



Analysis of Air Pollution and Lung Function in 20 European Cities

Environmental Issue

Air pollution ...

...can cause a number of serious health problems, even at concentrations found in many major cities. (www.epa.gov/airrow/particle/airborne.html#intro)

...has been associated with increased mortality and hospital admissions due to respiratory and cardiovascular disease. (Brunekreef & Holgate, 2002)

...[has] chronic, adverse effects on lung development in children [...]. (Gauderman et al., 2004)

Open issues

- What are the culprit air pollutants?
- What are the culprit sources of air pollution?

Abstract

Long term effects of air pollution on respiratory and cardiovascular health outcomes have been well established, mostly by American studies.

The European Community Respiratory Health Survey is the first large European follow-up study (10 years) that aims at investigating the long term effects of air pollution on asthma, chronic bronchitis, and lung function in approx. 10,000 adults across 20 European cities in 10 countries.

Scientific Approach

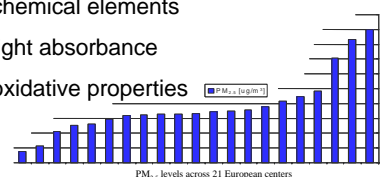
The European Community Respiratory Health Survey (ECRHS) is a 10 years follow-up study of approx. 10,000 adults from 20 European cities in 10 countries. (www.ecrhs.org)

Aim: Investigate the relation between air pollution and lung function

Air pollution assessment

- Estimate long term exposure
- Measure pollutants which may serve as source specific air pollution indicators

- 1 central monitoring location in each center
- Fine particles ($PM_{2.5}$) and NO_2 sampled over a 12 months period in 2000
- Further analyses of filter samples:
 - chemical elements
 - light absorbance
 - oxidative properties



Open issues

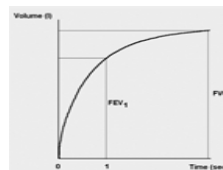
- Do central monitors represent the population mean of individuals' exposures?
- Can effects of various pollutants be distinguished (collinearity)?

Health assessment

- Measure individuals lung function
- For each center derive the population mean lung function, adjusted for individuals' characteristics, i.e. body size, age, gender, smoking, etc.

- 2 visits to clinic:
 - baseline 1990
 - follow-up 2000

- Lung function test
- Blood samples, allergy tests
- Questionnaire based interview on health, lifestyle, environment



Open issues

- Are there differences between centers and individuals (others than air pollution levels) which may affect lung function and which we are not able to control for (confounding)?

Impact

This study in particular...

- will provide a European assessment of long term health effects of air pollution
- will provide insight into issues of epidemiological studies that try to assess the effects of specific pollutants and sources

Air pollution research in general...

- addresses a major risk to public health, which is comparable in its magnitude to passive smoking

Interdisciplinary aspects

- Environmental justice: air pollution disproportionately affects the poor and members of minorities
- Air pollution abatement: as technological improvements reach their limits, reduction in fuel and energy consumption gets important
- Air pollution and global warming: 2 distinct problems with common solutions (?)

