMIA AGUDA. INTERACCIÓN ENTRE EL TABAQUISMO DE LOS PADRES Y LA SUSCEPTIBILIDAD A LA ENFERMEDAD. UN MODELO PARA EVALUAR LAS CAUSAS DE LA LEUCEMIA EN NIÑOS. Mejia-Arangure JM, Perez-Saldivar ML, Flores J, Bernaldez R, del Campo MA, Medina A, Palomo MA, Paredes R, Martínez A, Borja VH, Rodriguez MJ, Vargas VM, Zarco J, Rivera R, Flores H, Gorodezky C, Salamanca F and Fajardo-Gutiérrez A. Hospital de Pediatría, Instituto Mexicano del Seguro Social, México, D.F., México.

INTRODUCCION. Se ha sugerido que la leucemia aguda (LA) en los niños es el resultado de la interacción entre la susceptibilidad a la enfermedad y la exposición a diferentes factores cancerígenos.

OBJETIVO. Evaluar la interacción entre la susceptibilidad a desarrollar leucemia aguda y el tabaquismo de los padres como un factor de riesgo.

MATERIAL Y METODOS. Se hizo un estudio de casos y controles seleccionados por la susceptibilidad. Se tuvieron dos tipos de casos y dos tipos de controles: 47 niños con síndrome de Down (SD) y LA que son niños con una susceptibilidad elevada para desarrollar LA, 423 niños con LA y sin SD de la misma base poblacional. Un grupo de 207 niños con SD sin LA y otro grupo de niños sin LA ni SD. La interacción fue evaluada a través de un modelo de regresión logística y los resultados fueron ajustados por diferentes variables potencialmente confusoras.

RESULTADOS. No se encontró interacción entre la susceptibilidad a la leucemia y el tabaquismo de los padres. El tabaquismo paterno previo a la concepción tuvo una razón de momios (RM) de 5.9 (Intervalo de Confianza 95% de 2.3 a 15.8) cuando fue evaluada toda la población. En la población con SD la RM fue de 0.8 (0.4-1.7) y en el grupo sin SD fue de 5.4 (1.9-15.1). Con el tabaquismo post natal la RM fue de 2.6 (1.1-6.5), 0.4 (0.2-0.8) y 2.6 (1.1-6.43) para la población total, los niños con SD y los niños sin SD, respectivamente.

CONCLUSION. Los resultados no mostraron una interacción para desarrollar LA entre la susceptibilidad a la enfermedad y la exposición paterna al tabaco. Sin embargo los riesgos para el tabaquismo paterno antes y después de la concepción fueron muy elevados entre los niños sin SD.

BIOMASS BURNING CONTRIBUTIONS TO URBAN AEROSOLS IN A COASTAL MEDITERRANEAN CITY

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Background and Aims: Carbonaceous matter is a major constituent (up to 80%) of atmospheric aerosols in urban areas (Rogee at al., 1993; Pakkanen et al., 2000; Harrison et al., 2004) so that understanding the sources of such material is highly relevant to particulate matter (PM) control strategies. Biomass combustion is one of the main sources, both controlled and from wildfires. Therefore, the objective of the work is to investigate the concentrations in ambient air of biomass combustion tracers, such as levoglucosan, in the urban environment of a south European city, Barcelona (Spain), firstly to check if concentrations are large enough to be analysed, then to compare them with values obtained in urban environments in other geographical areas and, finally, to quantify the contribution of biomass burning to PM levels.
Methods: Measurements were carried out at an urban background monitoring site located in Barcelona (Spain) in the framework of the international DAURE campaign (winter 2009). The biomass burning impact to PM levels was quantified by means of levoglucosan, K^+ and OC concentrations and the receptor model Multilinear Engine 2 (ME-2) introducing the following constraints: upper limits for ammonium and K^+, a lower limit for OC and a target OC/levoglucosan ratio of 6.1±0.3.
Results: The significant correlation between levoglucosan and OC (r^2= 0.77) and K^+ (r^2=0.65), as well as a marked day/night variability of the levoglucosan levels during the DAURE campaign were indicative of the contribution of biomass burning emissions from around Barcelona during night-time for heating purposes (3±1% of $PM_{2.5}$ aerosols). In addition, on specific days (21-22th March), the contribution from regional or long-range transported biomass burning aerosols was detected (6±1% of $PM_{2.5}$). The model Multilinear Engine-2 allowed quantifying the contribution of this source on an annual basis, it accounted for 3% of PM_{10} and 5% of $PM_{2.5}$ and PM_1 in 2009.
Conclusions: The biomass burning impact was detected at an urban background site in Barcelona despite the complexity of the source mixture affecting the air quality of the city, characterised by notable primary and secondary traffic emissions. Two main emissions sources were identified: domestic emissions from heating and regional transported aerosols from forest or agricultural fires. The contribution of biomass burning to PM_{10}, $PM_{2.5}$ and PM_1 levels in winter was much lower than in urban environments in north and central European regions, indicating that heating habits differ widely among EU regions.

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COMPLICATIONS OF LABOR AND DELIVERY AMONG US WOMEN WITH ASTHMA, CONSORTIUM ON SAFE LABOR

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Background/Aims: Pregnant women with asthma may be at particular risk from air pollution exposures because poor pregnancy and infant outcomes have been independently associated with maternal asthma and with air pollutant exposure. We describe the labor and delivery complications from a US nationwide study, the Consortium on Safe Labor and assess differences between women with asthma and those without asthma.

Methods: The Consortium on Safe Labor (CSL) included 12 US clinical centers with a geographic distribution that will allow future analysis of air quality in relation to birth outcomes. A total of 228,668 deliveries with 233,844 newborns between 2002 and 2008 were included in the study. Extensive electronic medical record data on maternal and newborn information was captured. This preliminary analysis is based on the first delivery from each woman in the study (n= 206,969) and we examine the characteristics and labor and delivery complications of women with asthma compared to women without asthma.

Results: In the CSL, 13,716 women (6.6%) had a history of asthma noted in their medical records and 8,305 (4%) had asthma during the prenatal period. Preliminary findings show that women with asthma during pregnancy were more often Non-Hispanic Black or White than other race/ethnicities, generally younger, not married, and had public insurance. No differences in parity were observed. Behavioral and medical risk factors (smoking, alcohol use, obesity, diabetes, hypertension) were all more common among asthmatics. Asthmatic women were more likely to experience preeclampsia (4.3% vs. 3.3%), and less likely to have spontaneous labor (58.7% vs. 60.8%). Infants born to asthmatic mothers were more likely to weigh <2500 grams (12.8% vs. 9.3%).

Conclusions: Preliminary results suggest pregnant women with asthma may constitute a particularly vulnerable subpopulation and further research on the impact of air quality in relation to pregnancy and infant outcomes of asthmatic women is needed.

The role of non-governmental organizations in promoting occupational and environmental carcinogen regulation

Lisette van Vliet, PhD, *Toxics Policy Advisor, Health and Environmental Alliance*

In Europe an estimated 1 in 3 are diagnosed with cancer, and 1 in four will die from cancer. As the overall incidence seems to continue to rise, the contribution of environmental regulations towards cancer prevention becomes increasingly important. Experts recently meeting under the auspices of the World Health Organisation declared that a substantial percentage of all cancers are caused by environmental and occupational exposures, and that primary prevention of such exposures is the single most effective means to prevent cancer.

In the European Union, there is a complicated range of environmental laws and policies that address and control the uses of cancer-related chemicals: the most notable being chemicals (REACH), pesticides and workers protection laws. Others include biocides, outdoor air quality, water quality, toys, cosmetics, and food contact materials.

This talk covers how public interest organisations in general, and the Health and Environment Alliance in particular, work to improve cancer prevention: strengthening the formulation and application of environmental policies by highlighting important science to policy makers at appropriate junctures; running public awareness campaigns to engage citizens and affected groups; and identifying opportunities for policy revisions that can bolster prevention. For example, during the revision of the EU pesticides laws NGOs pointed to the increasing body of evidence on pesticides' impact on vulnerable groups, and insisted on the need to address endocrine disrupting chemicals.
How do NGOs work on the vaunted EU chemicals legislation REACH, what are our experiences so far?
What is the role of NGOs in the new Pesticides laws, with its high water marks prohibiting cancer-related chemicals?
How do NGOs use the epidemiological evidence to initiate and reinforce the policies?
How does Europe fare from an NGO perspective, and what are the main challenges both in particular policy areas, and in horizontal matters?

Doll and Peto Revisited: current knowledge about occupational and environmental causes of cancer

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In 1981 Doll & Peto provided the most comprehensive, at that time, estimates on the causes of cancer. Occupational exposures were estimated to produce around 4% of all cancers and environmental around 3%. Research in occupational and particularly environmental causes of cancer has dramatically expanded since then. At the same time, exposures were modified: many classical occupational carcinogens were controlled in industrialised countries; others were simply transferred to developing countries, while new exposures occurred. Half of today's recognized occupational carcinogens (IARC group 1) were already recognized as such by 1964; by contrast, > 95% of today's probable and possible occupational carcinogens were not even mentioned in the mid1960s, and about one-third were not mentioned as of 1987. A recent evaluation on occupational carcinogens in the UK provided a similar proportion as that suggested 25 years earlier. Estimates by the WHO on environmental cancer are slightly higher now, compared to those estimated by Doll & Peto. Exposure assessment is among the most important issues today in research on environmental and occupational cancer and should be regarded as the "Achilles heel" for research. Existing cohort studies may not be appropriate for future research that will depend heavily on the use of modern technological approaches such as satellite imaging, GIS, remote sensing and extensive use of biomarkers. The extent to which the use of "omic" technologies will help identify more environmental carcinogens and provide better estimates, is still uncertain. The emerging research model in environmental epidemiology is multidisciplinary, possibly focused more on cross-sectional and prospective cohorts and broadly collaborative.

Role of the ISEE in Evaluating Scientific Evidence and Making Policy Recommendations

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Background: Environmental epidemiology has made major contributions to the scientific basis for establishing environmental health policies. However, the role of epidemiology is less clear as governments and international organizations have given greater emphasis to precautionary, preventive oriented approaches to replace current reactionary approaches to environmental health policy. The ISEE is an international professional society with members from more than 50 countries. The ISEE Executive Council undertook a process to evaluate whether the Society should form a Policy Committee and to determine the mission and scope of such a committee.
Methods: The ISEE Executive Council established an *ad hoc* policy planning committee that recommended the formation of a standing Policy Committee and the conduct of a membership survey to clarify the standing committee's mission and scope. An online membership survey was administered in 2011 that contained questions on policy issues.
Results: This presentation will provide a summary of the *ad hoc* policy committee report and the findings of the membership survey. 394 ISEE members responded to the survey out of 895 current members. There was clear support – "strongly agree" or "agree" – that the ISEE should establish a Policy Committee (67%), that ISEE has a role to play in proactively identifying important policy issues (87%), and that the Policy Committee should provide policy makers and the public with expert opinion on scientific questions (83%). There was less consensus on whether ISEE policies should focus only on issues related to the professional practice of environmental epidemiology (45%) versus those wanting a larger scope (32%) and whether the ISEE should take positions on specific laws and regulations (31%) versus only taking general positions on scientific issues (46%).
Conclusions: The ISEE membership strongly endorsed establishing a Policy Committee, taking policy positions on the professional practice of environmental epidemiology and providing expert opinion on scientific questions related to environmental epidemiology.

Introduction and description of REACH and U.S. President's Cancer Panel

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Background: A new approach to regulating chemicals in commerce, called Registration, Evaluation, Authorization and Restriction of Chemical Substances (REACH), was developed in the European Union and adopted in 2007. Its provisions require that chemical manufacturers provide more information to the European Chemicals Agency about health risks and environmental effects than previously required. Certain substances "of very high concern" such as persistent bioaccumulative toxicants, are ultimately to be phased out but will in the interim go through a stringent control and permission process. Certain types of high concern substances will only be permitted if there are no feasible alternatives and overwhelming socio-economic reasons. The U.S. President's Cancer Panel report released in May 2010 reviewed information about occupational and environmental carcinogenic exposures provided by scientists over the period 2008-2009. The Panel and staff identified numerous deficiencies in current U.S. policies and recommended a new regulatory approach that would be more precautionary and prevention oriented. This report received considerable media attention and drew both criticism and praise from a range of U.S. cancer prevention advocates, scientists and organizations. The ISEE was asked to endorse the report in Summer 2010, but currently does not have a mechanism for doing this.
Methods: The European Commission's Environment Department assessed the health impacts and costs to industry of the REACH program. In a 2003 report, the EC projected costs of between 2.8 and 5.2 billion Euros over an eleven to fifteen year implementation period. Health benefits were estimated at 50 billion Euros over the next thirty years. In the U.S., literature on occupational and environmental causes of cancer was reviewed and presented to the President's Cancer Panel by several ISEE members. An eight-page summary table was included as an Appendix to the Panel's 2010 report and will be described.
Results: REACH regulations have gradually been implemented and have made substantial impact on European and North American chemical manufacturers. In 2011, six substances of very high concern were listed as candidates for phase-out. The U.S. President's Cancer Panel report has been cited in support of new chemicals policy legislation, the Safe Chemicals Act of 2011.
Conclusion: Important public health regulations in the EU and proposed legislation in the U.S. have benefited from environmental health and epidemiologic research. ISEE can play a more active organizational role in support of such policies. Endorsement of the U.S. President's Cancer Panel 2010 report should be considered in this context.

The President's Cancer Panel report and future research needs

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The US Presidents Cancer Panel is an advisory committee originally established by the National Cancer Act of 1971, charged with reporting to the President on important issues on cancer. In 2010 the current panel, consisting of 2 scientists published the 2008-2009 annual report, focusing specifically on environmental cancer risk, based on testimony from 45 representatives of academia, government, industry, the environmental and cancer advocacy communities and the general public. The overall conclusion from this report was that we do not understand enough about the environmental origins of cancer and that the precautionary principle needs to be employed more when considering the introduction of new chemicals into the general population. They also emphasized the need for more focus on vulnerable populations and periods of life such as *in utero* and early childhood. In this talk I will give an overview of the major findings and conclusions from this report, as well as some of the discussion that followed in the scientific and lay literature after its publication. Specifically, in the context of what we already do know, I will present the environmental risks deemed by the council to be important for further study and their suggestions about future research and policy needs. I will also discuss some of the challenges in studying the environment and cancer, emphasizing the need for new developments in exposure assessment.

HEALTH EFFECTS OF THE LACK OF ORGANIZED WASTE DISPOSAL IN UNRECOGNIZED BEDOUIN VILLAGES IN THE NEGEV AREA OF ISRAEL – IMPLICATIONS FROM MULTI-METHOD STUDIES OF HEALTH STATUS AND WASTE DISPOSAL PATTERNS

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Background and aims: The Bedouin of the Negev region of Israel are a formerly nomadic, indigenous, ethnic minority, of which 40% currently live in unrecognized villages without organized, solid waste disposal.
Methods: Findings from two studies, using both quantitative and qualitative methods, explored the health effects of transition from traditional rubbish production and disposal to current uses, the current composition of rubbish, methods of waste disposal, and the extent of exposure to waste-related environmental hazards among Bedouin women of the Negev. The first study based on personal interviews (N=202) and was compared to a comparable survey among Jewish women from the Negev (N=526). The second study was carried out over 6 months in the village of Um Batim and included observations, waste documentation, GSI mapping and personal interviews (N=58).
Results: Bedouin women reported higher rates of urinary tract infections (52.5% vs. 13.9), gynecological problems (18.7% vs. 14.7%), and asthma or respiratory tract infections (13.8% vs. 8.0%) than Jewish women reported. The modern, consumer lifestyle produced both residential, animal and construction waste which was dumped very close to households (range 3-65 meters, average 33). Waste was tended to by women who predominantly used backyard burning for disposal (79%), exposing villagers, predominantly women and children to corrosive, poisonous and dangerously flammable items at these burn sites. Village residents expressed a high level of concern over environmental hazards, yet no organized waste disposal or environmental hazards reduction was implemented.
Conclusions: Excess reported morbidity may be related to exposure to backyard burning of household and animal waste. More direct measurement of exposure to toxins from backyard burning is recommended to validate the exposure-morbidity axis. An on-going program to train women environmental activists and to introduce biogas digesters to handle animal and household organic waste hopes to provide partial solutions to the observed environmental health problems.

AN APPROACH TO MULTI-POLLUTANT ACCOUNTABILITY RESEARCH USING PRINCIPAL STRATIFICATION

Corwin Ziegler, *Harvard School of Public Health, USA*
Francesca Dominici, *Harvard School of Public Health, USA*

Air quality regulations are typically enacted with the goal of improving public health, and large-scale regulations that reduce ambient air pollution are often accompanied by improvements in mortality and morbidity. However, whether observed improvements in health are due to a regulation or to concurrent trends in other risk factors often remains uncertain. Quantifying health effects of actions taken to improve air quality, also known as accountability research, is challenging for large-scale efforts meant to improve air quality and health over a long period of time and over large geographical areas.

In this talk we will introduce a potential-outcomes framework for accountability research that uses a Bayesian MCMC computational strategy. The approach stratifies areas based upon the estimated causal effect of an air quality regulation on ambient air pollution and assesses the causal effect of the regulation on health outcomes within these strata. As regulations may affect concentrations of many interrelated pollutants, we extend the use of principal stratification to a multi-pollutant approach that accommodates a multivariate intermediate response vector. Furthermore, we make use of recent advancements in hierarchical modeling for point-referenced spatial data to capitalize on information contained in the geographic locations of the pollution measurement sites.

Insofar as these methods rely on unobserved potential outcomes, they rely on assumptions regarding associations not identified based on observed data, indicating the importance of sensitivity analyses. We apply our method to examine whether the 1990 Clean Air Act Amendments causally affected Medicare mortality through affecting ambient concentrations of particulate matter and ozone.

EPIDEMIOLOGY AND AIR QUALITY STANDARDS

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Air quality standards have been driven by epidemiological evidence for a long time. This has the advantage that no extrapolations are needed from high to low dose, or from animal to human. The disadvantage is that, due to the observational nature of epidemiology, causality of associations between air pollution and ill health are sometimes difficult to establish. As a consequence, fierce debates sometimes erupt about the epidemiology database for regulation.

In the US and the EU, slightly different approaches to setting air quality standards are being used, and implementation of standards is also slightly different. In the presentation, air quality standards for NO_2 and airborne particulate matter will be compared, and the use of epidemiological data in support of standard setting will be highlighted.

MAINTAINING THE RELEVANCE OF EPIDEMIOLOGY: ADDRESSING THE FULL SCALE FROM EXPOSURE TO POLICY WITHIN AN INTERACTIVE ENVIRONMENT

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Evi Samoli, *University of Athens Medical School, Greece*
Antonis Analitis, *University of Athens Medical School, Greece*

The wide recognition of air pollution, either at higher or at medium-lower levels of concentrations, as one of the most important public health problems has been a result of extensive and complementary research and of effective communication with stakeholders and decision makers. Today we are faced with questions and challenges to provide better answers for management and preventive strategies which will maximize the benefits for public health worldwide. In exposure assessment, on the one hand looking into greater detail, we need to understand the role of specific particle chemical and physical characteristics for each health outcome. On the other hand, we need to assess the role of mixtures of pollutants and the contribution of sources. For the estimation of exposures in locations with minimal monitoring, the uses of new technologies are explored. Concerning the causality of the pollutant-health outcome associations, studies on the mechanisms of effect using biomarkers of exposure and early effects, as well as epigenetics, both for cancer and cardiovascular endpoints are employed. A very important item in the chain leading to health protection, is the best use of evidence for assessing costs and benefits to result in useful standard setting. In this respect, a view placing air pollution reduction benefits in a more global context involving other environmental factors (which may originate e.g. from the urban environment, from specific life styles, or be related to climate changes), taking advantage of established synergies or seeking to explore other interactions can become very advantageous.

SATELLITE-BASED $PM_{2.5}$ EXPOSURE ASSESSMENT AND ITS IMPLICATIONS FOR EPIDEMIOLOGICAL STUDIES

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Background and Aims: Satellite-based $PM_{2.5}$ air quality monitoring data has been used to complement ground $PM_{2.5}$ monitoring networks, especially for regions with sparsely distributed $PM_{2.5}$ monitors. This study developed a statistical method to predict daily $PM_{2.5}$ concentrations for both retrieval and non-retrieval days.

Methods: AOD data from 2003 MODIS and GOES was used to predict surface-level $PM_{2.5}$ concentrations based on a mixed effects model with random intercepts and slopes, allowing daily calibrations of $PM_{2.5}$-AOD relationships, in the New England region. The model using MODIS AOD was also applied to an extended study period (Years 2000-2008), using daily spatial patterns of $PM_{2.5}$ ground measurements to estimate $PM_{2.5}$ concentrations for non-retrieval days. This model for non-retrieval days took into account the temporal variability of regional $PM_{2.5}$ levels along with a spatial smoothing function of coordinates.

Results: The AOD-derived $PM_{2.5}$ concentrations were compared with the measured $PM_{2.5}$ concentrations, and both 2003 MODIS and GOES AOD predicted ground $PM_{2.5}$ concentrations quite well (CV R^2=0.92 for MODIS; CV R^2=0.89 for GOES). For the entire period of 2000-2008, this model presented high $PM_{2.5}$ predictability for both retrieval (CV R^2=0.88) and non-retrieval (R^2=0.81) days. The spatial pattern of $PM_{2.5}$ for 9 years overlapped quite well with mapping of dense population areas, major interstate highways, and high point emission sources.

Conclusions: This statistical model greatly improved the $PM_{2.5}$ predictability for both retrieval and non-retrieval days (compared to previous methods that did not use daily calibrations), and the predicted $PM_{2.5}$ concentrations may be reliably applied to epidemiological studies. Our study indicates that satellite-based $PM_{2.5}$ exposure assessment can reduce the exposure measurement error which is likely to occur for current epidemiological studies using sparse ground $PM_{2.5}$ monitoring networks.

GLOBAL AIR POLLUTION AND HEALTH: WHAT TO DO WITH NON-LINEAR EXPOSURE-RESPONSE RELATIONSHIPS?

Kirk R. Smith, University of California, Berkeley, USA

Modern epidemiologic studies of combustion particle exposures increasingly find that extreme non-linear exposure-response relationships best fit the data for many important health outcomes. Prominent among these are adult cardiovascular outcomes and child pneumonia, which together are probably responsible for half or more of the global burden of disease from the four major exposure categories – outdoor pollution, environmental tobacco smoke, household pollution from cooking, and active smoking. Although there are physiological mechanisms that could explain such non-linearity, the policy implications are far from clear. As an example, one implication of such non-linearity is that the health benefits of modest exposure reductions in relatively clean cities would be greater than the great changes in exposure that would result in moving smokers to non-smoking status. In addition, it implies that there are important and unexamined interactions among the particle exposure categories, for example for a women living with a smoking husband and cooking over an open fire in a slum of a polluted city. What part of her exposure is the most important? Or is it all equivalent? How do we think of policy strategies to maximize the cost-effectiveness of interventions under such non-linearity? And what are the equity considerations? These issues will be explored in the global context, where the total burden of disease from combustion particles is currently estimated at nearly 8 million premature deaths a year, greater by far than any other environmental risk factor.

BIOLOGICALLY DRIVEN APPROACHES TO THE STUDY OF AIR POLLUTION: THE EXAMPLE OF LUNG CANCER

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The association between ambient air pollution exposure and lung cancer risk has been evaluated in prospective studies and the results are generally consistent, indicating that long-term exposure to air pollution might be causally related to lung cancer. The contribution of intermediate biomarkers in epidemiological studies will be assessed in our presentation, to ascertain whether biomarkers can reinforce causal reasoning. Using online databases and manual references we have identified papers which evaluated the effects of ambient air pollution using biological measures of dose and/or effect. The cumulative evidence for each biological measure was assessed by us using the Venice criteria which rate a group of studies from A (strong) to C (weak) on amount of evidence, replication of findings, and protection from bias. We consider here biological measures that scored A or B for all three criteria. The biological measures that fulfilled these criteria are: 1-Hydroxypyrene, DNA adducts, chromosomal aberrations, micronuclei, oxidative damage to nucleobases, and methylation changes. These biological measures cover the whole spectrum of progression from external exposure to tumor formation, adding to the plausibility of a causal association between air pollution and lung cancer. As DNA adducts, chromosomal aberrations, micronuclei and 8-oxo-7,8-dihydro-2'-deoxyguanosine have been suggested to be predictive for future cancer risk in some studies, these results support causality of an association between air pollution and lung cancer risk. We will also present results of pilot studies on epigenetics in relation to air pollution, and will discuss the role of epigenetics in lung carcinogenesis.

Overview: emphasizing the critical knowledge gained from the Chernobyl experience

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Background and Aims - Twenty-five years have passed since radioactive releases from the Chernobyl nuclear accident led to exposure of millions of people in Europe. Studies of affected populations have provided important new data on the links between radiation and cancer – particularly the risk of thyroid tumours from exposure to iodine isotopes - that are important not only for a fuller scientific understanding of radiation effects, but also for radiation protection.

Methods – The presentation reviews the epidemiological evidence to date concerning cancer and non-cancer outcomes published in the peer-reviewed international literature and discusses the information which further, well-structured studies of specific exposed populations may provide for the quantification of radiation risks and the protection of persons exposed to low doses of radiation.

Results – It is now well-documented that children and adolescents exposed to radioiodines from Chernobyl fallout have a sizeable dose-related increase in thyroid cancer, with risk greatest in those youngest at exposure and with a suggestion that deficiency in stable iodine may increase the risk. Data on thyroid cancer risks to other age groups are somewhat less definitive. In addition, there have been reported increases in incidence and mortality from non-thyroid cancers and non-cancer endpoints. Although some studies are difficult to interpret because of methodological limitations, recent investigations of Chernobyl clean-up workers ("liquidators") have provided evidence of increased risks of leukaemia and other hematological malignancies and of cataracts, and suggestions of an increase in risk of cardiovascular diseases, following low doses and low dose rates of radiation.

Conclusions – Further careful follow-up of these populations, and the establishment and long-term support of life- span study cohorts, may continue to provide important information for the quantification of radiation risks and the protection of persons exposed to low doses of radiation.

INTELLECTUAL AND PSYCHOSOCIAL FUNCTIONING IN PERSONS EXPOSED IN UTERO TO CHERNOBYL FALLOUT IN BELARUS

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Background and Aims – Investigation of intellectual and psychosocial development of persons from Belarus exposed *in utero* to radiation following the Chernobyl accident in 1986. Antenatal exposure of the thyroid gland to radioiodine is one of the factors that might impact upon intellectual development.

Methods – Intellectual and psychosocial assessments were performed on 250 persons randomly selected from children exposed to Chernobyl fallout *in utero* recorded in the Belarusian Chernobyl State Registry and 250 controls similar in age drawn from settlements with ^{137}Cs soil levels indicating little radioactive contamination. The mean fetal thyroid doses from ^{131}I intakes by the mother were estimated to be ~ 400 mGy in the exposed group and 40 mGy among controls; mean fetal doses from external exposure were estimated at 10 mGy and 0.2 mGy respectively. Intellectual development was evaluated at ages 6–7, 10–12, and 15–16 years using the Wechsler Intelligence Scale for Children (WISC-III^{UK}) validated for use in adolescents. Psychosocial assessments were based on interviews with subjects and their parents. We used t-tests to analyze continuous variables and χ^2 tests for comparisons of proportions.

Results – At 6–7 years of age, the exposed group had a lower mean full-scale intelligent quotient (*IQ*) compared to controls (89.6±10.2 vs 92.1±10.5, P=0.007). Group differences at 10–12 years (94.3±10.4 vs 95.8±10.9) and 15–16 years (98.2±10.7 vs 99.5±10.5) were not significantly different. Inverse correlations were observed between prenatal exposure dose and *IQ* both for (i) ^{131}I: at 6–7 years (r =-0.11), at 10–12 years (r=-0.21), at 15–16 years (r=-0.29); and (ii) external irradiation: at 6–7 years (r=-0.14), at 10–12 years (r=-0.13), at 15–16 years (r=-0.19) but were not statistically significant. The exposed group had a higher incidence of developmental disorders of speech, language and motor function, and childhood-onset emotional disorders and disorders of social functioning.

Conclusions – Unfavorable social-psychological and social-cultural factors (low parental education level, adaptation difficulties following relocation from contaminated areas) proved to play a significant role in the genesis of borderline intellectual functioning and emotional disorders in *in utero* exposed persons.

Effects Of Exposure Later In Life: Cancer And Cardiovascular Disease Among Chernobyl Cleanup Workers From The Most Affected Countries

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Background and Aims. The current presentation summarizes results of studies of radiation risks among Chernobyl emergency workers (liquidators) conducted over the last 25 years and empahizes the importance of future follow-up of this cohort for radiation research.

Methods. Cohort and case-control studies of radiation risks, conducted among liquidators from Russia, Ukraine, Belarus and Baltic countries are reviewed.

Results. Two case-control studies with detailed individual dose reconstruction – one conducted in Belarus, the Russian Federation and the Baltic countries, and the other in Ukraine (in collaboration with the International Agency for Research on Cancer and the National Cancer Institute respectively) – reported similar estimates of leukaemia risk among Chernobyl liquidators: the ERRs for all leukaemia were 4.8/Gy (90% CI: n.d. – 33.1) and 3.44/Gy (95% CI: 0.47 - 9.78), in the IARC and NCI study, respectively. These are slightly higher but statistically compatible with those estimated from A-bomb survivors and recent low-dose-rate studies. A similar case-control study of thyroid cancer was also conducted in Belarus, the Russian Federation and the Baltic countries, suggesting an increased risk of thyroid cancer following low dose-rate exposures to external radiation and I-131 in adults. Follow-up of the cohort of Russian liquidators also suggested an increased risk of mortality from solid cancers ERR/Gy=0.74 (95% CI: 0.03; 1.76) and circulatory system diseases ERR/Gy=0.41 (95% CI: 0.02; 0.86).

Conclusions. Because of the size of the exposed populations (600-800 000 in total from all over the former USSR), the range of doses received, the possibility to obtain or reconstruct individual radiation dose estimates for a large proportion of the population, liquidators cohorts are particularly suited to improve our knowledge on effects of radiation received at low doses and dose rates, thus providing evidence to assess the adequacy of current basis for international radiation protection guidelines.

RESULTS OF UKRAINIAN-AMERICAN PROJECT FOR THE STUDY OF THYROID CANCER IN COHORT EXPOSED TO CHERNOBYL FALLOUT AS CHILDREN OR ADOLESCENTS

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Background and aims – As a result of the accident at the Chernobyl Nuclear Power Plant, millions of residents of Belarus, Russia and Ukraine were exposed to significant doses of radioactive iodine isotopes, mainly I-131. The purpose of the Ukraine-American Thyroid Project is to quantify the risk of thyroid cancer and other thyroid diseases in the framework of a classical cohort study, comprising subjects who were aged up to 18 years at the moment of the accident, had direct measurements of thyroid I-131 activity taken within two months after the accident, and were resident in three heavily contaminated northern regions of Ukraine (Zhytomyr, Kyiv, and Chernihiv oblasts).
Methods - Four two-year screening cycles have been implemented: 13,243 subjects were screened in cycle 1 (1998-2000); 12,419 (93.8%) in cycle 2 (2001-2002); 11,745 (88.7%) in cycle 3 (2003-2004); and 10,186 (76.9%) in cycle 4 of screening. A standardized procedure of clinical examinations included: thyroid palpation, ultrasound examination, blood collection followed by a determination of thyroid hormone levels, urinary iodine content test, and, if indicated, fine needle aspiration. Individual I-131 doses on cohort member's thyroid were assessed from I-131 activity measurement in the subject's thyroid and extended dosimetry interview data (mean dose = 0,79 Gy; dose range - 0 to 40 Gy).
Results - 45 prevalent cases of thyroid carcinoma have been detected in cycle 1 of screening. Thyroid cancer risk based on the first cycle of screening demonstrated a strong approximately linear relationship with the individual thyroid exposure dose ($p < 0.01$); the ERR was estimated to be 5.25 (95% CI: 1.70, 27.5) per Gy. Also, an analysis has been completed, of 65 incident cases of thyroid cancer diagnosed during the screening cycles 2 - 4, and about 73,000 persons/years of observation. The dose dependence was consistent with both linear model of excessive absolute risk (EAR), and that of excessive relative risk (ERR). EAR per 10^4 PY per Gy was estimated to be 2.21 (95% CI: 0.04 - 5.78) and ERR 1.91 per Gy (95% CI: 0.43 - 6.34).
Among 110 cases of thyroid cancer diagnosed in 1998-2008, papillary carcinomas were prevalent - 104 cases (94.5%); in addition, 5 cases (4.6%) of follicular adenoma and one case (4.6%) of medullary carcinoma were diagnosed.
Conclusions - The data obtained demonstrate that for a period of 20 years after the Chernobyl accident thyroid cancer risk still remains reliably significant, which is a weighty argument in favor of a further follow-up of cohort members of the Ukrainian-American Thyroid Project in order to ascertain the dose-effect relationship and determine the time pattern of risk.

Early Exposures and Later Effects in Life: Revisiting the Barker Hypothesis
Professor Brenda Eskenazi

We have all heard the adage that "children are not little adults" but what does it mean for *their* adulthood when fetuses and children become exposed to environmental pollutants. What are the long-term costs and consequences of early exposure? The often-cited Barker hypothesis, which is based on observations of adult cardiovascular disease being related to early life exposure to poor nutrition, will be revisited in terms of the effects of early life exposure to environmental pollutants. How can assessment of early life exposure be incorporated into studies of adult-onset disease?

Environmental Epidemiology in the Context of Translational Science: Lessons from Studies of Air Pollution and Cardiovascular Diseases

Professor Joel Kaufman

"Translational science" is typically conceived in the context of medical sciences: a bridge between basic research discoveries and clinical practice. The archetypal application is pharmaceutical development. This "bench-to-bedside" emphasis now prevails with funding agencies and academic institutions. The concept of translational science can be difficult to apply but is also important in the environmental health arena; instead of influencing treatment, the goals are beneficial interventions and relevant policymaking in the interest of improving public health. Environmental epidemiologists are well-placed to straddle the research-to-practice bridge, free of challenges facing most environmental health "bench" scientists—by avoiding the need to adjust results from animal models to humans and by directly examining exposure concentrations in relevant ranges--but challenges persist. Research over the past twenty years concerning the association between air pollution and cardiovascular disease provides a useful lens to consider the incorporation of translational science concepts into the framework of environmental epidemiology.

Environment and Cancer – research priorities

Professor Christopher Wild

The global burden of cancer is estimated to double in the next 20 years, with a majority of the increase occurring in the low and middle-income countries. These trends are in common with those for other non-communicable diseases, including cardiovascular disease and diabetes. Much could be achieved in terms of prevention based on implementation of current knowledge but at the same time the aetiology of many cancers remains obscure. This implies research into causes must parallel that into prevention; this combination should be one priority in the coming decade.

The majority of cancers have an environmental (broadly defined) aetiology but the precise contribution and interaction with other risk factors is difficult to elucidate. This is at least partially due to limitations in accurately measuring individual exposure, including exposures early in life. Recent advances in laboratory sciences (e.g. "omics" technologies) have been paralleled by an increased understanding of disease mechanisms (e.g. epigenetics). This provides a promising avenue for the improvement of environmental exposure assessment and an understanding of its consequences. In addition, this new generation of biomarkers can help establish the biological plausibility of exposure-disease associations, providing also a bridge from epidemiology to experimental data.

Much remains to be accomplished to provide the evidence-base for public health decisions on cancer prevention. Nevertheless, rapid advances in technology, the fresh understanding of mechanisms and the availability of large prospective cohort studies with associated biobanks provide exciting new opportunities. Prevention strategies based on these foundations demand an interdisciplinary approach whereby the term translational cancer research includes translation from the laboratory to the clinic and to the population. Such a "two-way translation" holds rich promise in combating the projected increases in global cancer burden (Wild CP, Mutagenesis, 24, 117-125, 2008; Wild CP, Environ. Heath, 10, suppl. 1, S15, 2011).

How can toxicology inform environmental epidemiology? A new approach to Environmental Health.

Professor Linda Birnbaum

The disciplines of environmental epidemiology and toxicology must work closely together on the challenges of addressing human relevance to existing experimental models by sharing techniques and approaches to fill relevant data gaps to improve public health. Research from toxicology has (1) provided solid mechanistic evidence to strengthen epidemiologic conclusions, (2) helped inform design of epidemiological studies by identifying windows of susceptibility (3) has led to new methods to identify interim phenotypes related to biological response to environmental exposures, and (4) has provided evidence for more complex dose response relationships that explain why various exposures have differing health effects.

Challenges in environmental health sciences can be met by supporting collaborations among scientists across disciplines, by developing strategies to integrate new methods and technologies, and sharing results with broader audiences. At NIEHS, we have developed several programs and models to foster collaborative efforts between disciplines within extramural, intramural and the National Toxicology Programs.

Transport and Health
Professor Bert Brunekreef

There are many links between transport and public health. Worldwide, death and injury from road traffic accidents are by far the most important, accounting for 1,3 milion deaths and from 20 - 50 million non fatal injuries every year according to a recent WHO report. Some 90% of these occur in low to middle income countries where without proper preventive measures, a further increase is expected with the ongoing increase in road traffic.
Vehicles powered by internal combustion engines produce toxic air pollutants which adversely affect the health of traffic participants, subjects living close to busy roads and the population at large. Engineering controls on vehicles and fuels have mitigated some of these problems in the developed world. Again, the disease burdens are likely to be larger in low to middle income countries which have not yet been able to afford the most technologically advanced pollution controls. However, relatively few studies have been conducted in areas of the world likely to experience the worst problems.
Active modes of transport such as cycling and walking are being promoted in some developed countries as an alternative to driving cars. Although cyclists and pedestrians are at higher risk of inhaled pollutants - because of higher respiration rates - and of traffic accidents than car riders or users of public transport, there is general concensus that the health benefits of physical exercise associated with walking and cycling outweigh the pollution and accident risks.
Transport may also increase health risks of infection as especially in mass transport, transmission may easily occur. Disease vectors may also hitchhike their way to faraway places ("airport malaria"), and in an increasingly global market, foodborne diseases may also be more easily transported elsewhere.