ehp | ENVIRONMENTAL HEALTH PERSPECTIVES

Healthy and Sustainable Environments for Children: Turning Research into Practice

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Committed to publishing reliable information about human health and the environment

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- No publication fees or page charges (supported by NIEHS)
- Readers can sign up for notifications of new content
- Social media: Twitter and Facebook @EHPonline

"Environment" is defined broadly

- Observational studies about human populations
- Exposure science: measurement and modeling
- Toxicology of environmental contaminants:
  - Chemicals in industry and products
  - Air pollution from energy generation, fuel use, forest fires
  - Pollutants in drinking water: byproducts of disinfection, chemicals leaching into water from industry, personal use
- Risk assessment advances

Focus: Environment–Health Interactions

Inherent (Host):

- Lifestage/sex
- Genetics & epigenetics
- Pre-existing disease

Environmental:

- Toxic Substances
- *Natural:* Temperature, clean air & water, greenspace
- *Built:* home, school, workplace, roads

Healthy Families

Lifestyle:

- Diet
- Exercise
- Habits
- Education

Community/Social:

- Cultural/ethnic factors
- Stress: Crime/Poverty
- *Access* to healthy food, medical care, recreation, transportation

Broad concerns about real-world exposures

POCs in Breast Milk: PCBs, DDT Dioxins

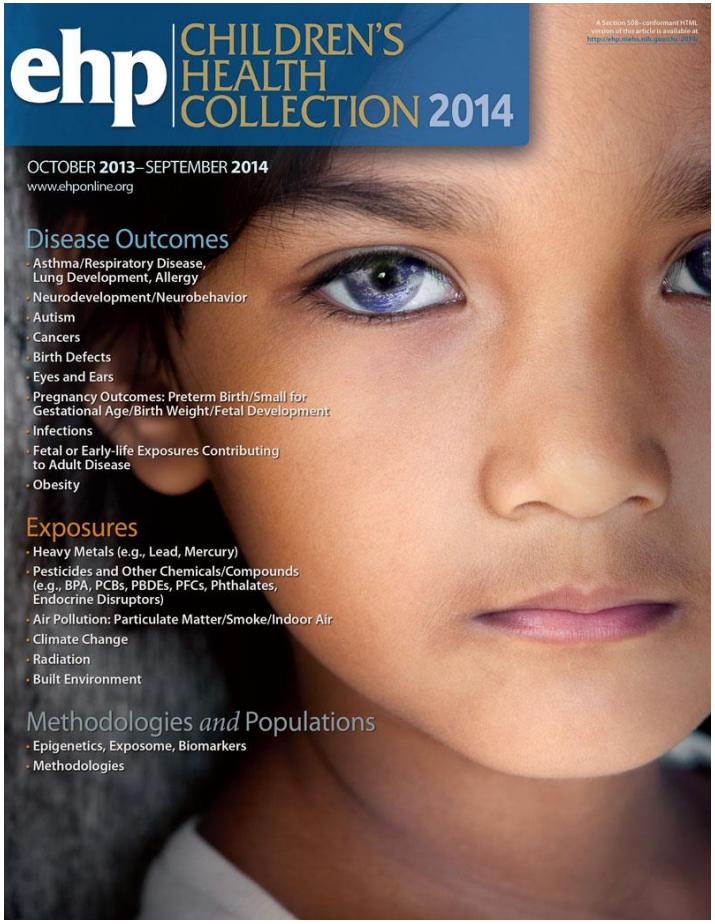
Pesticides in Foods
Estrogens in Soy Formula

Plasticizers in products: BPA, phthalates

Important children's health research

- Informs and supports both public health practices and environmental regulations that protect and promote children's health
- Fills gaps in the evidence base used to make medical diagnoses and optimize treatment
- Provides reliable advice to pregnant women, parents, and youth
- Builds public trust of science

Children's Health Collections, 2010–2015

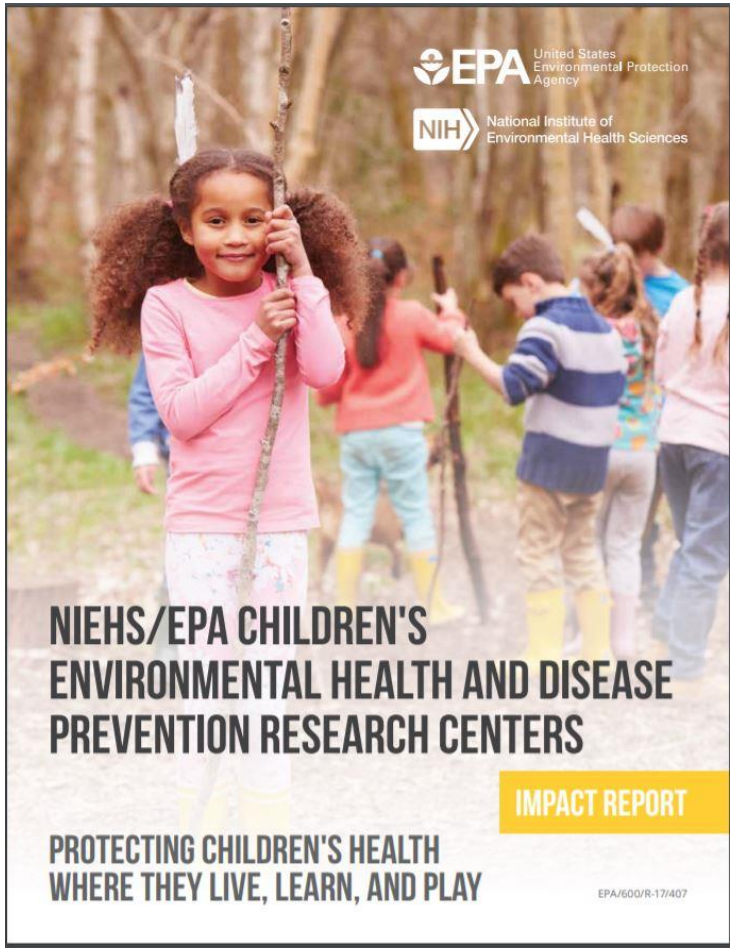


Abstracts of all relevant articles, grouped by

- Disease outcomes
- Exposures
- Methodologies and populations

NIEHS/EPA Children's Environmental Health and Disease Prevention Research Centers Program—20 Year Report

- 1998–2018
- Summarizes research from 24 Centers
- Includes outcomes, exposures, community outreach efforts
- https://www.epa.gov/sites/production/files/2017-10/documents/niehs_epa_childrens_centers_impact_report_2017_0.pdf?pdf=chidrens-center-report



Examples from NIESH/EPA Children's Health Research Centers Program

RESEACH ON:

- Farm workers bring pesticides home (U. Washington)
- Integrated pest management (IPM) approach (Columbia U.)
- Exposures common in schools (several)

TO PRACTICE:

- Workers taught to remove clothes and wash before contact with children
- IPM adopted by public housing authorities in NYC
- EPA developed "Tools for Schools"

Children's health cohort study findings published in *EHP*

- Continue to explore early-life exposures (maternal) with health outcomes in children
- Use various approaches, designs, cohorts
- Have traditionally focused on one chemical (or chemical group) and one health outcome/condition

Early exposures and neurodevelopment

- **Triclosan: thyroid disruption?**

  "Identifying Vulnerable Periods of Neurotoxicity to Triclosan Exposure in Children" Jackson-Browne et al. (Braun lab), 2018. https://doi.org/10.1289/EHP2777

  Authors measured triclosan (antimicrobial found in many personal care products) in maternal urine during pregnancy and at birth, and in children at ages 1–8, and evaluated associations with cognitive indicators in children at age 8.

  They report associations with full-scale IQ and several other indicators found with mother's levels *at birth* (but not prenatally or in children).

Early exposures and neurodevelopment

- **PFCs**

  "Prenatal Exposure to Perfluoroalkyl Substances and IQ Scores at Age 5: A Study in the Danish National Birth Cohort," Liew et al., 2018. https://doi.org/10.1289/EHP2754

  Authors measured 16 PFASs in maternal plasma collected in early gestation and child IQ in their children at age 5.

  NO consistent associations with IQ and maternal PFAs in this cohort. Authors call for more studies in other cohorts and using additional measures (e.g. ADD) and older ages.

Early exposures and neurodevelopment

- **PFAs**

  "Prenatal Maternal Serum Concentrations of Per- and Polyfluoroalkyl Substances in Association with Autism Spectrum Disorder and Intellectual Disability," Lyall et al., 2018. https://doi.org/10.1289/EHP1830

  In this nested case-control study, prospectively collected maternal blood levels of PFAs were NOT higher in children with autism. Authors conclude that these findings do not support the hypothesis that prenatal PFA levels are positively associated with ASD.

Early exposures and neurodevelopment

- **OPs**

  "Prenatal Organophosphate Pesticide Exposure and Traits Related to Autism Spectrum Disorders in a Population Living in Proximity to Agriculture," Sagiv et al. (Eskenazi lab), 2018. https://doi.org/10.1289/EHP2580

  Authors measured OP metabolites in maternal urine and pesticide use data, and evaluated various measures of social development in children at ages 7, 10.5, and 14. They found MIXED evidence for OP exposure contributing to autism-like behaviors

Early exposures and neurodevelopment

- **Pesticides: mancozeb**

  "Prenatal Mancozeb Exposure, Excess Manganese, and Neurodevelopment at 1 Year of Age in the Infants' Environmental Health (ISA) Study," Mora et al., 2018. https://doi.org/10.1289/EHP1955

  Authors measured mancozeb metabolites Mn and ETU in urine, hair, and blood of pregnant women and evaluated associations with neurodevelopment in their children at age 1 (Bayley Scales of Infant and Toddler Development). They found SEX-DEPENDENT associations for some but not all outcomes.

Challenges

- Many different cohorts
- Various chemicals of interest
- Highly variable exposure levels; lack of quantitative dose response needed for risk assessment
- Human studies show associations between exposure and response, but not causation

Exposure characterization

- **Understanding the maternal exposome (chemicals)**

  "A Suspect Screening Method for Characterizing Multiple Chemical Exposures among a Demographically Diverse Population of Pregnant Women in San Francisco," Wang et al. (Woodruff lab), 2018. https://doi.org/10.1289/EHP2920

  Authors used "semi-targeted" approach with data acquisition via high-resolution mass spectrometry and "targeted data analysis" to identify known and unknown chemicals in maternal blood samples.

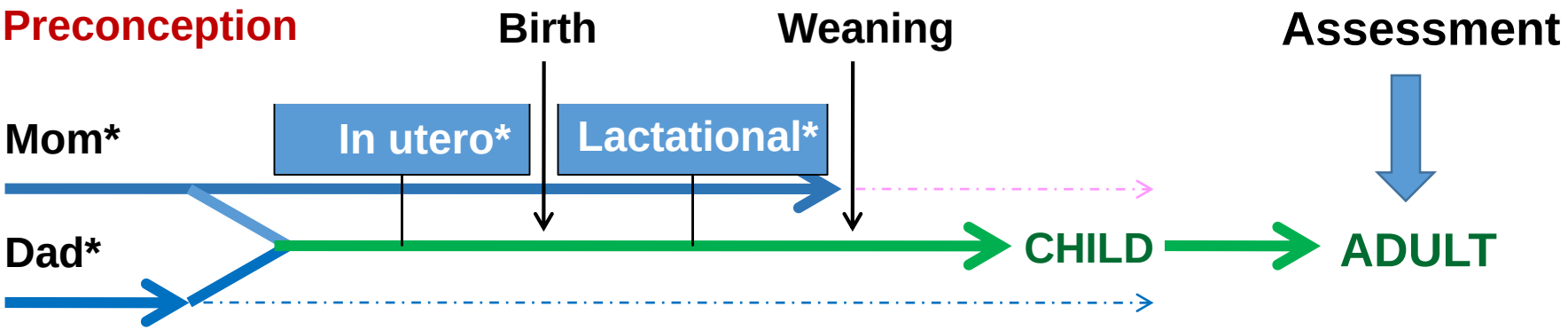
  Applications: Confirm associations with maternal factors, and identify new chemicals/metabolites to prioritize for further study

Importance of life-course exposures and lasting health impacts

Interest continues in early-life exposures and chronic disease (DOHaD), including epigenetic mechanisms

- **Neurodegenerative:** Alzheimer's disease, Parkinson's disease
- **Obesity:** complex interactions of genetics, diet, exercise, inflammation, diabetes, etc.
- **Cardiovascular disease:** contribution from air pollution and chemicals that cause oxidative stress
- **Role of the built environment:** access to healthy food and health care, walkable communities, safe play places, "green schools," etc.

The reality: multiple exposures contribute to total health across all life stages



Epigenetic reprogramming???
Testis and ovary formation
Reproductive tract development

Growth
Maturation
Puberty

Endocrine Function
Fertility
Cognition
Metabolism
Pulmonary, Cardio-vascular

* **Exposures from parents:** smoking and air pollution; chemicals from work; chemicals used at home; food choices

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Larger and longer cohort studies such as JECS can rise to this challenge, BUT:

- Large cohorts and resulting databases are difficult (and expensive) to sustain over time
- Data sharing and access systems are needed and must ensure protection of human subjects
- Biobanks and biomarker analysis: large sample inventories, QA, sustainability, access control
- Publication plans involve collaboration among many investigators and students
- Communication strategies are needed to convey study results to the public and funders (government)

Journals can help disseminate and translate children's health research findings to diverse stakeholders

- **Researchers**: By publishing original research articles to fill critical data and knowledge gaps (basic and applied)
- **Policy makers**: By publishing systematic reviews that weigh the evidence according to clear and objective criteria
- **Public**: By including articles on children's health written for lay audiences; podcasts; video interviews; commentaries; links to other resources
- **All:** by using social media to push out content

FEATURED NEWS

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Connecting $PM_{2.5}$ Exposure to Insulin Resistance: Oxidative Stress May Be an

© Juanmonino/Getty Images

Institutes in the Lead: Identifying Environmental Factors in Breast Cancer

ANNOUNCEMENTS

Introducing the *EHP* News Page

Since 1993 the News section of *EHP* has provided readers with objective, accurate information on timely environmental health topics. After years as one of the most popular features of *EHP*, and as our main tool for reaching a broader audience, we felt it was time the News had its own home on our website. We are now pleased to present our brand-new page devoted exclusively to *EHP* News! (more...)

News Articles: Timely, Clear, Useful

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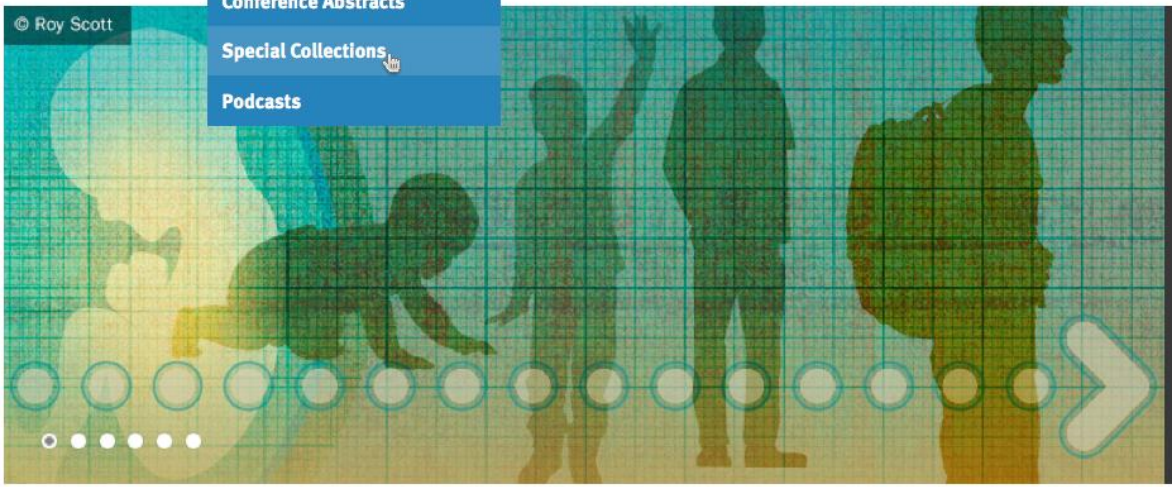
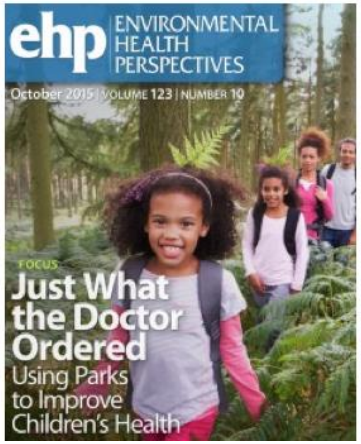


THIS MONTH IN *EHP*

Environmental Influences on Child Health Outcomes

Charles W. Schmidt

Read More >



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ON THE COVER

In recent years researchers have dramatically expanded their understanding of health benefits tied to visiting parks and some of the many pathways through which these benefits occur. Now park visits are being integrated into children's health care through "park prescriptions" and community health programs.

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ANNOUNCEMENTS

ISEE 2015 Abstracts Now Available

EHP is pleased to present the abstracts for the 2015 annual conference of the International Society for Environmental Epidemiology (ISEE), "Addressing Environmental Health Inequalities," held 30 August–3 September 2015 in São Paulo, Brazil.

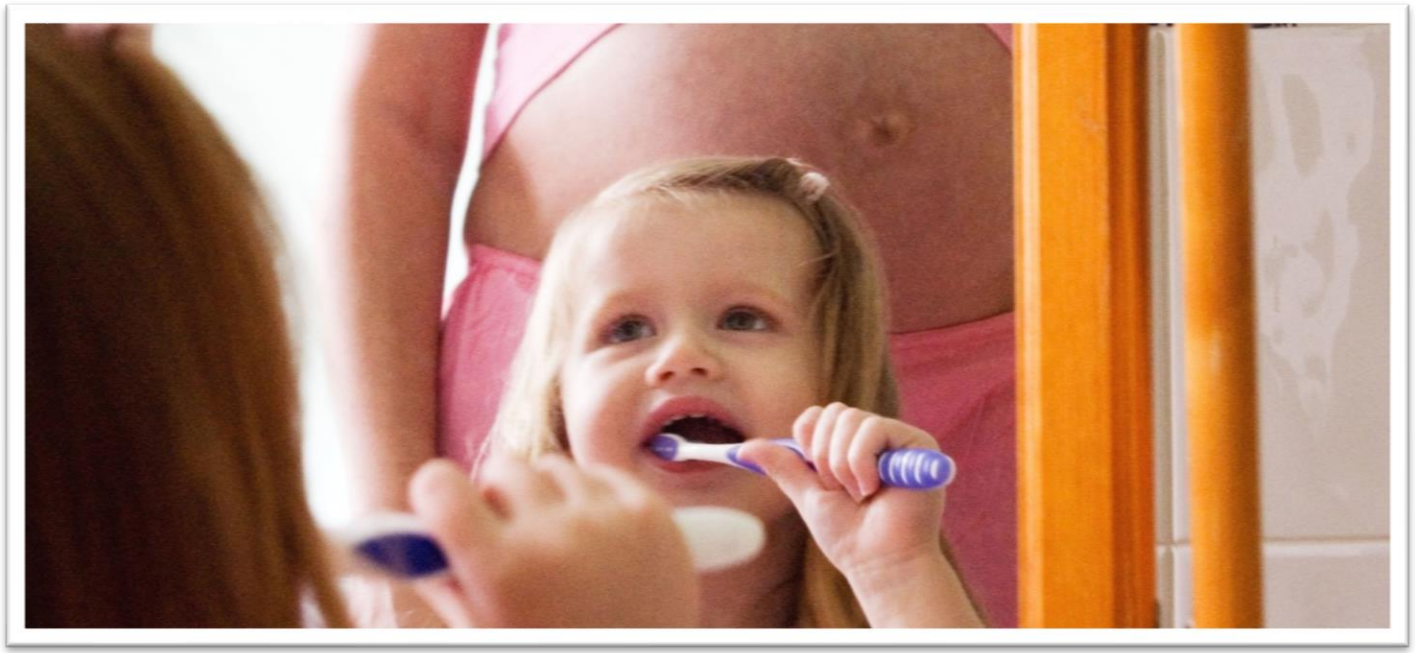
Authors can help

- Follow widely accepted reporting guidelines to ensure transparency, reproducibility, and rigor
  - ARRIVE for animal and experimental studies
  - STROBE for observational (human) studies
  - PRISMA for systematic reviews
- Make your data accessible and reusable in online data archives designed to enable data sharing (e.g., NIH genomics, Dryad)
- Volunteer to be on peer-review boards and governmental or community advisory boards

Authors can also

- Work with journal editors to
  - Write short summaries in “reader-friendly” language
  - Develop graphical abstracts
  - Participate in webinars and podcasts
- Work with university public affairs staff
  - Press releases
  - Newsletters
  - Learn to talk with press

Press releases are powerful tools



"Prenatal Fluoride Exposure and Cognitive Outcomes in Children at 4 and 6–12 Years of Age in Mexico" (Bashash et al., EHP, 2017)

- First week after publication:
  - 10,026 web hits
  - 675 PDF downloads

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Pittsburgh Post-Gazette

http://markets.post-gazette.com/postgazette/news/read/34975088/new_study_confirms_fluoride_harms_fetal_brain Sept. 22, 2017

New Study Confirms Fluoride Harms Fetal Brain; Lowers IQ

"The results of the first ever US government funded study of fluoride and IQ have just been published. A team of researchers found a statistically significant association between fluoride exposure in women during pregnancy and a lowering of IQ in their children, reports the Fluoride Action Network."

"Urinary Concentrations of Organophosphate Flame Retardant Metabolites and Pregnancy Outcomes among Women Undergoing *in Vitro* Fertilization" (Carignan et al., EHP, 2017)

- First week after publication:
  - 1,430 web hits
  - 266 PDF downloads

Supporting "research to practice"

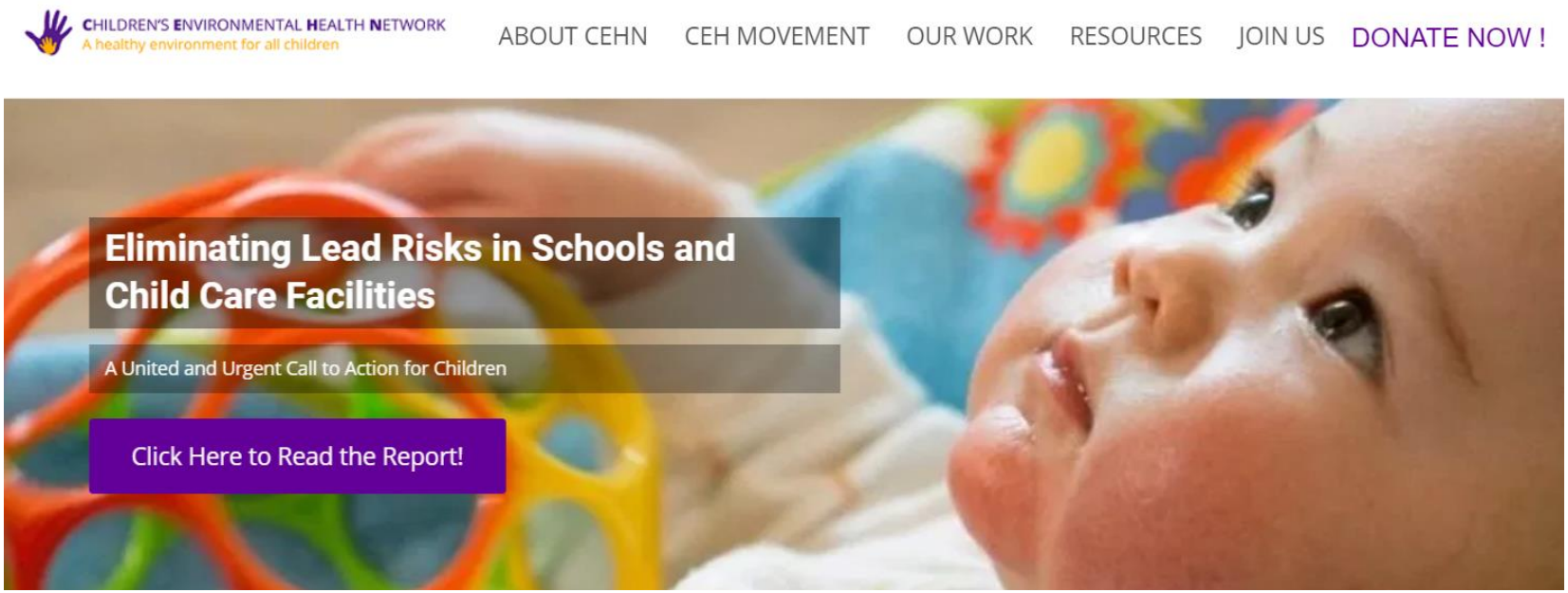
- Identify and engage "knowledge users" at the start in defining the problem
  - Community groups
  - Regulatory agencies (national and local)
  - Medical care providers (physicians, nurses, health care workers)
- Create a strategic outreach and communication plan specific to targeted audiences (regulatory, biomedical, public)

Scientists, health care providers, and advocates can also play a role

- Speak at public meetings, webinars, and podcasts
- Write about your research (and that of others) for newspapers and your personal social networking avenues (blog about children's health)
- Create or share existing online resources

E.g. online resource: NGO

https://CEHN.org Children's Environmental Health Network



E.g. online resource: government

https://www.epa.gov/iaq-schools US EPA materials about indoor air quality (IAQ) and “Tools for Schools” kit

EPA United States Environmental Protection Agency

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Our Collective Goal: Translate Environmental Health Research into Actions that Protect and Promote Children's Health.

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