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# Short-term effects of carbonaceous particles on mortality: A time-series study in London

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## Background

Exposure to ambient particulate matter (PM) has been identified as a major global health concern. Recent studies have suggested that it is the carbonaceous constituents of PM that pose the greatest health risks. Using time-series methods, we investigated the associations between short-term exposure to carbonaceous particles and mortality in London.

## Methods

Daily concentrations of carbonaceous species [organic (OC), elemental (EC), black (BC), wood-burning (WC), and total carbon (TC)] were measured at two centrally located monitoring sites: Marylebone Road (roadside) and North Kensington (background). Daily counts of natural, cardiovascular, and respiratory deaths were obtained for London between 2010 and 2019. Generalised additive models (GAM) were used to estimate percentage changes in risks of mortality associated with interquartile range (IQR) increases in particle concentrations, at different time lags. Stratified analyses were conducted by age (0-64, 65+), season and site type.

## Results

For non-accidental mortality, positive associations were observed for all particle species at lag 1, including statistically significant percentage risk changes for WC (0.51% (95%CI: 0.19%, 0.82%)) and OC (0.44% (95%CI: 0.03%, 0.85%)), as shown in figure 1.

For respiratory deaths, associations were greatest at lag of 3 days with increases in mortality risk of 1.70% (95% CI: 0.64%, 2.77%) for WC, 1.28% (95%CI: -0.11%, 2.68%) for OC, and 1.30% (95%CI: -0.46%, 3.08%) for TC.

No associations were found with cardiovascular mortality.

Results were robust to adjustment for particle mass concentrations. Stratified analyses suggested particulate effects were greatest in the summer and respiratory associations more pronounced in females.

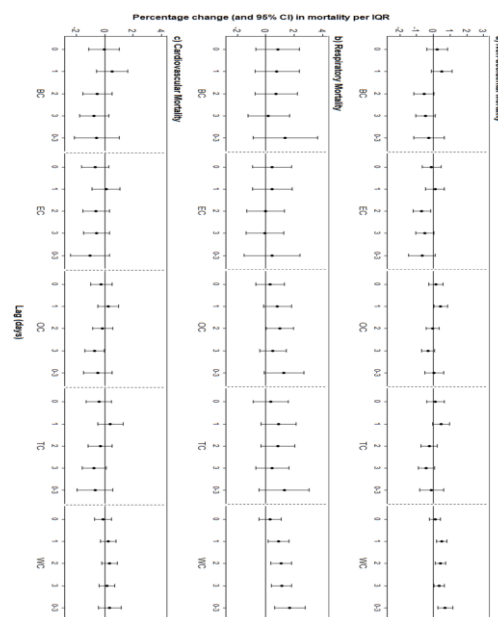


Figure 1 Percentage change in mortality per interquartile increase in daily mean concentration.

## Conclusions and significance

Our findings are supportive of an association between carbonaceous particles and non-accidental and respiratory mortality.

The strongest evidence of an effect was for WC; this is of significance given the rising popularity of wood burning for residential space heating and energy production across Europe and raises questions regarding the need for more targeted PM abatement policies.

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