Childhood Asthma & Exposure to Traffic

February 23, 2006

Air Resources Board

California Environmental Protection Agency
Background

Deaths Associated with Traffic
- Dutch - living near roadways doubled the risk of death from heart or lung disease

Prenatal Impacts
- Los Angeles - infants born to women living near high traffic areas increased risk of premature birth and low birth weight

Cardiovascular Effects
- North Carolina - PM exposure in cars is associated with cardiovascular effects in young men

Children & Respiratory Effects
- Bay Area - children in schools nearby freeways have more respiratory symptoms
Introduction

- Previous studies many in Europe
- A growing body of literature from the US
- Different indicators used for traffic
- Compare and validate traffic indicators
  - same study subjects
- Today’s Study:
208 children - from 10 Southern California cities
- 15% of children had asthma
- USC-led Children's Health Study
Methods

**MEASURED**
- Distance from nearest freeway to child's home
- Volume of vehicles 150 meters from home
- NO$_2$ samplers outside homes

**MODELED AT EACH CHILD’S HOME**
- include weather conditions, vehicle counts
- Modeled freeway pollution
- Modeled non-freeway road pollution

**POTENTIAL CONFOUNDERS**
- Included gas stove, maternal smoking, and ETS
## Results

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Measured $\text{NO}_2$</th>
<th>Distance to Freeway</th>
<th>Modeled Freeway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma Prevalence</td>
<td>1.83 (1.04-3.22)</td>
<td>1.89 (1.19-3.02)</td>
<td>2.22 (1.36-3.63)</td>
</tr>
</tbody>
</table>
Evaluation of Traffic Indicators

- Estimates of freeway indicators were strongly correlated with measured \( \text{NO}_2 \) at home
- \( \text{NO}_2 \) a product of combustion engines

*Absolute value, as \( \text{NO}_2 \) is negatively correlated with distance of home to the freeway.*
Summary of Results

- Higher asthma prevalence near freeways
- Proximity to freeways linked with increased wheezing & asthma medication use
- Freeway traffic has a strong influence on NO\(_2\) concentrations at homes
- A traffic indicator - NO\(_2\)
ARB Ongoing Traffic Studies

Children
- Traffic-Related Air Pollution and Asthma in Economically Disadvantaged and High Traffic Density Neighborhoods in Los Angeles County, California
- Traffic Pollution and Children’s Health: Refining Estimates of Exposure for the East Bay Children’s Respiratory Health Study

Elderly
- Cardiovascular Health Effects of Fine and Ultrafine Particles during Freeway Travel
- Air Pollution and Cardiovascular Disease in the California Teachers Study Cohort
Concluding Remarks

- Traffic air pollution associated with asthma in children
- Freeway a major pollution source in a community
- Continued research on traffic effects