
Children's Environmental Health Research Findings
February 2016

Topic: Air pollution

Title: Lifetime Exposure to Ambient Pollution and Lung Function in Children.

Conclusion: Estimates of long-term exposure to ambient pollution, including proximity to major roadway, fine particulate matter and black carbon (a traffic-related PM_{2.5} constituent) were associated with lower lung function.

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Abstract: RATIONALE: Few studies have examined associations between exposure to air pollution and childhood lung function after implementation of strict air quality regulations in the 1990's. OBJECTIVE: Assess traffic-related pollution exposure and childhood lung function. METHODS: We geocoded addresses for 614 mother-child pairs enrolled during pregnancy in the Boston area 1999-2002 and followed them until a mid-childhood visit (median age 7.7). We calculated the proximity of the home to the nearest major roadway. We estimated first year of life, lifetime and prior-year exposure to fine particulate matter (PM_{2.5}) by a hybrid model using satellite-derived aerosol optical depth, and to black carbon (BC) by a land-use regression model. MEASUREMENTS AND MAIN RESULTS: Residential proximity to roadway, and prior-year and lifetime PM_{2.5} and BC exposure were all associated with lower forced vital capacity (FVC). Associations with FEV₁ were also negative and proportionally similar. Pollution exposures were not associated with the FEV₁/FVC ratio, or bronchodilator response. Compared to >400 m, living <100 m from a major roadway was associated with lower FVC (-98.6 mL; -176.3, -21.0). Each 2 µg/m³ increment in prior-year PM_{2.5} was associated with lower FVC (-21.8 mL; -43.9, 0.2) and higher odds of FEV₁ < 80% predicted (1.41; 1.03, 1.93). Each 0.2 µg/m³ increment in prior-year BC was associated with a 38.9 mL (-70.4, -7.3) lower FVC. CONCLUSIONS: Estimates of long-term exposure to ambient pollution, including proximity to major roadway, fine particulate matter and black carbon were associated with lower lung function in this Boston-area cohort of children with relatively low pollution exposures.

Keywords: outdoor air pollution; child; traffic