Lecture 1: Overview of Small Area Estimation (SAE) methods

- **Introduction**
- **Poverty map**
- **SAE methods**
- **Data**
- **Literature**

Small Area Estimation

- To identify areas for targeted programs, for example:
  - Identify poor areas such as districts or communes with high poverty rates.
  - Identify areas with low levels of access to clean water.
  - Identify areas with high rates of multidimensional child poverty.
  - Identify areas with high rates of food insecurity.
- Data to estimate the above indicators are often not representative of the provincial and district levels.

Small Area Estimation

- Small area estimation (SAE) are methods to estimate statistical indicators for geographical areas or population groups.

  - Usually socio-economic statistical indicators such as poverty rate or per capita income are estimated from sampling surveys, which are representative at the regional level. Extrapolating estimates to small areas such as provinces or districts will not ensure accuracy. Direct estimates have large errors due to the small sample size.

  - The SAE method combines auxiliary data from censuses, administration, geospatial data, or other large surveys to produce estimates with a higher degree of accuracy.

Small Area Estimation

■ SAE method is similar to the method to estimate missing values in survey data.

id	Thu nhập	Quy mô hộ	Tuổi chủ hộ	Giới tính chủ hộ
1	12	4	81	1
2	24	5	53	0
3	8	6	68	1
4	16	3	43	0
5	66	4	82	0
6	8	3	89	1
7	16	2	80	0
8	22	6	74	1
9	.	5	75	1
10	.	6	43	0

Poverty mapping

- One of the popular applications of SAE is poverty mapping.

- Vietnam has implemented many poverty reduction policies and programs.

- To improve the effectiveness of these policy tools, programs must reach the poor.

- International experience shows that the impact of financial assistance on poverty is greater when the poor is better identified (Baker and Grosh, 1994; Bigman and Fofack, 2000; Elbers et al. 2007).

- Estimating poverty rates at district and commune levels will help improve the effectiveness of assistance programs.

Estimation of poverty rate

- Poverty rate is measured:
  - Monertary indicators such as income and expenditure
  - Multidimensional poverty
- Vietnam Household Living Standard Surveys (VHLSS):
  - Advantages: Detailed data collected on income, expenditure and household living standard indicators.
  - Disadvantages: Results represent the regional level, cannot be directly estimated for the province or district.
- Vietnam Population and Housing Census (VPHC):
  - Advantages: Representavtive at small geographical areas such as provinces, districts and communes.
  - Disadvantages: Only collects information on demographics and basic housing characteristics. Do not contain information about income and expenses.

Estimation of poverty rate

- The SAE method combines household surveys and population censuses to estimate household welfare indicators at the provincial and district levels.

Household survey

ID code	Per capita expenditure	household size	Education of hh. head	Motorbike	Television	Solid house	Piped water
1	500	6	12	1	1	1	0
2	450	7	10	0	1	0	1
.....							
200	390	9	8	1	1	0	1

Population census

ID code	Per capita expenditure	household size	Education of hh. head	Motorbike	Television	Solid house	Piped water
1	.	7	12	1	0	1	0
2	.	3	10	0	1	0	1
.....							
2,000,000	.	7	8	1	0	0	1
......							
53,890,021	.	6	9	1	1	0	0

Estimation of poverty rate
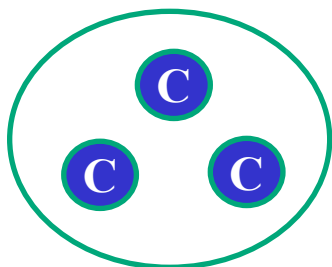
VHLSS 2020   **VPHC 2019**
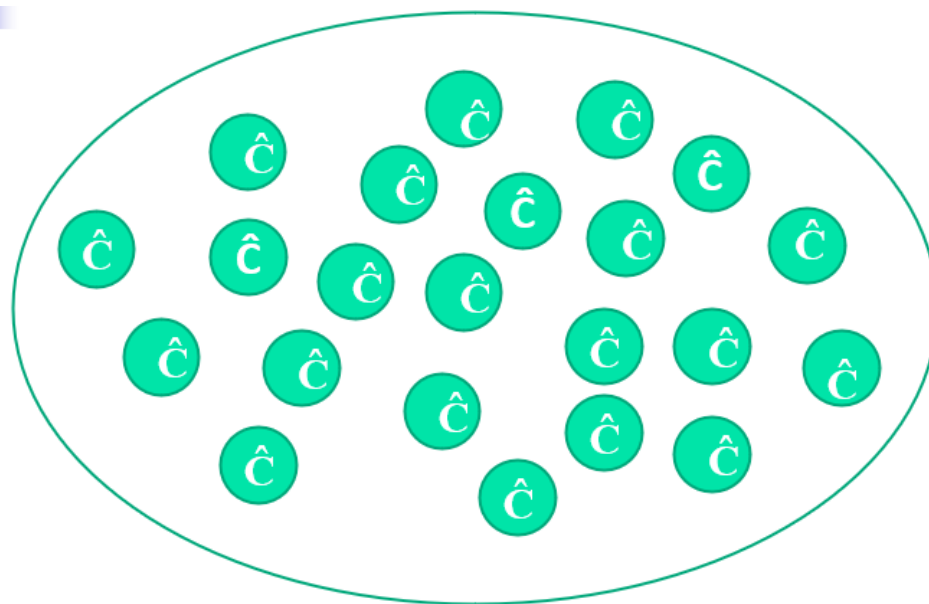
SAE methods

- Area-level model: This method only uses aggregated auxiliary information at the regional level such as province. Aggregated data is more readily available for public access. The disadvantage of this method is that the information is less detailed than with unit-level models.

- Unit-level model: This method is based on detailed income/expenditure information from household surveys and a set of household-level characteristics in both household and census surveys to predict household expenditure or income for each household in census data, thereby estimating indicators in small areas.

Data

- Data at the regional level:
    - The statistical yearbook includes information on socio-economic indicators of the province/city.
    - The Provincial/City Statistical Yearbook includes information on socio-economic indicators of the district/district.
- GIS data:
    - Rainfall and temperature data from monitoring stations.
    - Night lighting from the Defense Meteorological Satellite Program (DMSP) and the Visible Infrared Imaging Radiometer Suite (VIIRS).
    - Tools like USGS EarthExplorer, Landviewer, Google Earth.

Data

- Sample surveys:
  - Household Living Standards Survey.
  - Survey of Sustainable Development Goals on Vietnam's Children and Women (MICS)
- Census:
  - Vietnam Population and Housing Census
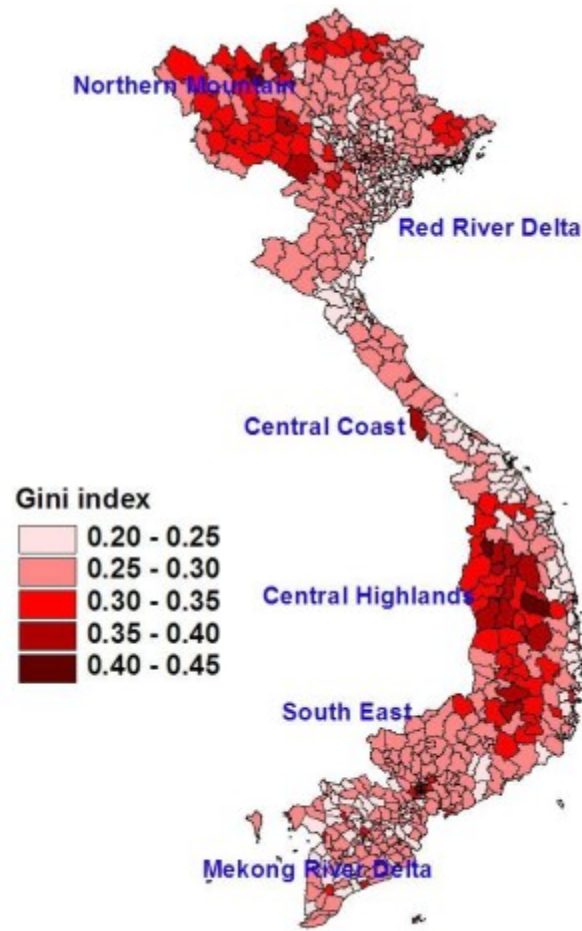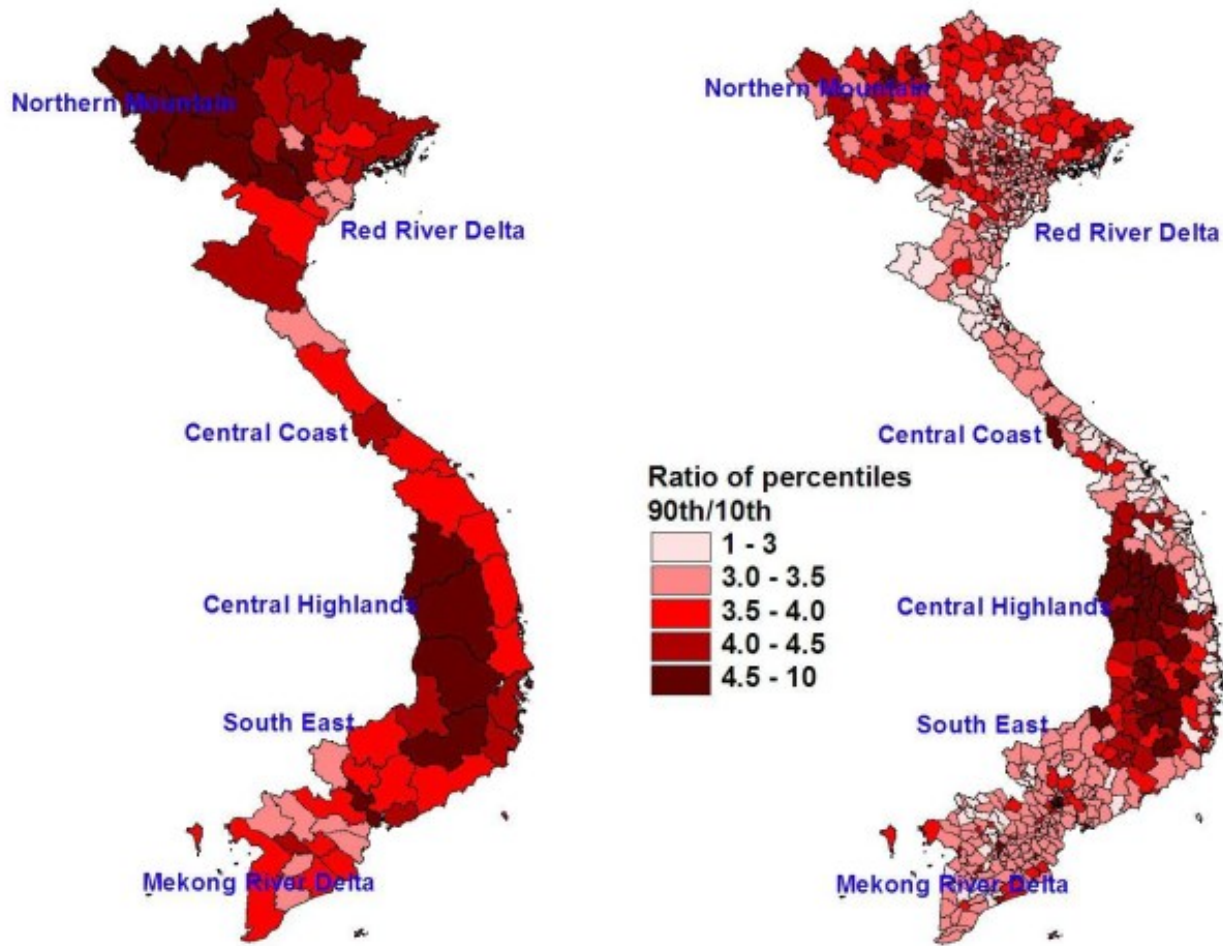 - Rural, Agricultural and Fishery Census
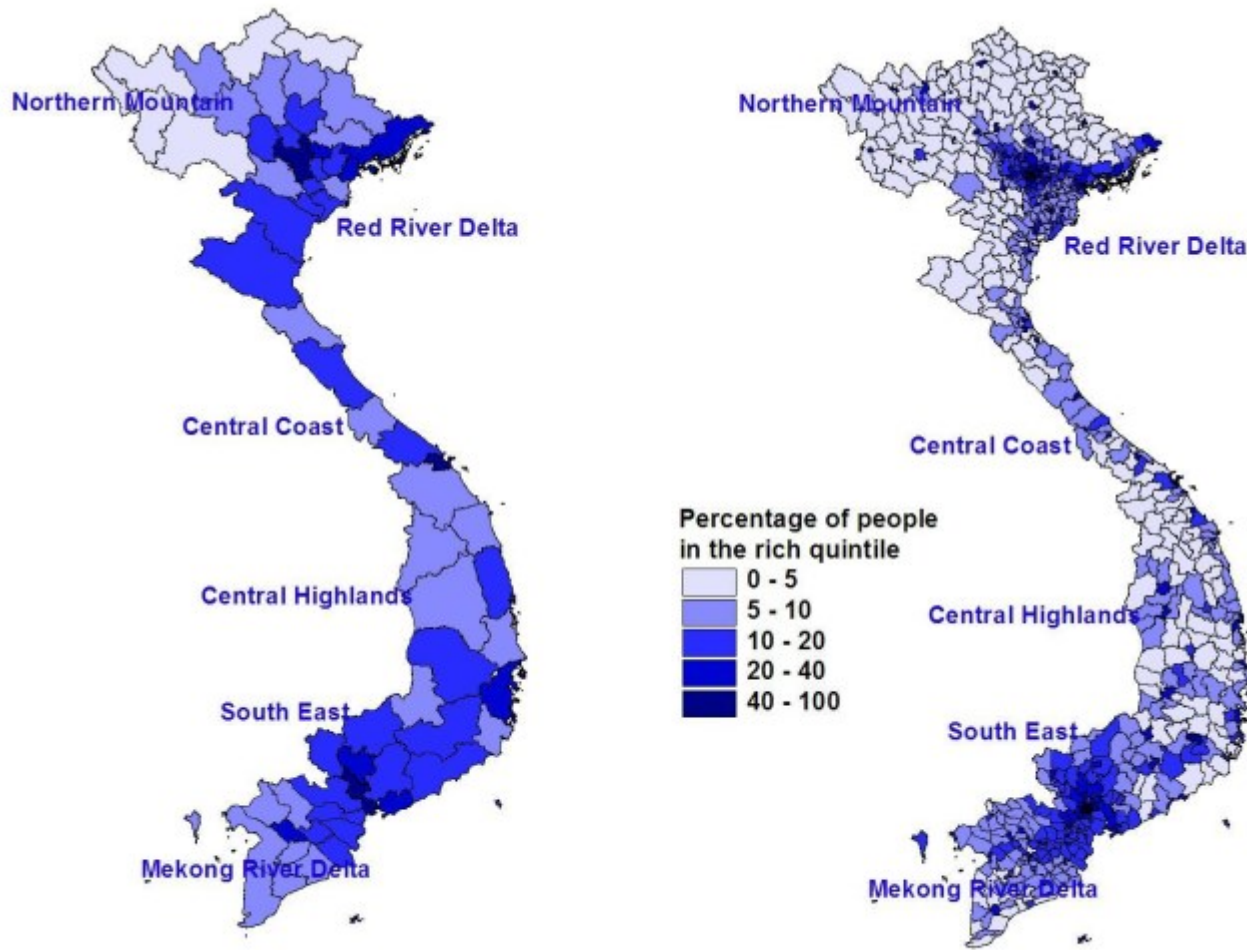
Poverty rate
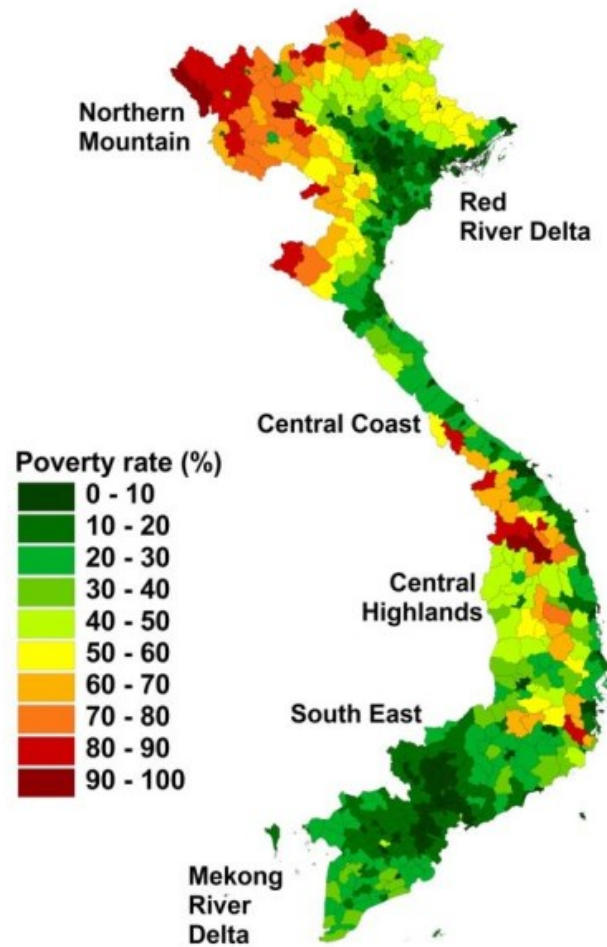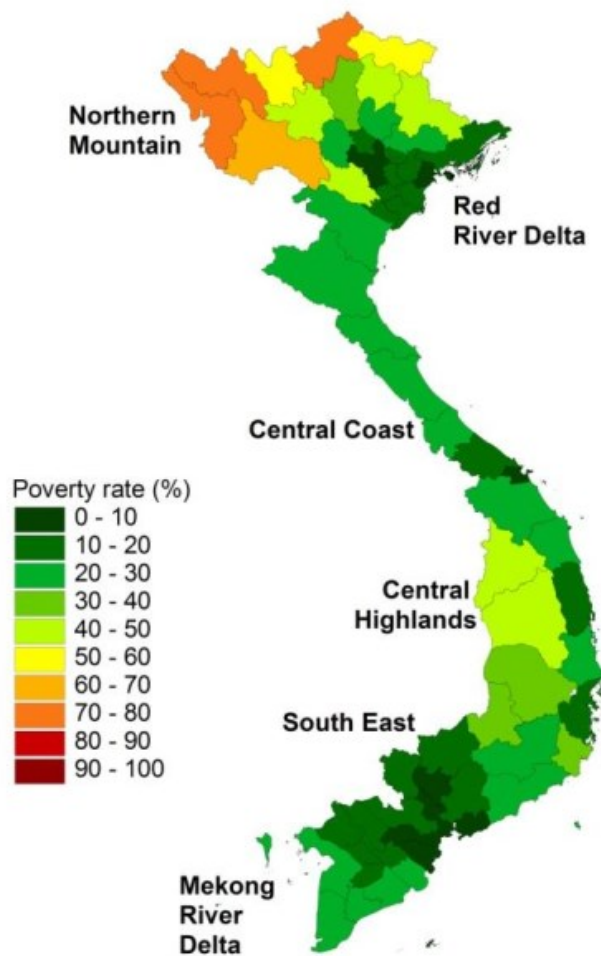
Poverty density

Inequality map

Gini index
- 0.20 - 0.25
- 0.25 - 0.30
- 0.30 - 0.35
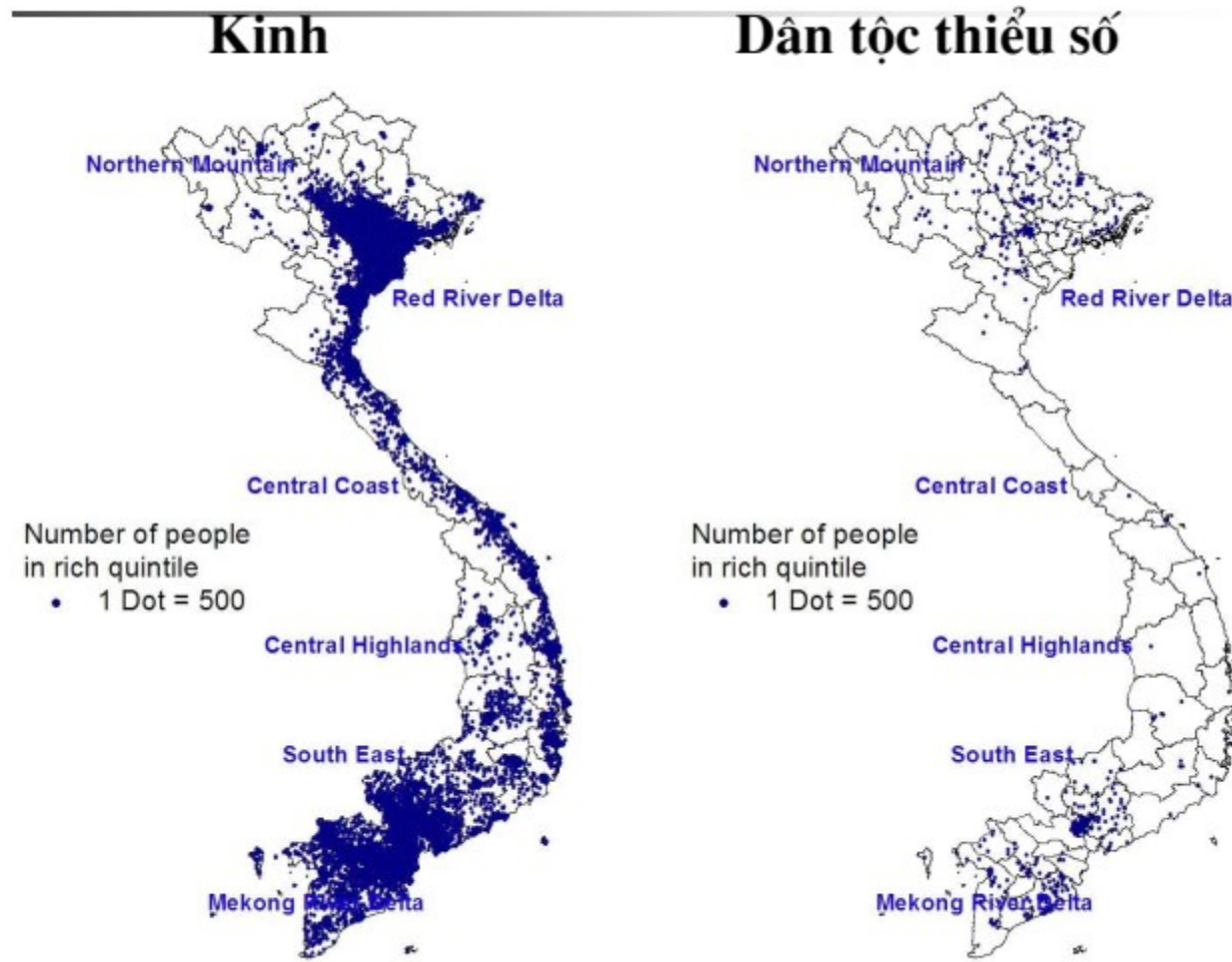- 0.35 - 0.40
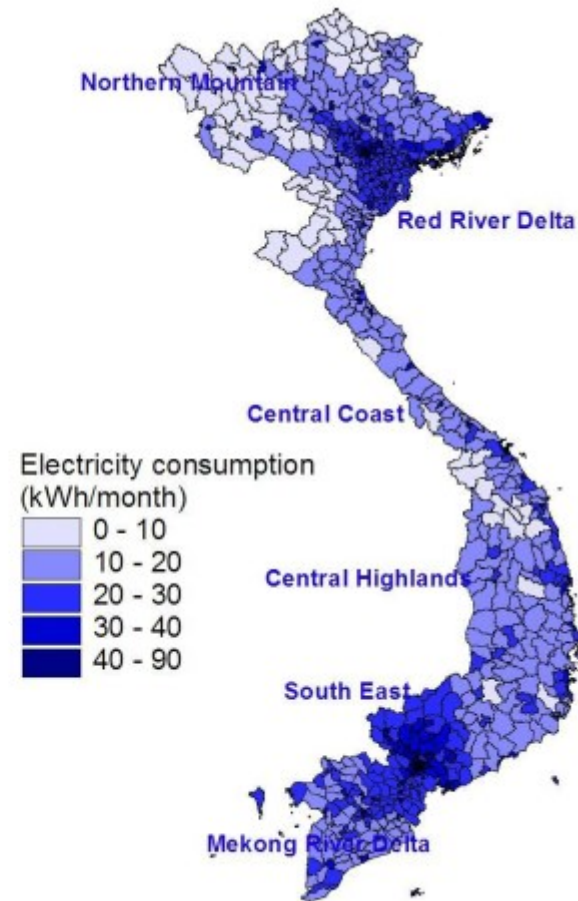- 0.40 - 0.45
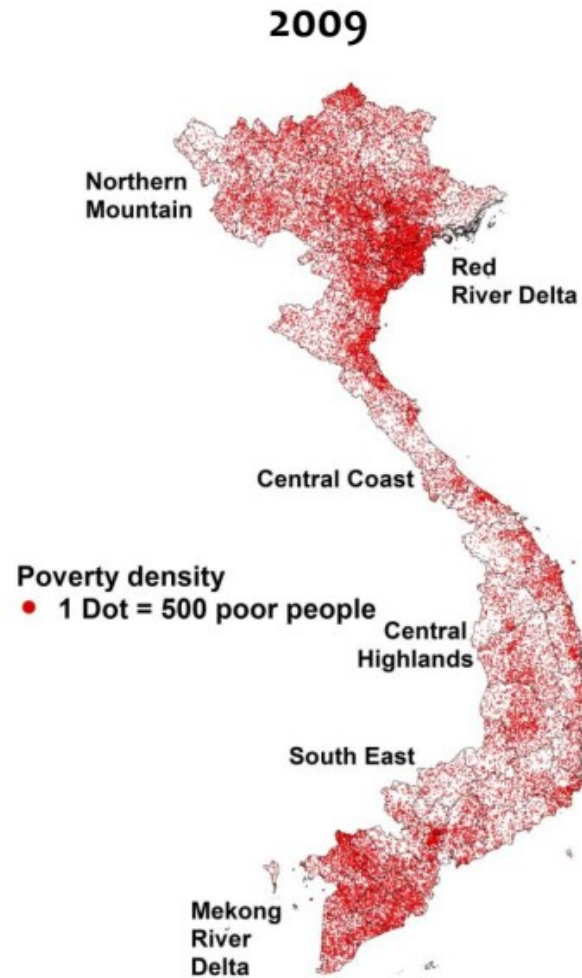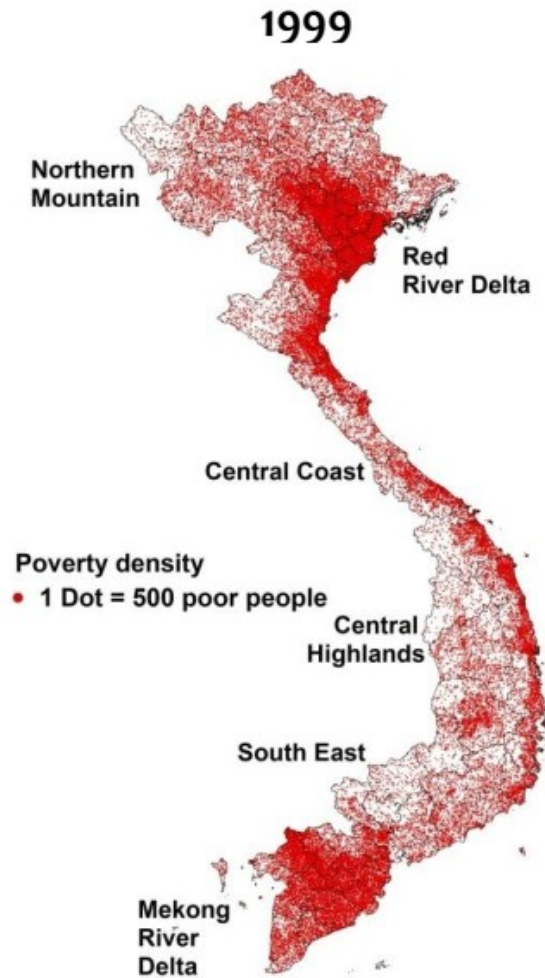
Bản đồ bất bình đẳng thu nhập

Rate of the top 20% people with highest per capita expenditure

Percentage of people in the rich quintile
- 0 - 5
- 5 - 10
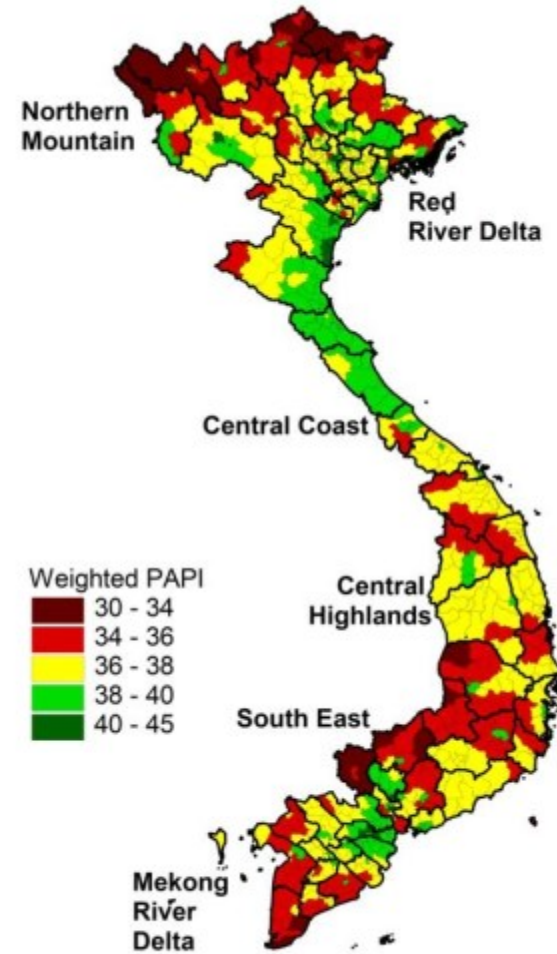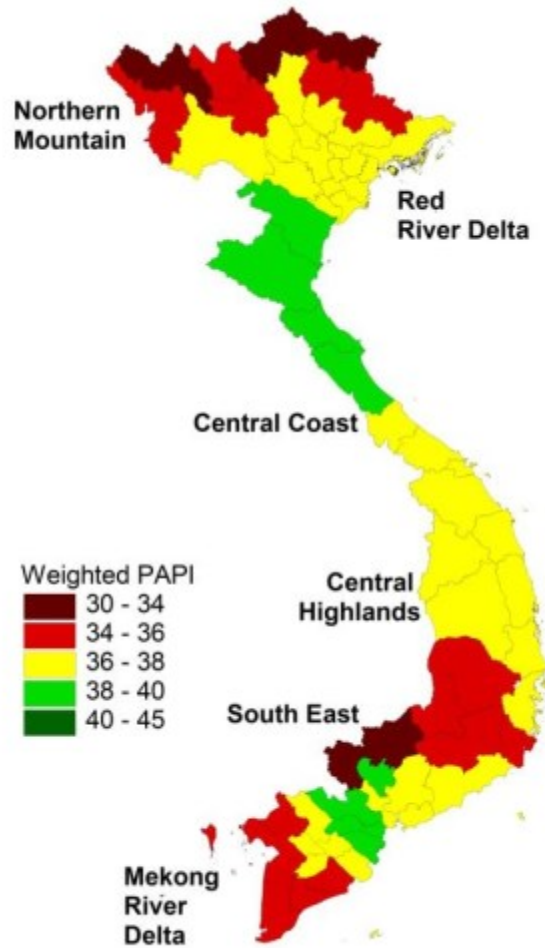- 10 - 20
- 20 - 40
- 40 - 100

The top 20% people with highest per capita expenditure

Electricity expenditure

% households without electricity
- 0 - 1
- 1 - 3
- 3 - 5
- 5 - 7
- 7 - 9
- 9 - 11
- 11 - 13
- 13 - 15
- 15 - 17
- 17 - 100

Electricity consumption (kWh/month)
- 0 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 90

Northern Mountain
Red River Delta
Central Coast
Central Highlands
South East
Mekong River Delta
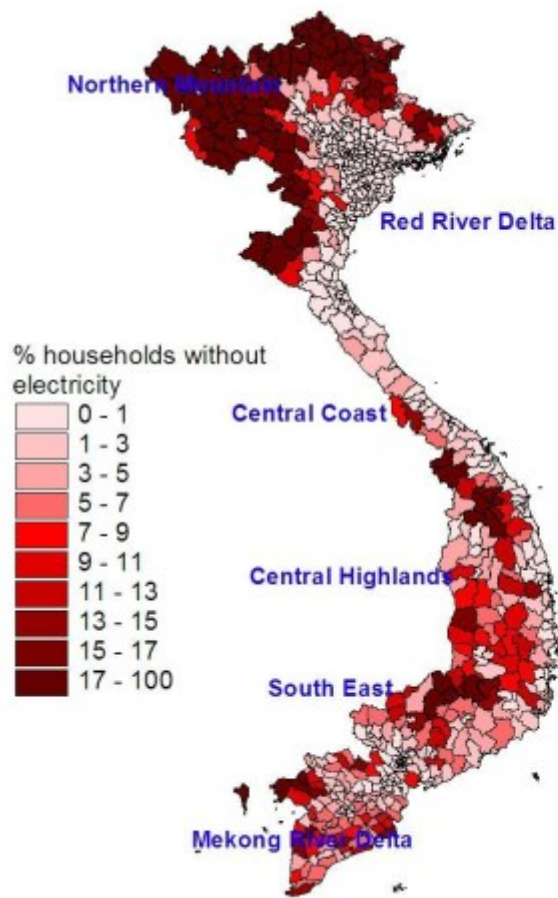
The governance and public administration performance index

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