

Topic: Air quality and lung development

Title: Association of improved air quality with lung development in children.

Conclusion: Long-term improvements in air quality were associated with statistically and clinically significant positive effects on lung-function growth in children.

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Abstract: **BACKGROUND**: Air-pollution levels have been trending downward progressively over the past several decades in southern California, as a result of the implementation of air quality-control policies. We assessed whether long-term reductions in pollution were associated with improvements in respiratory health among children. **METHODS**: As part of the Children's Health Study, we measured lung function annually in 2120 children from three separate cohorts corresponding to three separate calendar periods: 1994-1998, 1997-2001, and 2007-2011. Mean ages of the children within each cohort were 11 years at the beginning of the period and 15 years at the end. 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, measured as the increases in forced expiratory volume in 1 second (FEV₁) and forced vital capacity (FVC) during that period (referred to as 4-year growth in FEV₁ and FVC). **RESULTS**: Over the 13 years spanned by the three cohorts, improvements in 4-year growth of both FEV₁ and FVC were associated with declining levels of nitrogen dioxide (P<0.001 for FEV₁ and FVC) and of particulate matter with an aerodynamic diameter of less than 2.5 μm (P= 0.008 for FEV₁ and P<0.001 for FVC) and less than 10 μm (P<0.001 for FEV₁ and FVC). These associations persisted after adjustment for several potential confounders. Significant improvements in lung-function development were observed in both boys and girls and in children with asthma and children without asthma. The proportions of children with clinically low FEV₁ (defined as <80% of the predicted value) at 15 years of age declined significantly, from 7.9% to 6.3% to 3.6% across the three periods, as the air quality improved (P = 0.001). **CONCLUSIONS**: We found that long-term improvements in air quality were associated with statistically and clinically significant positive effects on lung-function growth in children.