

Air Pollution and Childhood Respiratory Allergies in the United States

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Background



- Respiratory allergies
 - Common chronic condition in children
 - Contribute to school absences
- Environmental factors may worsen symptoms
- Association between air pollution and childhood allergies studied in Europe and Asia
- Today's health update – 1st large nationwide study*

*Jennifer D. Parker, Lara J. Akinbami, and Tracey J. Woodruff. 2009. Air Pollution and Childhood Respiratory Allergies in the United States. *Environmental Health Perspectives* 117(1):140-147. Supported by the National Center for Health Statistics (Centers for Disease Control and Prevention) and the Office of the Assistant Secretary for Planning and Evaluation.

Methods

- 72,279 children, ages 3-17
 - 7.6% from Southern California
- Air pollutant data
 - Annual averages for PM_{2.5}, PM₁₀, NO₂, SO₂
 - Ozone summer averages
- Controlled for race/ethnicity, age, sex, and other factors



Results

- 19.2% had hay fever and/or respiratory allergy
- Ozone: for every 10 ppb increase, likelihood of allergy exacerbation increased by 20%
- PM2.5: for every 10 $\mu\text{g}/\text{m}^3$ increase, likelihood of allergy exacerbation increased by 16%
- Greater ozone effect in children from higher income families
 - Reason for effect is unclear

Results (cont.)

- No associations with NO₂, SO₂
- Study limitations
 - Annual or summer average pollutant concentrations
 - Parental recall survey
 - Incomplete record of smoking exposures



Results Consistent with Some Prior Studies

- Previous U.S. study showed trend of increased hay fever rates with higher ozone concentrations¹
- German study described association between long-term PM_{2.5} exposure and hay fever and pollen sensitization²
- Dutch study found increased pollen sensitization near roadways with high truck traffic³

¹Dockery, DW et al. 1989. Effects of inhalable particles on respiratory health of children. *The American Review of Respiratory Diseases* **139**:587-594.

²Morgenstern, V et al. 2008. Atopic diseases, allergic sensitization, and exposure to traffic-related air pollution in children. *American Journal of Respiratory and Critical Care Medicine* **177**:1331–1337.

³Janssen, NAH et al. 2003. The relationship between air pollution from heavy traffic and allergic sensitization, bronchial hyperresponsiveness, and respiratory symptoms in Dutch schoolchildren. *Environmental Health Perspectives* **111**:1512–1518.

Conclusions



- Ozone and PM_{2.5} can exacerbate allergic symptoms
- Continued reduction in ozone and PM_{2.5} exposures are expected to
 - Reduce allergic symptoms in children
 - Reduce school absences