Lung Cancer Mortality and Exposure to Atmospheric Aerosol Particles in Guangzhou, China

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The economic development of China has been accompanied by the emergence of several megacities with enhanced consumption of energy, increased emissions of air pollutants, and dramatic degradation of air quality.
the hazard of haze

- Visibility
- Air quality
- Solar radiation
- Respiratory tract diseases
- Rickets
- Infection
- Plant photosynthesis and respiration
- Climate change
- Harm climatic extreme event
High concentrations of aerosol particles are believed to induce oxidative damage to human DNA, resulting in significant effects for human health.

Air pollution is provides a considerable risk for respiratory morbidity and cardiopulmonary mortality. It is also associated with the incidence of lung cancer.
the haze effect on human respiration system

deposition

- particle diameter (μm)

- totals

- upper respiratory tract

- bronchus

- lungs
Method

We examine long-term records of aerosol particles and lung cancer incidence in the city of Guangzhou to infer a statistical relationship between the abundance of atmospheric aerosol particles and the incidence of lung cancers in this particular megacity.
A long-term statistical record suggests that the mortality due to lung cancer in Guangzhou is closely correlated with the levels of aerosol particles present in the atmosphere near the surface.

The rate of cigarette smoking in Guangzhou does not exhibit any significant long-term trend from 1954 to 2006.

Results

AEC | lung cancer
---|---
1954-1972 | 150 | 10
1972-1980 | 300 | 20
1980-2005 | 400 | 50-70

other cancers: nasopharyngeal, leucocytthemia and cervical cancers
The result shows that the highest correlation coefficient is found for a time lag of about 7-8 years.

<table>
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<tr>
<th>Lag (year)</th>
<th>Correlation coefficient</th>
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<tr>
<td>0</td>
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<tr>
<td>1</td>
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<tr>
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<tr>
<td>6</td>
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<tr>
<td>9</td>
<td>0.96</td>
</tr>
</tbody>
</table>

**Table**  Statistical relationship (correlation coefficient) between AEC (Mm-1) and the mortality by lung cancer for different time-lags (year)
This figure clearly shows that lung cancer mortality and AEC are better correlated when a time lag of 7 year is adopted.
Summary

- There is strong statistical evidence for a relationship between the degradation of air quality and the mortality associated with lung cancers in a highly polluted megacity such as Guangzhou in Southern China.

- Only a slight increase in the rate of smokers was noticed during the period under consideration. Since several studies suggest that the death rate due to lung cancer appears to increase under polluted conditions. The possible association between air pollution and lung cancers in less polluted regions such as the urban areas of Europe and North America also needs further studies.
Thank you!

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