Health Outcomes Research: The Gilliland Study

Bert Brunekreef, PhD on behalf of HEI Review Committee

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Strengths of the Study

• Unique and rich data sets spanning two decades:
  • monitoring data across southern California
  • health outcomes data for several cohorts
• Solid attempt to bring together data from multiple disciplines and agencies
• Multiple air quality regulations implemented during this time period
Initial Review – Central Issue

“To what extent does this research convince the reader that the observed changes in lung function growth and bronchitis symptoms are primarily due to changes in air pollution concentrations, and not the result of trends in demographics, health care delivery, or other secular trends?”
Changes in Population?

- Is it possible that there are fundamental differences among the cohorts that may have affected lung function (and chronic bronchitic (CB) symptoms)?

- Ethnic and demographic shifts over time ✓
- Shift in puberty onset in later years ✓
- Environmental tobacco smoke exposure ✓
- Health care delivery (more aggressive outpatient asthma treatment in children) ~✓
- Trends in enrollment and loss to follow-up in cohort
- Absence of information on traffic-related pollution ✓
Table S5: Estimated difference in 4-yr height growth for average decreases in ambient pollutant levels

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Growth, age 11 to 15</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NO₂</td>
<td>-0.39</td>
<td>(-1.12, 0.34)</td>
<td>0.29</td>
</tr>
<tr>
<td>O₃ (10-6)</td>
<td>0.01</td>
<td>(-0.44, 0.46)</td>
<td>0.97</td>
</tr>
<tr>
<td>PM₁₀</td>
<td>-0.24</td>
<td>(-0.81, 0.34)</td>
<td>0.42</td>
</tr>
<tr>
<td>PM₂.₅</td>
<td>-0.14</td>
<td>(-0.83, 0.56)</td>
<td>0.70</td>
</tr>
</tbody>
</table>
Figure S5: Predicted change in 4-yr lung function growth (vertical change in the trend lines of Figure 2) versus the change in average NO₂ over the study period (horizontal change in the trend lines of Figure 2) for each community (LB=Long Beach, ML=Mira Loma, RV=Riverside, SD=San Dimas, UP=Upland)
Figure 2. Community-Specific Average Growth in FEV$_1$ among Girls and Boys During the Eight-Year Period from 1993 to 2001 Plotted against Average Nitrogen Dioxide (NO$_2$) Levels from 1994 through 2000.
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## Figure 2. Forest Plot of the Adjusted Annual Change in the Rate of Hospital Admissions for Asthma after Implementation of Smoke-free Legislation, According to Subgroup.

The annual change shown here is the change relative to the rate on March 26, 2006 — the date on which the smoke-free legislation was implemented. Analyses were adjusted for sex, age group, urban or rural area, quintile of socioeconomic status, and region.
Status of Gilliland report

• Report still in purgatory (i.e., HEI Review Committee)
• Revised version will be submitted soon
A relatively benign...

COMMENTARY
Health Review Committee

INTRODUCTION
Epidemiologic studies conformed, in a variety of locations, that short-term increases of particulate pollutant concentrations, and (4) bioavailability, are all important factors in the complex formation of HEI.

An Unpublished report
Universiteit Utrecht