

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 NO₂ 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 (NO_x), the refinery plant (SO_x) and the landfill (H₂S, 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 (NO_x, SO_x, and H₂S). 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 SO_x) and from the landfill (HR=1.26, 95%CI:1.01-1.57, high vs low H₂S) 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.