Neighbourhood Index of Socio–Economic Position and its Association with Deprivation and Mortality: The Swiss National Cohort

Radoslaw Panczak, Bruna Galobardes, Adrian Spoerri, Marieke Voorpostel, Marcel Zwahlen, Matthias Egger
Area based Socio-Economic Position

- Research originated in **1960s**
- British indices of **Townsend**, Jarman, and Carstairs
- Indices of Multiple Deprivation (**UK**)
- Work in other countries
- **Compound** indicators to combine several **domains**
- **Proxy** for missing individual level data
- **Effects of place** on health
Swiss area based Index

Proportion of households led by person with primary education or less:
- 0% - 15.2%
- 15.3% - 18.8%
- 18.9% - 21.2%
- 21.3% - 23.5%
- 23.6% - 25.9%
- 26% - 28%
- 28.1% - 30.7%
- 30.8% - 34%
- 34.1% - 39.6%
- 39.7% - 76.5%

Population of communities and city quarters
Switzerland 2000

SPH 2011
Swiss Neighbourhood Index of Socio–Economic Position
Six steps to build Index

1. Select data sources
2. Define spatial boundaries
3. Define domains & variables
4. Construct Index
5. Validate Index
6. Association with health outcomes
1. Data sources

1. Census 2000 records
2. Georeferenced buildings
3. Road network model
2. Spatial boundaries

1,267,353 x
3. Domains & variables

• **Income:**
  Median *rent* per m$^2$ among *3-5 bedroom* rented flats

• **Education:**
  % of households led by person with *low or no education*

• **Employment:**
  % of households led by person employed in *manual or unskilled occupations*

• **Housing:**
  Mean *crowding* among households
4. Data reduction

• Several methods used in the field
• We chose Principal Component Analysis
• PCA based on data aggregated for each neighbourhood
• First principal component retained as index
• SEP index value for each neighbourhood
Swiss Neighbourhood Index of SEP

- Single value describing SEP of each of 1.27 million neighbourhoods
- Standardized to range 0 (worst area SEP) to 100 (best)
- Based on household and its ~50 closest neighbours
Neighbourhoods across Index deciles

- **Education**: Percentage of households led by a person with low education.
- **Occupation**: Percentage of households led by a person in unskilled education.
- **Housing**: Mean crowding of households.
- **Income**: Median rent among 3-5 bedroom flats (CHF/m²).

SPH 2011

Swiss Neighbourhood Index of Socio–Economic Position
Deciles of Neighbourhood Index of SEP
Switzerland 2000
**Swiss Household Panel**

- Representative **sample** of 5,074 Swiss households from **1999**
- Detailed information about **financial** situation of households
- 4,460 (87.9%) households **geocoded** and spatially **linked** to Index
Validation using Swiss Household Panel

N = 3,669  
Source: SHP
Area SEP and all cause mortality
Switzerland 2001 - 2008

Age and sex adjusted hazard ratios from Cox regression models

Source: SNC
Area SEP and cause specific mortality
Switzerland 2001 - 2008

Lung cancer

Breast cancer

Age and sex adjusted hazard ratios from Cox regression models

Source: SNC
Strengths and limitations

+ Avoids fixed, discreet boundaries
+ Road connectivity as a proxy of interactions
+ Better precision - less misclassification
+ Better geovisualization and retrieval
- Many possible indices
- Census data exclusively
- Road connectivity as a proxy of interactions
- Rent as a proxy of income
Thank you!

www.ispm.ch/panczak