Introduction

Many epidemiological studies have reported associations between outdoor particulate matter and adverse health effects. Particulate matter is a mixture of particles of varying size, number and composition and the nature of this mixture varies according to emission sources, secondary chemical reactions in the atmosphere, weather conditions and other factors. For the protection of public health it would be desirable to know which component of the particulate mixture to target with regulation.

The purpose of this study was to analyse, using time series methods, the health effects of various particle metrics within London and to identify which of the particle metrics are most important for health impact considerations.

Results

Results for deaths due to cardiovascular and respiratory mortality are shown in Figures 1 and 2.

A specific association between particle number concentrations and deaths due to cardiovascular diseases was observed. This association was independent of other metrics and was also observed for admissions for cardiovascular diseases (not shown).

Respiratory mortality was associated with a range of metrics most notably the mass based measurements (PM_{10} and PM_{2.5}). A similar pattern of associations for respiratory admissions was also observed.

Conclusions

Preliminary conclusions from these analyses suggest that particle numbers (predominantly very fine particles) are the most relevant particle metric in terms of cardiovascular disease.

Deaths and admissions from respiratory disease were associated with a range of particle metrics and it is less clear which metric(s) are the most relevant. Further work is underway to investigate this issue.

Acknowledgements

This project was funded by DEFRA under contract number AQ05515/CPEA 30.

Relationship between central site measurements and personal exposure

A further component of this study was to examine the relationship between central site measurements and personal exposure to various PM metrics using published work and results from the RUPOH study. This analysis helps inform the evidence from ecological time series studies based upon pollution data collected at a single location within a city.

The key finding relevant to this ecological time series study was that there were substantial longitudinal correlations between outdoor measurements (central or home) and personal exposure (PM_{2.5} & PM_{10}).