Air Pollution

• What is it?
• Why should you care?

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What is it?
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We Care Because we Think that Air Pollution is Killing People

Why do we think that?
They Kill People at High Dose
They Kill People at Low Concentrations: Change in Daily Deaths Vs PM2.5 in New England Medicare Population
Utah Hospital Admissions
Children 0-17 Year

Mean PM$_{10}$

Bronchitis & Asthma

Pneumonia & Pleurisy

μg/m$^3$ or Admissions

85/86 86/87 87/88 85/86 86/87 87/88 85/86 86/87 87/88

Winter

Pope, Amer J Public Health 1989; 79: 623
Adjusted prevalence of bronchitis in children and annual TSP

![Graph showing the relationship between TSP and adjusted prevalence of bronchitis. The graph includes data points for Zerbst, Bitterfeld, and Hettstedt.]
Pope Smelter Strike

• Smelter Strike Reduced Sulfates in U.S. Southwest by ~60%

• 2.5% Reduction in Mortality during the strike

• Mortality rates went back up after the strike

• In surrounding states, there was no change in mortality rates during the strike
New Jersey Turnpike Study

• Walker and Currie considered two groups, those living within 1.5km of a toll plaza, and those living near the highway, but further (2-10 km) from the plaza

• They controlled for individual and small area covariates, but what about omitted confounders?

• What happened to birthweight after the tolls were removed?
Percent increase in Risk of Death associated with a 10 µg/m³ increase in PM10 concentration in Cook County Illinois, 1988-1991 among population previously admitted to hospital for a diagnosis of heart or lung disease.

<table>
<thead>
<tr>
<th>Individuals Admitted to Hospital with Specific Condition</th>
<th>Increase in Risk (per 10µg/m³)</th>
<th>95% CI</th>
<th>Relative Effect Modification*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myocardial Infarction</td>
<td>1.98 %</td>
<td>(-0.25 %, 4.26 %)</td>
<td>2.67</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.49 %</td>
<td>(-0.06 %, 3.07 %)</td>
<td>2.00</td>
</tr>
<tr>
<td>Congestive Heart Failure</td>
<td>1.28 %</td>
<td>(-0.06 %, 2.64 %)</td>
<td>1.72</td>
</tr>
<tr>
<td>COPD</td>
<td>0.58 %</td>
<td>(-0.82 %, 2.00 %)</td>
<td>0.78</td>
</tr>
<tr>
<td>Conduction Disorders</td>
<td>0.64 %</td>
<td>(-0.61 %, 1.90 %)</td>
<td>0.85</td>
</tr>
<tr>
<td>None of the above conditions</td>
<td>0.74 %</td>
<td>(-0.29 %, 1.79 %)</td>
<td>Reference</td>
</tr>
</tbody>
</table>
Percent Change in Daily Deaths by Educational Level in 20 US Cities

<table>
<thead>
<tr>
<th>Primary cause of death</th>
<th>Low (≤8 years)</th>
<th>Medium (8–12 years)</th>
<th>High (&gt;12 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%†</td>
<td>95% confidence interval</td>
<td>%</td>
</tr>
<tr>
<td>All cause</td>
<td>0.62</td>
<td>0.29, 0.95</td>
<td>0.36</td>
</tr>
<tr>
<td>Respiratory disease</td>
<td>0.82</td>
<td>−0.32, 1.96</td>
<td>0.88</td>
</tr>
<tr>
<td>Heart disease</td>
<td>0.72</td>
<td>0.23, 1.21</td>
<td>0.38</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>0.33</td>
<td>−0.63, 1.49</td>
<td>0.79</td>
</tr>
<tr>
<td>Stroke</td>
<td>0.07</td>
<td>−1.44, 1.58</td>
<td>0.29</td>
</tr>
</tbody>
</table>
Other Studies Indicate Susceptibility by:

- Obesity
- Poverty
- Violence
- Stress

- These are all prevalent, and, with Diabetes and Heart Disease, increasing risk factors, so the impact of Pollution will likely grow