Particulate Air Pollution and Fatal Coronary Heart Disease: Women may be at Greater Risk

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Air Resources Board
California Environmental Protection Agency
Study Design*

• Middle-aged Californians followed for 22 years (1977-1998) as part of the AHSMOG study (Adventist Health Study on the Health effects of Smog)
  – >3,000 healthy, non-Hispanic white participants
  – 10 years at initial residence in 1976

• Estimates of monthly ambient concentrations of PM2.5, ozone, sulfur dioxide, and nitrogen dioxide (1973-1998)

• Coronary Heart Disease (CHD) deaths were determined from death certificates

• Gender-specific and time dependent statistical analysis

PM2.5 Concentrations by Location
Results

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
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<tbody>
<tr>
<td>PM2.5</td>
<td></td>
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<tr>
<td>Coarse PM</td>
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<td>PM2.5+O3</td>
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(95% CI)
Results (2)

![Graph showing the relationship between PM$_{2.5}$ mean concentration and relative risk (RR) with 95% CI. The graph includes two scenarios: PM$_{2.5}$ only and PM$_{2.5}$ + O$_3$. The concentration ranges are: Low = 25, Medium = >26-38, High = >38. The data shows an increasing trend in relative risk with higher PM$_{2.5}$ concentrations.](image)
Implications

- Bulk of cardiopulmonary disease in PM mortality studies is likely due to coronary heart disease (heart attacks)

- First long-term cohort study to show statistically significant gender-specific results
  - Agrees with higher risk seen for women in the American Cancer Society cohort study
  - Consistent with significant increased risk for atherosclerosis in older women (Kunzli et al., 2005)

- Differential deposition of fine particles in the lung and differences in blood chemistry may be responsible for gender differences

- Coarse PM may be contributing to chronic heart disease in women