INDUSTRIAL EXPOSURES AT BIRTH ARE ASSOCIATED WITH REDUCED FORCED VITAL CAPACITY IN CHILDHOOD

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Background and Aims: Previous studies have focused on particulate air pollutant exposures , we examined the impact of other early life exposures on pulmonary function in childhood.
Methods: In Detroit and Dearborn, MI in 2007, we examined children aged 7 to 13 years in a clinical cohort (241 with asthma and 365 without asthma). We collected pulmonary function and exhaled nitric oxide measurements using standard ATS/ERS protocols. Using information on traffic and local point sources coupled with passive monitoring of nitrogen dioxide and petroleum-related volatile organic compounds (benzene, toluene, ethylbenzene, and xylenes), we developed land-use regression models to estimate the long-term, outdoor exposures of these children at their current residence and at their birth residence. Forced vital capacity (FVC) and other measures of pulmonary function were modelled as the natural logarithm adjusted for a random neighborhood effect; sex; race; the natural logarithms of weight, height and the interaction of height and sex; parental education; home ownership; and environmental tobacco smoke in the home.
Results: In this population, 43 percent of the children had different residences at birth. Based on their birth residence, a 100-ppt increment in modelled o-xylene was linearly associated with a 2.6 percent decrement in FVC (95% CI -4.7, -0.5) and this decrement was stronger among the 365 children without asthma (-3.2 percent, 95% CI -6.0, -0.5). Proximity to a specific industrial site was associated with a 2.2 percent decrement in FVC (95% CI -3.4, -0.1) for a 5 km increment. Other estimated petroleum-related compounds at birth residence showed similar associations, but weaker associations at their current residence.
Conclusions: Early life exposures as indexed by modelled outdoor concentrations of petroleum-related compounds for the residence at birth appear to be associated with persistent decrements in lung volumes.