

EFFECTS OF LIFETIME AIR POLLUTION EXPOSURE ON LUNG FUNCTION DURING CHILDHOOD

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Background and Aims: Previous studies of effects of air pollution on lung function in children have shown heterogeneous results. Although some studies have suggested a negative association between air pollution and lung function, others found no effect, while effects for specific pollutants, for specific lung function measures or in specific subpopulation only have also been reported.

One common limitation of previous studies has been the use of pollution exposure data, which does not allow for spatial and temporal variation and may not reflect individuals' exposure. We have developed and validated a comprehensive exposure model of lifetime exposure to PM₁₀ and NO₂ for children, which incorporates spatio-temporal variation by combining time-activity data with concentrations in the home, school and during home-school travel, the microenvironmental exposure model (MEEM). The aim of this study was to assess the effect of lifetime PM₁₀ and NO₂ exposure on forced expiratory volume in one second (FEV₁) within the setting of a population based birth cohort study, the Manchester Asthma and Allergy Study.

Methods: Participants were recruited prenatally. FEV₁ was measured at age 5, 8 and 11 years and results were expressed as % predicted FEV₁. Children's exposure to PM₁₀ and NO₂ was estimated retrospectively using MEEM. The model estimated PM₁₀ and NO₂ concentrations (in µg/m³) for a typical day for each month of the child's life. This data was aggregated to provide exposure windows of 0-5, 0-8 and 0-11 years, for approximately 400 children. Multiple linear regression was used to assess the effect of modelled exposure on lung function, adjusting for sensitisation and asthma or current wheeze.

Results: No significant associations were found between FEV₁ % predicted and lifetime PM₁₀ or NO₂ exposure ($p > 0.05$).

Conclusions: This study found no significant association between lung function in children and NO₂ and PM₁₀ exposure, despite the use of a detailed exposure assessment methodology.