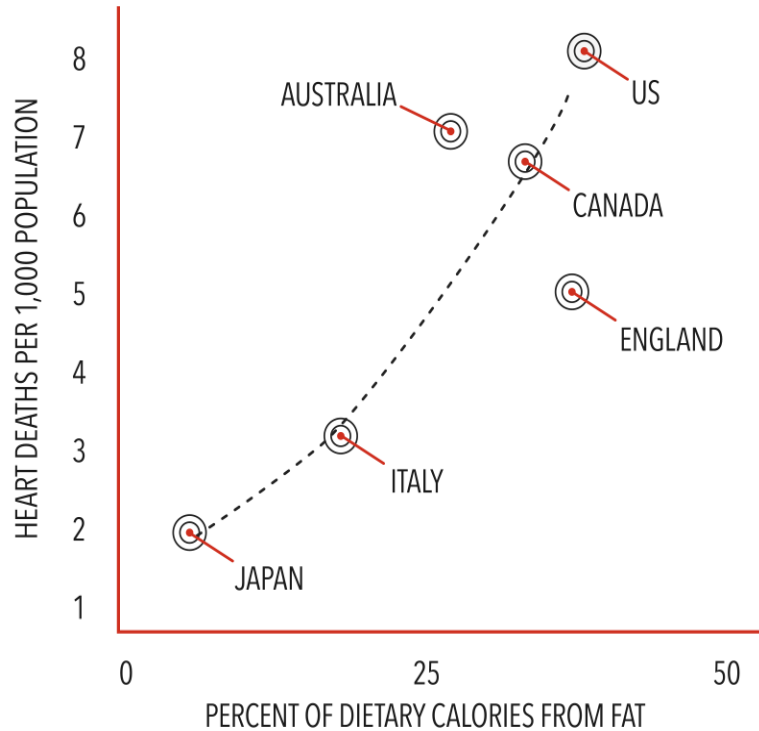# Epidemiologie

# Ekologické studie

## Praktikum

# Seven Countries Study



- Ancel Keys (1904 – 2004) launched the Seven Countries Study in 1958, after exploratory research on the relationship between dietary pattern and the prevalence of coronary heart disease in Greece, Italy, Spain, South Africa, Japan, and Finland.

- How dietary fat influenceds blood cholesterol (and CVD risk)?

# KEYS' CAREFULLY SELECTED COUNTRIES



**What Keys Published**

Data from a small selection of countries surveyed in 1953 produced a tight correlation between total fat intake and deaths from heart disease.

**The Bigger Picture**

Analysis of all 22 countries in the original dataset would have produced a weaker correlation.

Country

1. Australia
2. Austria
3. Canada
4. Ceylon
5. Chile
6. Denmark
7. Finland
8. France
9. German Fed. Rep.
10. Ireland
11. Israel
12. Italy
13. Japan
14. Mexico
15. Netherlands
16. New Zealand
17. Norway
18. Portugal
19. Sweden
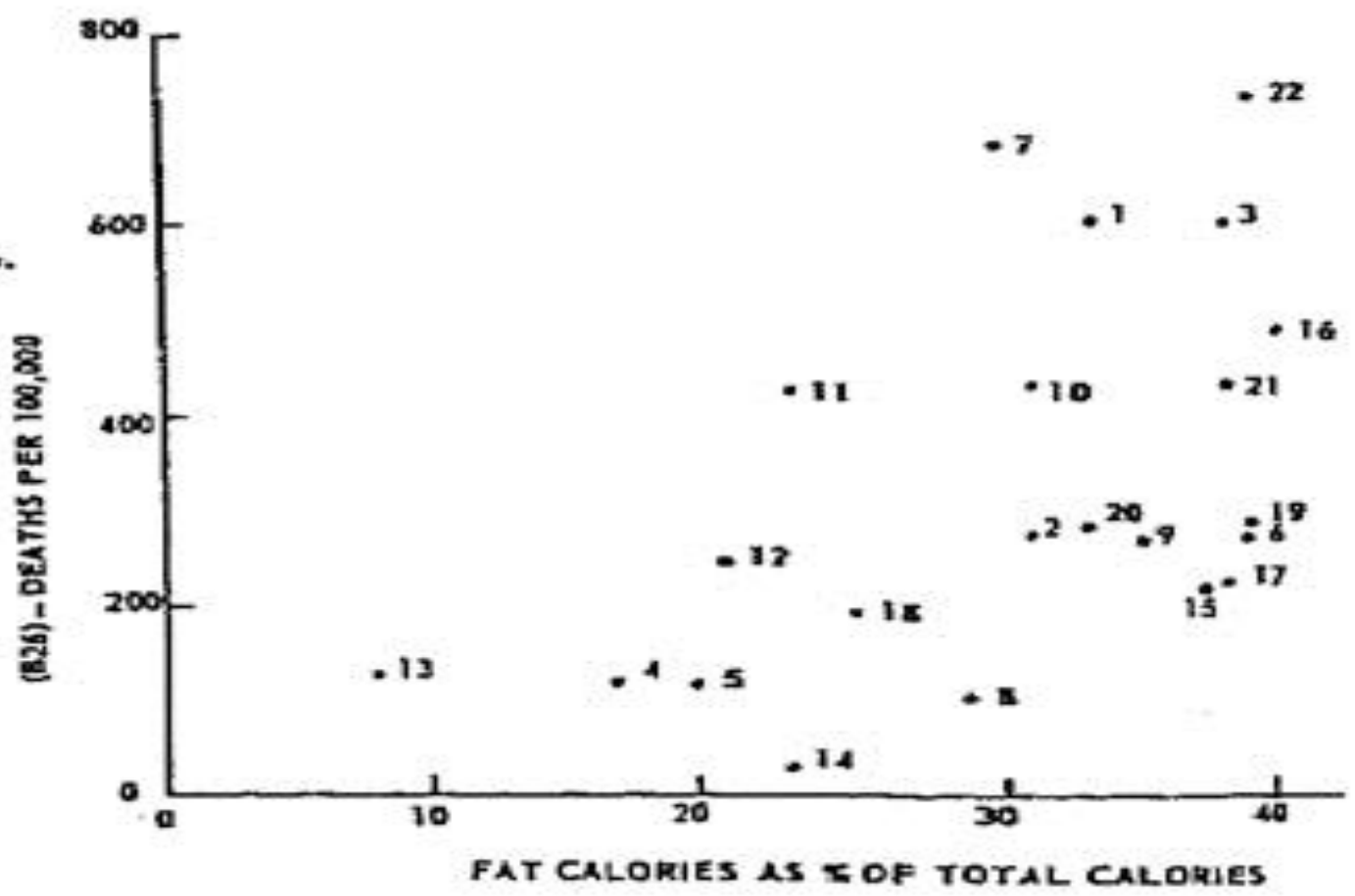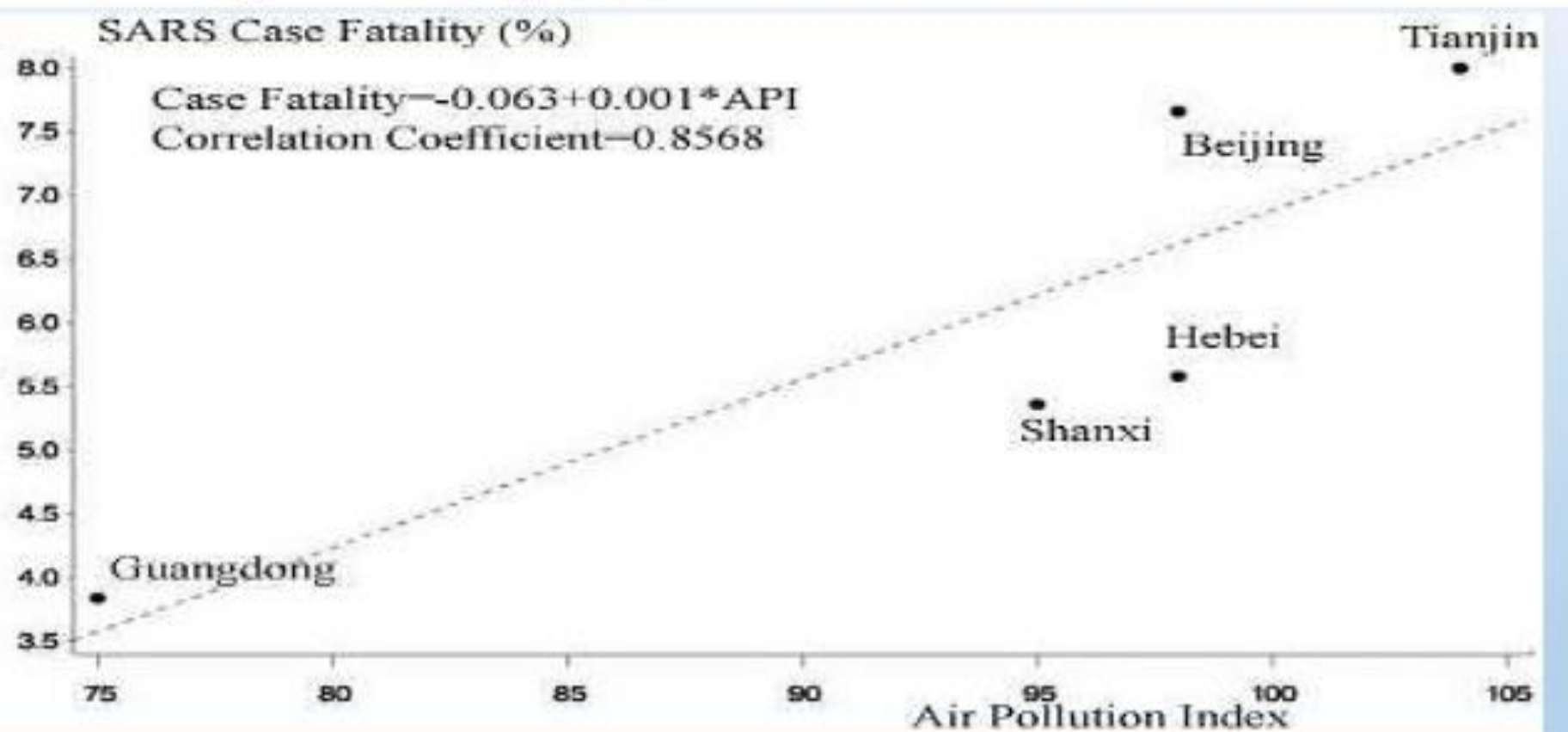20. Switzerland
21. United Kingdom
22. United States

FIG. 3. Mortality from arteriosclerotic and degenerative heart disease (B-26) and fat calories as per cent of total calories in males fifty-five to fifty-nine years. Calculated from national food balance data by F.A.O. (see text for definition).

# 1.

- O jaký graf se jedná?
- Popište, co graf ukazuje.
- Z jakých zdrojů pocházejí tato data?
- Jaký je vztah mezi příjmem kalorií a úmrtností na srdeční onemocnění?
- Jak velké jsou rozdíly v úmrtnosti mezi zemí s nejvyšším a nejnižším kalorickým příjmem na levém grafu?
- Proč se od sebe grafy liší?
- Poskytují tato data nezvratný důkaz, že vysoký kalorický příjem vede k srdečním onemocnění? Proč?

# Air pollution and case fatality of SARS in the People's Republic of China: an ecologic study

Yan Cui[1], Zuo-Feng Zhang*[1], John Froines[2], Jinkou Zhao[3], Hua Wang[3], Shun-Zhang Yu[4] and Roger Detels[1]

The Correlation and Association between Short-term Exposure to Ambient Air Pollution and Case Fatality of SARS in People's Republic of China.

*Cui Y et al. Environmental Health : A Global Access Science Source .2003;2:15

# 2.

- Co ukazuje tento graf?
- Z jakých zdrojů asi pocházejí tato data?
- Jak se počítá case-fatality rate?
- Co graf naznačuje?
- Může se jednat o příčinný vztah? Mohou být nějaká jiná vysvětlení?
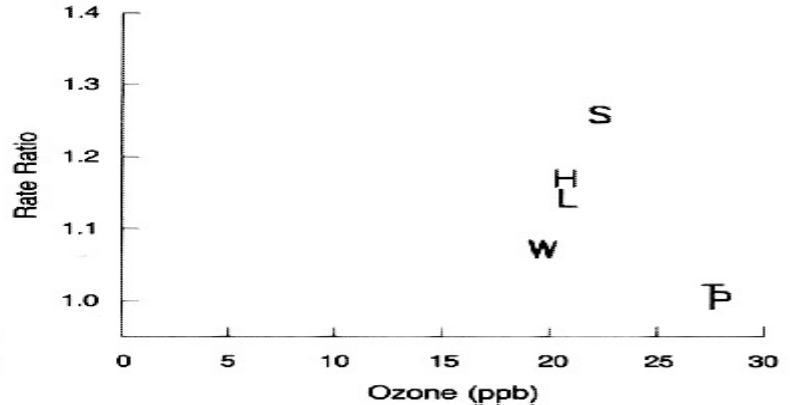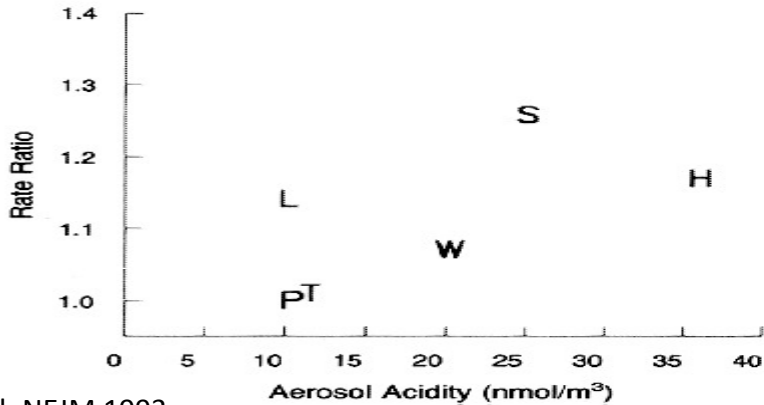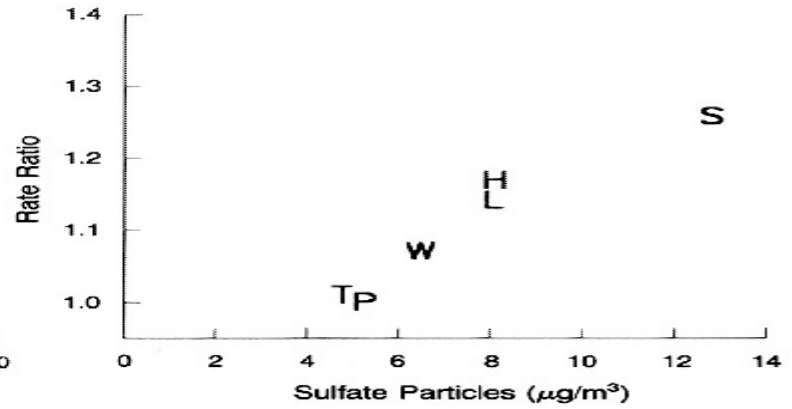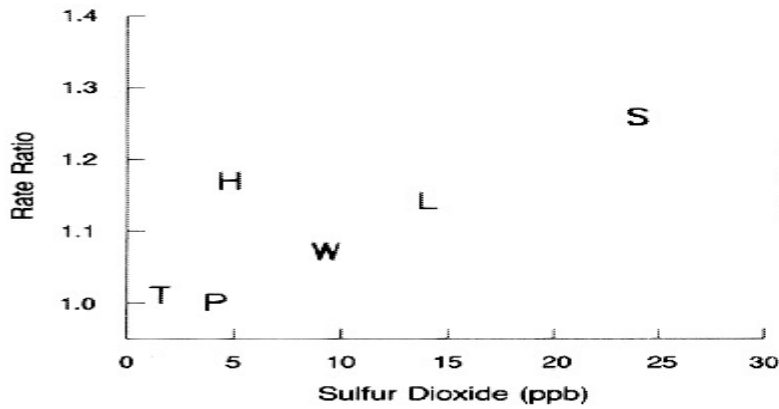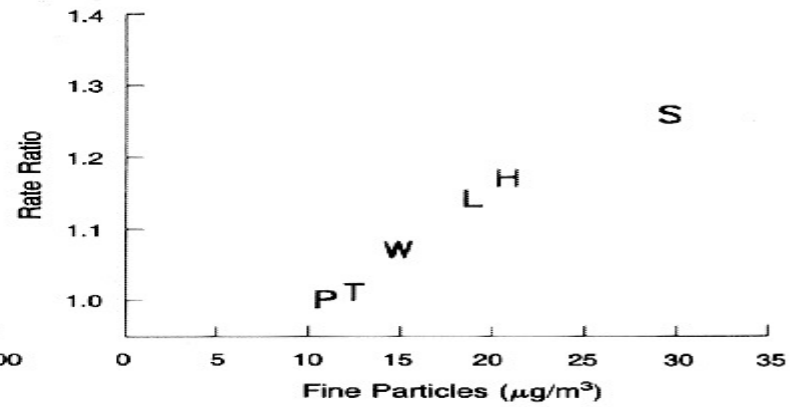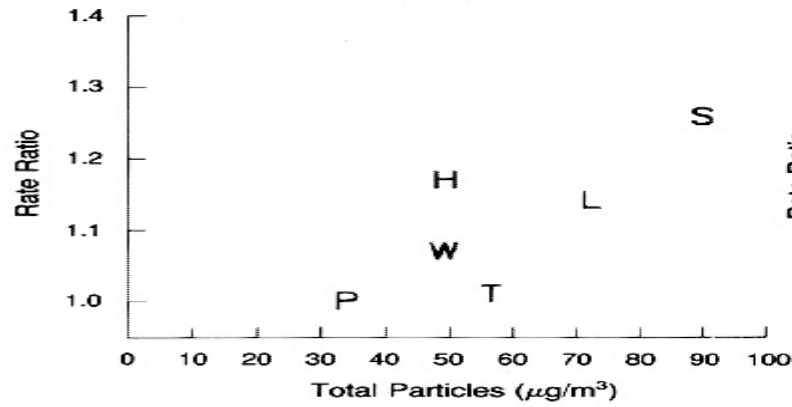- Může být výsledek studie ovlivněn incidencí SARS?

# Six Cities Study

- **Methods**
- In this prospective cohort study, we estimated the effects of air pollution on mortality, while controlling for individual risk factors. Survival analysis, including Cox proportional-hazards regression modeling, was conducted with data from a 14-to-16-year mortality follow-up of 8111 adults in six U.S. cities (Portage, Wisconsin; Topeka, Kansas; Watertown, Massachusetts; St. Louis; Harriman, Tennessee; S Steubenville, Ohio).
- **Results**
- Mortality rates were most strongly associated with cigarette smoking. After adjusting for smoking and other risk factors, we observed statistically significant and robust associations between air pollution and mortality. The adjusted mortality-rate ratio for the most polluted of the cities as compared with the least polluted was 1.26 (95 percent confidence interval, 1.08 to 1.47). Air pollution was positively associated with death from lung cancer and cardiopulmonary disease but not with death from other causes considered together. Mortality was most strongly associated with air pollution with fine particulates, including sulfates.

Dockery at al, NEJM 1993

Estimated Adjusted Mortality-Rate Ratios and Pollution Levels in the Six Cities Study.



Dockery at al, NEJM 1993

# 3.

- Jaká data byla použita v této studii? Z jakých zdrojů?

- Co graf naznačuje?

- Jak velké jsou rozdíly v úmrtnosti mezi městy?

- V čem se tato studii nejvíce liší od přechozích příkladů? Je lepší nebo horší?

# SAVIAH Study

- Study of outdoor air pollution and respiratory symptoms in children collected in the Czech part of the international Small Area Variations in Air pollution and Health (SAVIAH) Project.

- A methodological study designed to test the use of geographical information systems (GIS) in studies of environmental exposures and health at small area level:
  - (1) individual data on 3,680 children (response rate 88%) by questionnaires;
  - (2) census-based socio-demographic data for small geographical units;
  - (3) concentrations of nitrogen dioxide ($NO_2$) and sulfur dioxide ($SO_2$) measured by passive samplers in three 2-week surveys at 80 and 50 locations, respectively.

- We integrated all data into a geographical information system. Modeling of $NO_2$ and $SO_2$ allowed estimation of exposure to outdoor $NO_2$ and $SO_2$ at school and at home for each child.

- We examined the associations between air pollution and prevalence of wheezing or whistling in the chest in the last 12 months by logistic regression at individual level, weighted least squares regression at small area (ecological) level and multilevel modeling.

**TABLE 3.** Effect of NO₂

|  | Univariate | |
|---|---|---|
|  | OR | 95% CI |
| Ecological analysis (both outcome and exposure at area level) | 1.04 | 0.90–1.20 |

Estimated odds ratios and 95% confidence intervals for 10 $\mu g/m^3$ increase in co
* One pollutant and socioeconomic variables.
† Both air pollutants and socioeconomic factors.
‡ Socioeconomic variables in model (except univariate models): sex, age, gas/sto
time spent outside Prague.
§ Socioeconomic variables in model (from census): proportion of houses with v
‖ Socioeconomic variables in model: both ‡ and §.

# 4.

- Vysvětlete, co je míněno termínem ecological analysis
- Interpretujte výsledek

TABLE 3. Effect of NO₂

| | Univariate | |
|---|---|---|
| | OR | 95% CI |
| Individual outcome and individual exposure | | |
|   Logistic regression‡ | 1.16 | 0.98–1.38 |
|   Multilevel modeling | | |
|     Individual covariates‡ | | |
|     Ecological covariates§ | | |
|     Individual + ecological‖ | | |
| Individual outcome and area exposure | | |
|   Logistic regression‡ | 1.02 | 0.87–1.20 |
|   Multilevel modeling | | |
|     Individual covariates‡ | | |
|     Ecological covariates§ | | |
|     Individual + ecological‖ | | |
| Ecological analysis (both outcome and exposure at area level) | 1.04 | 0.90–1.20 |

Estimated odds ratios and 95% confidence intervals for 10 μg/m³ increase in c

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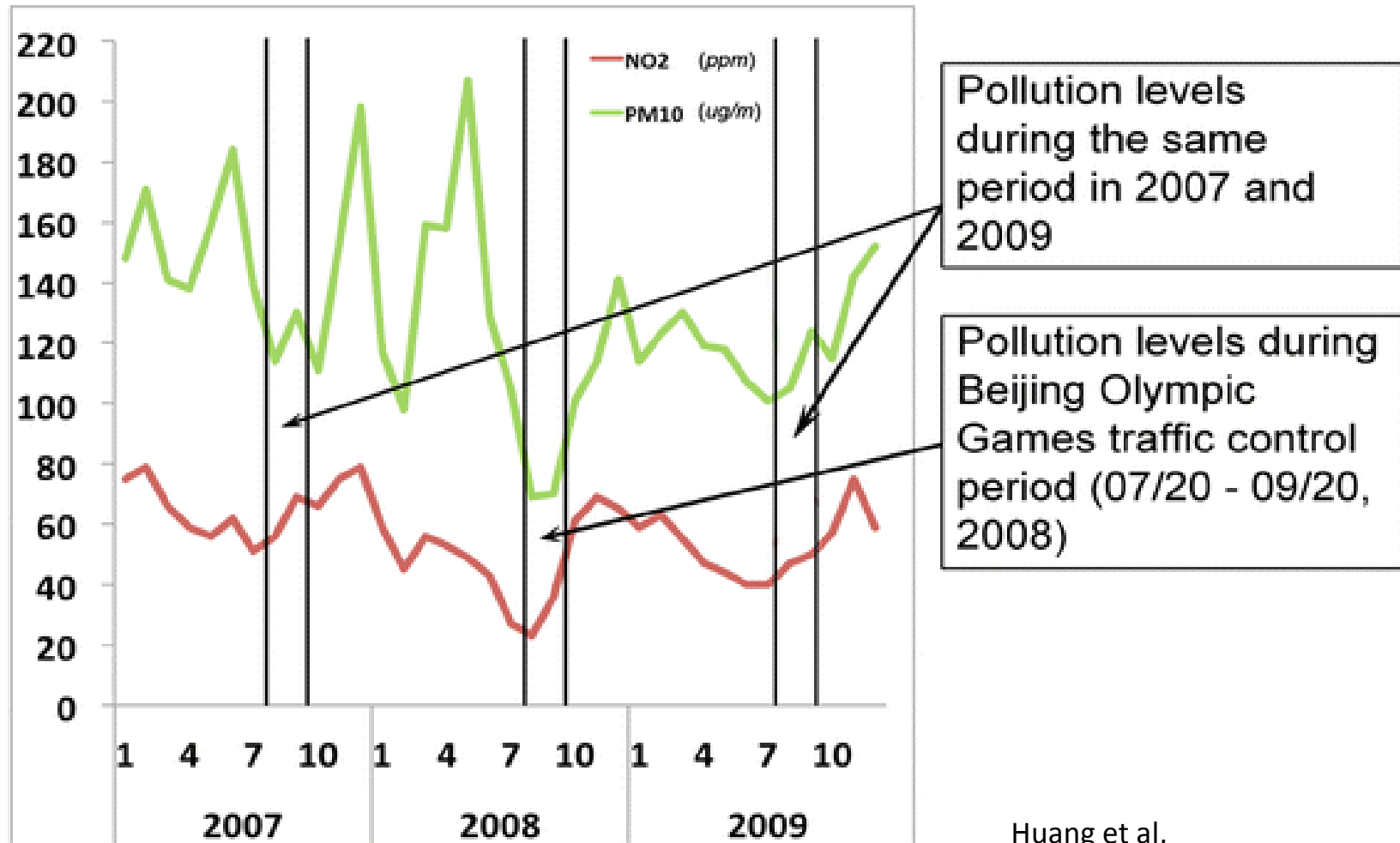‖ Socioeconomic variables in model: both ‡ and §.

# 4.

- Vysvětlete, co je míněno termínem *ecological analysis?*

- Interpretujte výsledek

- Čím se od sebe liší různé typy analýz?

- Porovnejte výsledky různých typů analýz. Liší se od sebe? Proč?

- Jaký závěr byste učinili z těchto výsledků – ovlivňuje kvalita ovzduší plicní funkce dětí?

# Ambient air pollution and adverse birth outcomes: a natural experiment study

- We estimated the effect of $PM_{10}$ and $NO_2$ exposure during each trimester of gestation on the risk of preterm birth among live births and the birth weight among term babies. The data were based on 50,874 live births delivered between January 1, 2006 and December 31, 2010 at the Beijing Haidian Maternal and Child Health Hospital.

# NO$_2$ and PM$_{10}$ concentrations before, during, and after the Beijing Olympic Games Traffic Control period

Huang et al,
Population Health Metrics, 2015, 13, 17

# 5.

- Jaký je asi cíl této studie?
- Jaký je princip této studie?
- Co ukazuje graf koncentrací polutantů?
- Odkud asi tato data pocházejí?
- Proč autoři pouřili období Olympijských her?

# Effects of concentration of ambient air pollutants on birth weight of infants born full term

| Concentration of ambient air pollutant | NO$_2$ (per 10 ug/m$^3$) | | | | PM$_{10}$ (per 10 ug/m3) | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Single pollutant model | | | | Single pollutant model | | | |
| | Change of birth weight | P-value | | | Change of birth weight | P-value | | |
| 1$^{st}$ trimester | 5.85 (−1.03, 12.74) | 0.096 | | | −1.18 (−3.21, 0.85) | 0.254 | | |
| 2$^{nd}$ trimester | −3.72 (−11.76, 4.32) | 0.364 | | | 0.43 (−1.74, 2.60) | 0.699 | | |
| 3$^{rd}$ trimester | −13.78 (−21.12, −6.43) | 0.000 | | | −2.55 (−5.29, 0.20) | 0.069 | | |

# 6.

- Jaký je asi cíl této studie?
- Jaký je princip této studie?
- Co ukazuje graf koncentrací polutantů?
- Odkud asi tato data pocházejí?
- Odkud asi pocházejí data o porodní váze?
- Proč autoři pouřili období Olympijských her?
- Jaká byla nejmenší jednotka data v analýze?
- Proč nebyla studie standardizována pro další faktory?
- Jak velké jsou efekty znečištění na porodní váhu?
- Co leze z těchto výsledků usoudit?