

Traffic-Related Air Pollution Exposure and Asthma, Hayfever, and Allergic Sensitisation in Birth Cohorts: A Systematic Review and MetaAnalysis.

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Abstract

Background: The causal role of ambient air pollution for asthma and allergic conditions continues to be debated. We provide a systematic review and meta-analysis of birth cohort studies with follow-ups from birth to adolescence.

Methods: In a previous systematic review by Bowatte et al. 19 birth cohort studies published from 1960 to March 2014 were identified. Using the same methodology, we extended this search up to January 2016, which allowed several key new studies to be considered. Random effects meta-analysis was used to obtain combined estimates.

Results: In total, 338 references published between April 2014 and January 2016 were identified. Of these, 88 were duplicates and 216 studies did meet the inclusion criteria. Manual searches identified 4 additional papers. These new studies were added to those previously identified by Bowatte et al. Ultimately, 27 eligible papers were included in the systematic review, 15 of which could be used in meta-analyses. Combined associations between asthma with particulate matter with a diameter of less than 2 μm (PM_{2.5}) [1.11 (95% CI 0.97, 1.26) per 2 $\mu\text{g}/\text{m}^3$ increment] and nitrogen dioxide (NO₂) [1.08 (95% CI 0.96, 1.20) per 10 $\mu\text{g}/\text{m}^3$ increment] were not significant. Also for wheeze, the combined association was not significant neither for PM_{2.5} [1.13 (95% CI 1.00, 1.28) per 2 $\mu\text{g}/\text{m}^3$ increment] nor for NO₂ [1.08 (95% CI 0.98, 1.18) per 10 $\mu\text{g}/\text{m}^3$ increment]. None of the combined associations with allergen sensitization or hay fever reached statistical significance. There were too few birth cohort studies on eczema to conduct a metaanalysis.

Conclusion: Despite the existence of a wealth of high quality, large, longitudinal birth cohort studies, the epidemiological evidence supporting an association between traffic-related air pollution with asthma and other allergic health outcomes remains insufficient to confirm a causal association.

Keywords: Traffic-related air pollution; NO₂ ; PM_{2.5}; Asthma; Hayfever; Allergic sensitization; Wheeze; Children; Adolescents; Birth cohorts