

# Environmental Epidemiology

단국의대 권호장

## What is environment?(Last 1995)

- All that which is external to the individual human host
- It can be divided into physical, biological, social, cultural, any or all of which can influence health status in populations

## Traditional hazards

- Shortage of food and drinking water
- Plants with natural toxin
- Infections and parasites
- Injuries from falls, fires, and animal attack
- Cold and hot temperature, natural disasters

## Modern hazards – chemical and physical agents

- Diet and food contaminants
- Water: chlorinated hydrocarbons and infectious agent
- Air pollution
- Environmental tobacco smoke
- Radiation including EMF
- Global environmental changes (ozone depletion, global warming)

## What is epidemiology? (Last, 1995)

- The study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to control of health problems.

## Unique features in EE

- Very large number of exposures
- Low concentrations
- Little difference among individuals with certain area
- Very low relative risks
- Indirect and long-term effects
- Involuntary exposures

## Exposure assessment

- Interviews, questionnaires, structured diaries
- Measurement in external media
- Concentrations in the personal or microenvironment
- Individual dose
- Measurements of concentrations in human tissues
- Markers of physiologic effects

## Overview of study designs

- All the standard designs
- Chronic low lead exposure vs lower IQ (Needleman et al.)
  - IQ vs lead content of deciduous teeth (cross-sectional study)
  - Follow up of cohort identified in cross-sectional study
- Community intervention study: the evaluation of dental benefits from fluoridation of public water system

## Ecologic studies in environmental epidemiology

- Can be useful when
  - (1) the goal is to screen hypothesis inexpensively
  - (2) the goal is to determine the effectiveness of programs, policies, or regulations that are implemented at the ecologic level
  - (3) Variation across individuals is outweighed by between group variance

## Three stages in air pollution studies

- 1<sup>st</sup> generation: health impact of incidents with extremely high levels of air pollution
- 2<sup>nd</sup> generation: less extreme levels of pollution
- 3<sup>rd</sup> generation: even lower levels of air pollutants and more subtle design

## 1<sup>st</sup> generation

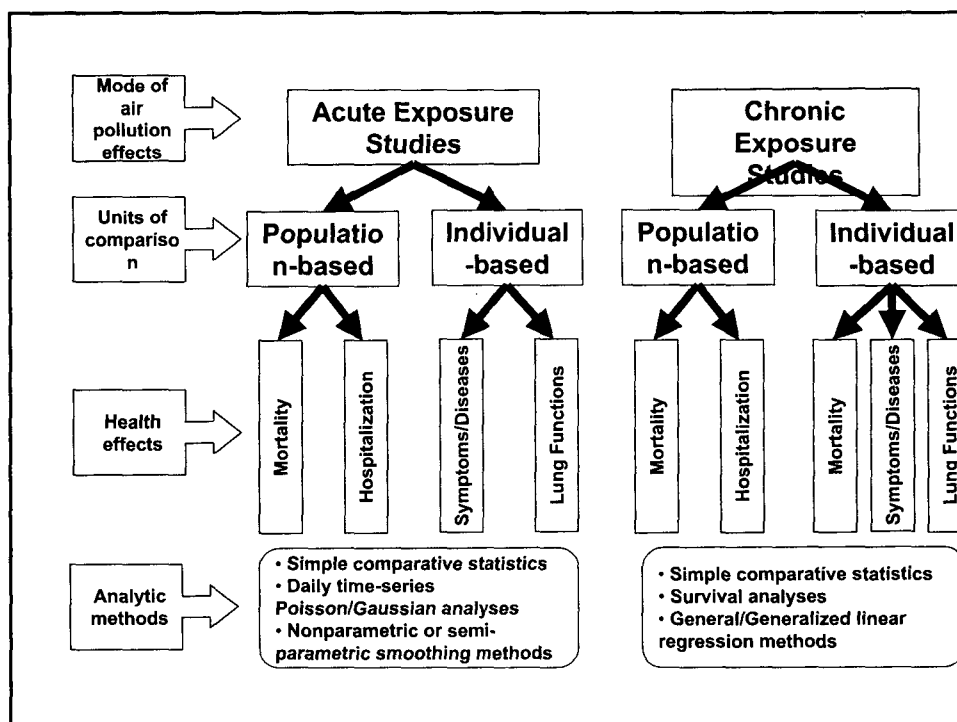
- In Meuse valley of Belgium in 1930; in Donora, Pennsylvania, in October 1948; in London winter of 1952
- Methodologically similar to the reports of infectious disease epidemics
- Within community comparisons using a before-and after design

## 2<sup>nd</sup> generation

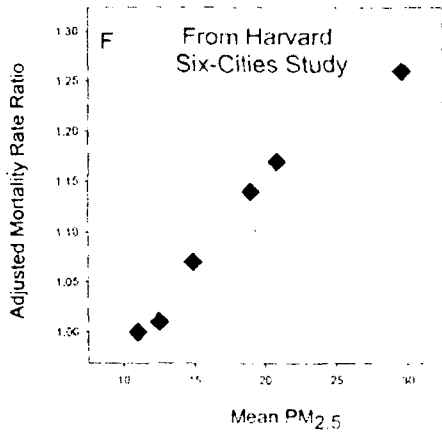
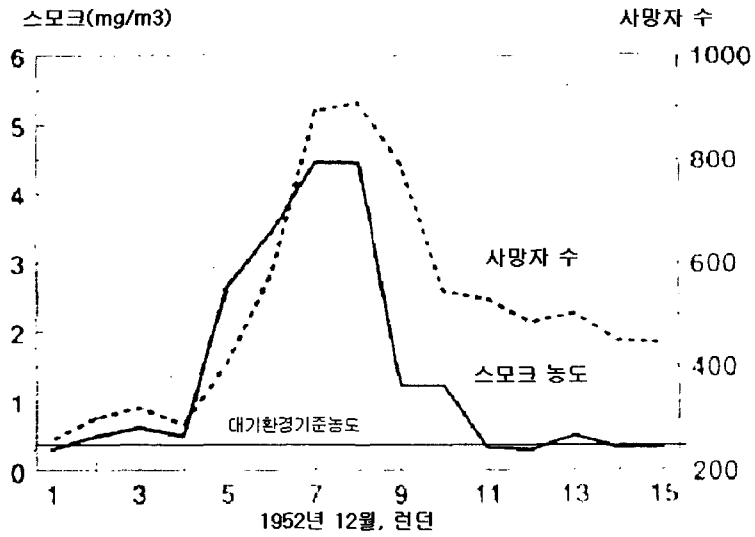
- Conducted in the 1950s and 1960s
- A design that compared communities with higher pollutant levels to ones with lower level
- Strong correlation between socioeconomic level and air pollution level
- Demonstrated the threat from ordinary ambient air pollution to the general pop.
- Contributed to the establishment of air standards

## 3<sup>rd</sup> generation

- Relied heavily on within–community time–series analyses that examine the effects
- Time series analysis avoids problems from confounders that differ across individuals (smoking prevalence, distribution of social class, age)
- Fairly consistent associations



### 런던스모그, 1952년



N Engl J Med 1993;329:1753-1759



