Association of Improved Air Quality With Lung Development in Children


STUDY POPULATION. Children 11 to 15 years of age living in Southern California communities.

METHODS. There were 2120 children enrolled in 12 Southern California communities, and analysis was done from 5 communities where consistent results were obtained in all 3 cohorts. Linear regression models were used to examine the relationship between declining pollution levels over time and lung function development from 11 to 15 years of age.

RESULTS. Over the 13 years, improvement in 4-year growth in both forced expiratory volume in 1 second and forced vital capacity were associated with concurrent decline in levels of nitrogen dioxide and a particulate matter of aerodynamic size <2.5 microns and also for particles <10 microns. The portion of children with low forced expiratory volume in 1 second (<80% predicted) at 15 years of age declined significantly from 7.9% to 6.3% and then 3.6% across the three periods. There was no difference in females or males and in patients with or without asthma.

CONCLUSIONS. Long-term improvement in air quality was associated statistically and clinically with significant positive effect on lung function and lung growth in children.

REVIEWER COMMENTS. These data are a major public health statement of the salutary benefits for our efforts to improve air quality. A higher level of lung function in early adulthood decreases the effect of chronic respiratory conditions and also decreases premature death of all causations.

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The Influence of Childhood Traffic-Related Air Pollution Exposure on Asthma, Allergy and Sensitization: A Systematic Review and a Meta-analysis of Birth Cohort Studies

PURPOSE OF THE STUDY. To summarize the literature on the effect of childhood exposure to traffic-related air pollution (TRAP) on the development of asthma and allergies.

STUDY POPULATION. Birth cohort studies that examined the association between TRAP exposure in early childhood and development of respiratory or allergic outcomes.

METHODS. Medline, Embase, and ISI Web of Science databases were searched using key words related to TRAP and respiratory or allergic outcomes and data were extracted using a standardized form. Only English-language studies were considered. Meta-analysis was done to analyze the association between exposures to various components of traffic, including PM2.5, NO2, and “black carbon” and the outcomes of asthma incidence and allergic sensitization separately. Analyses were further stratified by the age at which asthma incidence was measured.

RESULTS. Nineteen articles describing 11 birth cohorts fit the inclusion criteria. Increased exposure to NO2, PM2.5, and black carbon showed significant associations with increased asthma incidence, especially at younger ages, but there was substantial variability between studies, particularly for the studies of NO2 and PM2.5. Increased exposure to NO2 and PM2.5 was also associated with increased risk of sensitization to outdoor, but not indoor, allergens, again with substantial variability between studies. Meta-analysis of the association between TRAP and hay fever, eczema, or wheeze could not be performed.

CONCLUSIONS. Increased exposure to TRAP was found to be associated with increased risk of incident asthma and allergic disease, but substantial heterogeneity was found between studies. The authors call for more large, long-term studies investigating the effects of age of exposure on these outcomes and looking at long-term outcomes.

REVIEWER COMMENTS. Traffic-related air pollution is a known risk factor for asthma and allergic diseases, and this study
confirms that the weight of the literature suggests that specific components of TRAP are related to incident asthma and sensitization to outdoor aeroallergens. Some of the studies showed that respiratory effects can occur at levels of these pollutants below guidelines recommended by the World Health Organization, suggesting that regulation may need to be focused on further lowering TRAP below current thresholds. Future research is needed to identify thresholds for these and other pollutants where health effects are expected.

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Green Areas Around Homes Reduce Atopic Sensitization in Children

PURPOSE OF THE STUDY. The “biodiversity hypothesis” suggests that exposure to greater environmental biodiversity in the natural flora and fauna can contribute to immune tolerance. The aim of this study was to test this hypothesis by assessing the environments near children’s homes in relation to atopic sensitization.

STUDY POPULATION. Combined data from 3 studies that were completed in Finland and Estonia from 2003 to 2012, including a total of 1044 children aged 0.5 to 20 years.

METHODS. Three data sets were used that included children from diverse environments in Finland and Estonia. The prevalence of atopic sensitization was determined by measuring serum specific immunoglobulin E to common inhalant allergens. Five land types around the homes of the children were calculated using a standardized classification: forest, agricultural land, built area, water bodies, and wetland areas.

RESULTS. The cover of forest and agricultural land within 2 to 5 km from the home was inversely and significantly correlated with the land-use gradient in healthy children. Early life exposure to green environments appeared to be most important. The loss of natural green areas and environmental biodiversity in developed countries leads to a decrease in beneficial environmental microbes and the development of atopy.

REVIEWER COMMENTS. This fascinating study is 1 of a series that has emerged from Finland relating a variety of dietary and environmental factors to the development of allergic and other inflammatory diseases. Given the rising prevalence of allergic disease, it is extremely important that we understand the role that environmental factors, especially in early life, may play in the development of allergy so that preventive strategies might be developed. Although more studies in different environments are needed, specifically with more in-depth assessment of microbial exposures, data from these studies conducted in Finland clearly support the biodiversity hypothesis.

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Moisture Damage and Asthma: A Birth Cohort Study

PURPOSE OF THE STUDY. To determine whether the extent and location of moisture damage and mold growth were related to asthma.

STUDY POPULATION. The study included a birth cohort of 442 children born 2002–2005, with 214 from Finland rural areas and 228 from suburban areas.

METHODS. Home inspection by a trained civil engineer, including assessment of moisture damage and mold, was undertaken when the child was 5 months of age and children were followed to 6 years of age. There were periodic evaluations of the child, including allergy testing at age 6 years.

RESULTS. Signs of moisture damage with or without mold at an early age in the child’s main living areas were associated with having physician diagnosed asthma “ever,” persistent asthma, and respiratory symptoms during the first 6 years of life. Moisture damage and mold found in other areas such as the bathroom or other interior spaces not usually occupied by the child was not related to the child’s outcomes. Asthma “ever” was most strongly associated with moisture damage and visible mold in the child’s bedroom (adjusted odds ratio 4.82; 95% confidence interval, 1.29–18.02) and in the living room (adjusted odds ratio 7.51; 95% confidence interval, 1.49–37.83). No relationships of moisture or mold were found for allergen sensitization. However, the associations with asthma ever were stronger in the earlier part of the follow-up and among atopic children.
The Influence of Childhood Traffic-Related Air Pollution Exposure on Asthma, Allergy and Sensitization: A Systematic Review and a Meta-analysis of Birth Cohort Studies

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