Background

- Long-term exposure to ambient fine particulate matter (≤ 2.5 μg/m³ in aerodynamic diameter, PM$_{2.5}$) is significantly associated with increased risk of premature mortality.
- Our goal was to provide an updated meta-analysis of all-cause and cause-specific mortality associated with exposure to PM$_{2.5}$ and to better estimate the risk of death as a function of air pollution levels.

Methods

- We systematically searched all published cohort studies examining the association between long-term exposure to PM$_{2.5}$ and mortality up to April, 2017.
- We included studies that examined the association between long-term exposure to PM$_{2.5}$ and all-cause-all-age, respiratory, cardiovascular, cardiopulmonary or lung cancer mortality; and all-cause, age 65+ mortality in the general population.
- To estimate the overall mortality effect size, we applied multivariate linear random effects meta-analysis and meta-regression models.
- Large cohorts (Medicare, Harvard Six Cities, ESCAPE, ACS etc.) were represented by more than one study. To address the correlation among multiple analyses of the same cohort, we incorporated random nested random effects of study within cohort.
- Meta-regression variables: mean PM$_{2.5}$ concentration, percent female, age distribution, percent of smoking and different exposure assessment methods.

Conclusions

This meta-analysis provides: a) strong evidence for the adverse effect of long-term exposure to air pollution and mortality, b) The concentration-response function produced here can be further applied in the global health risk assessment of air particulate matter.

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