Publication

Variability in the association between long-term exposure to ambient air pollution and mortality by exposure assessment method and covariate adjustment: a census-based country-wide cohort study

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BACKGROUND: Ambient air pollution exposure has been associated with higher mortality risk in numerous studies. We assessed potential variability in the magnitude of this association for non-accidental, cardiovascular disease, respiratory disease, and lung cancer mortality in a country-wide administrative cohort by exposure assessment method and by adjustment for geographic subdivisions. METHODS: We used the Belgian 2001 census linked to population and mortality register including nearly 5.5 million adults aged >/=30 (mean follow-up: 9.97 years). Annual mean concentrations for fine particulate matter (PM2.5), nitrogen dioxide (NO2), black carbon (BC) and ozone (O3) were assessed at baseline residential address using two exposure methods; Europe-wide hybrid land use regression (LUR) models [100x100m], and Belgium-wide interpolation-dispersion (RIO-IFDM) models [25x25m]. We used Cox proportional hazards models with age as the underlying time scale and adjusted for various individual and area-level covariates. We further adjusted main models for two different area-levels following the European Nomenclature of Territorial Units for Statistics (NUTS); NUTS-1 (n = 3), or NUTS-3 (n = 43). RESULTS: We found no consistent differences between both exposure methods. We observed most robust associations with lung cancer mortality. Hazard Ratios (HRs) per 10 mug/m(3) increase for NO2 were 1.060 (95%CI 1.042-1.078) [hybrid LUR] and 1.040 (95%CI 1.022-1.058) [RIO-IFDM]. Associations with non-accidental, respiratory disease and cardiovascular disease mortality were generally null in main models but were enhanced after further adjustment for NUTS-1 or NUTS-3. HRs for non-accidental mortality per 5 mug/m(3) increase for PM2.5 for the main model using hybrid LUR exposure were 1.023 (95%CI 1.011-1.035). After including random effects HRs were 1.044 (95%CI 1.033-1.057) [NUTS-1] and 1.076 (95%CI 1.060-1.092) [NUTS-3]. CONCLUSION: Long-term air pollution exposure was associated with higher lung cancer mortality risk but not consistently with the other studied causes. Magnitude of associations varied by adjustment for geographic subdivisions, area-level socio-economic covariates and less by exposure assessment method.

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