HISTORY DEPARTMENT - QUETELETCENTER

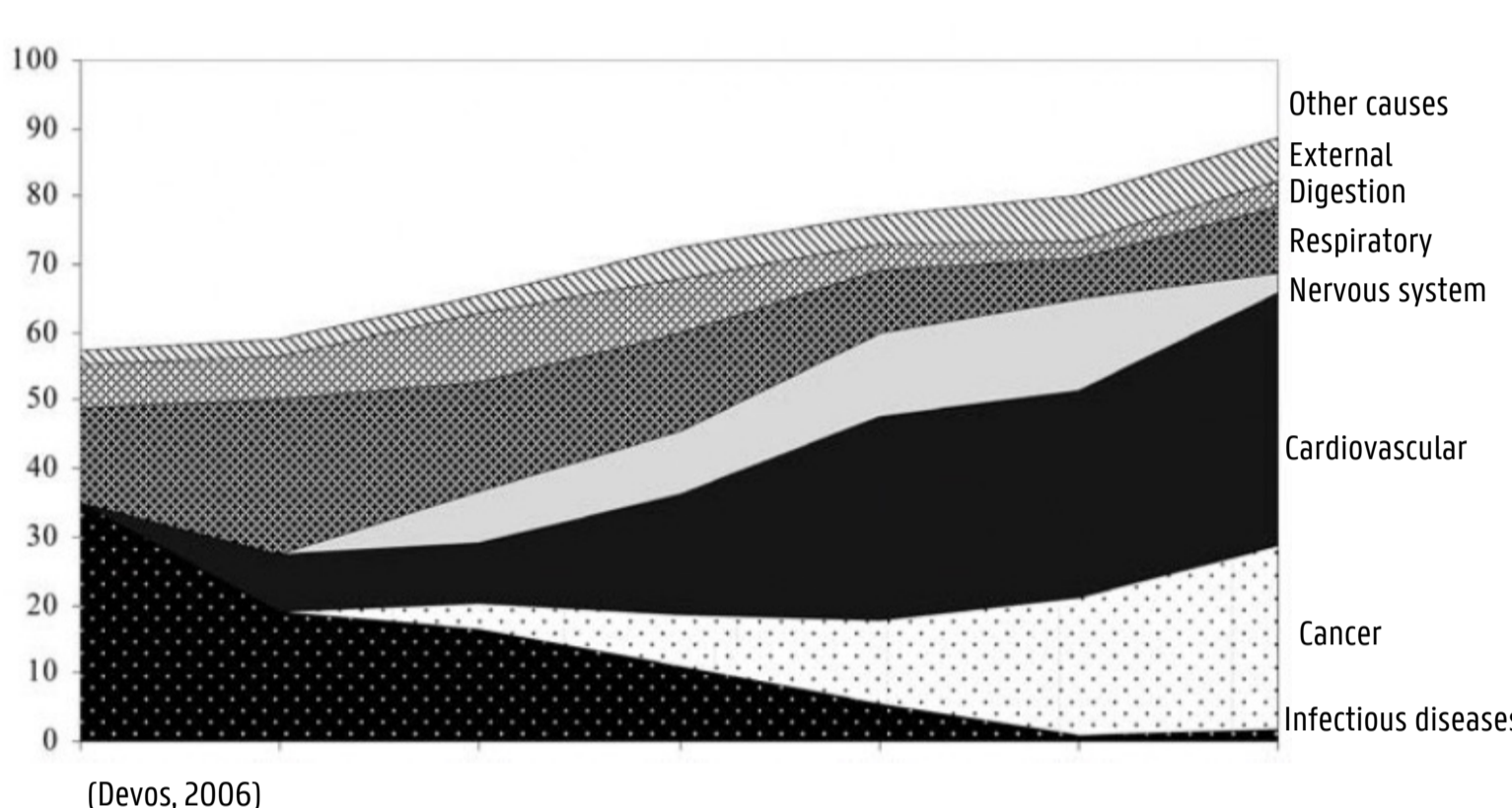**Lise Bevernaegie, Isabelle Devos, Sylvie Gadeyne**

HEART OF THE MATTER: SOCIOECONOMIC AND ENVIRONMENTAL INEQUALITIES IN CARDIOVASCULAR MORTALITY, BELGIUM 1890-2011
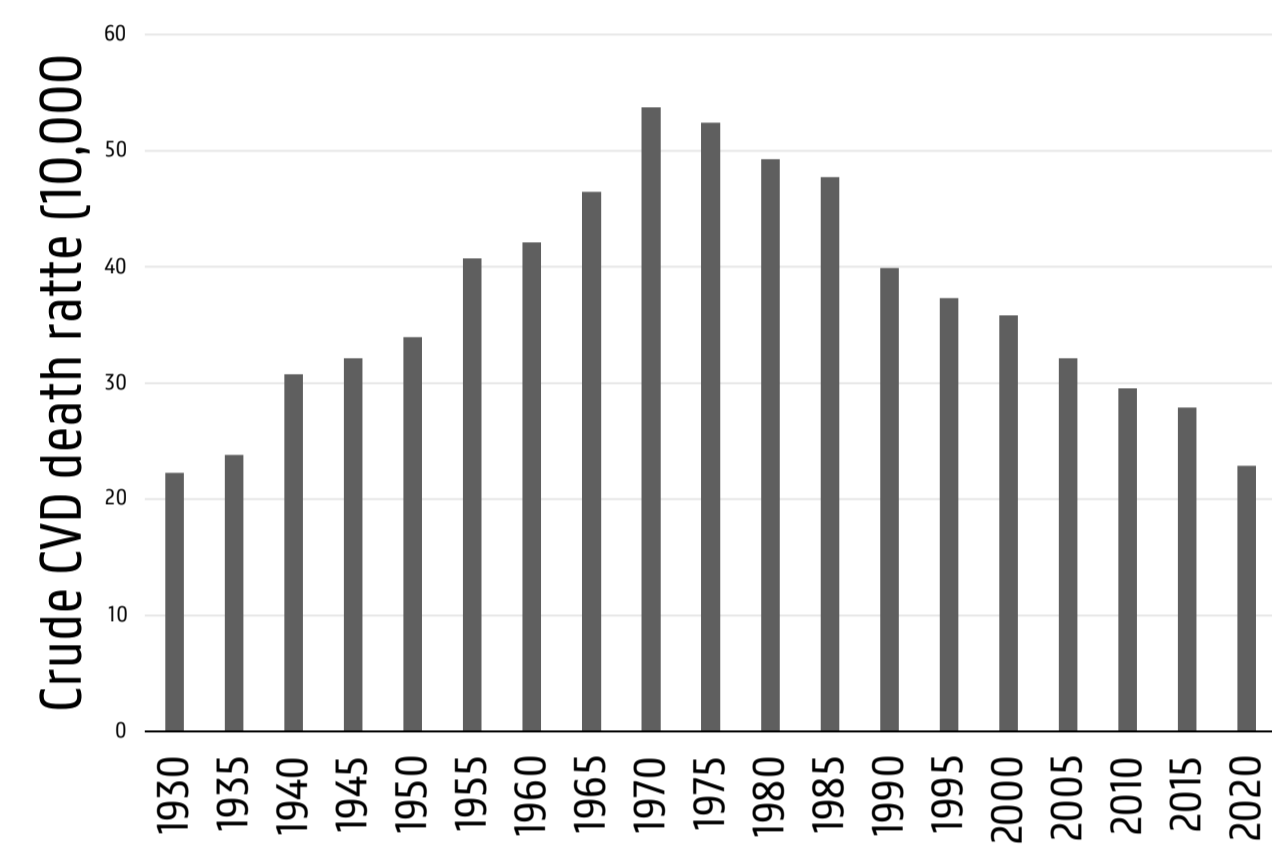
1 Introduction

- Early 20th century: **Increase** in CVD mortality; shift from infectious to chronic diseases (Omran, 1971)
- From 1970s: CVD mortality **decline**; remains **leading cause of death** worldwide and second in Belgium (Statbel, 2022)
- Primary CVD risk factors:
    - **Behavioural**: Unhealthy diet, tobacco use, physical inactivity, etc... (WHO)
    - **Environmental:** Air pollution (WHO)

Share (%) of each cause of death group in total mortality, Belgium, 1870-1995

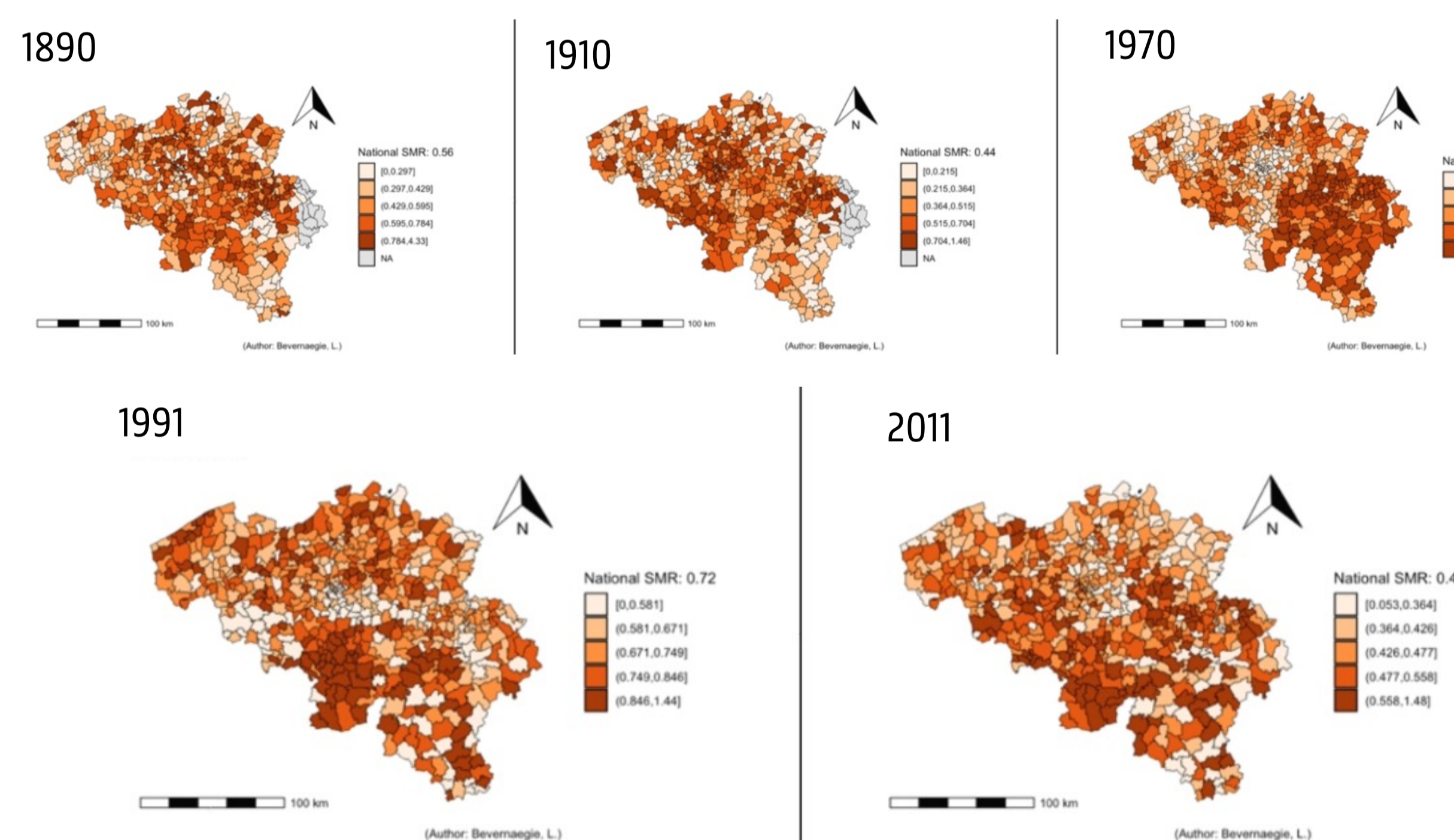CVD deaths per 10,000 persons (Belgium 1930-2020)

2 State of the art

1. Socioeconomic Inequalities in CVD Mortality

- Socioeconomic (SE) factors are **key drivers of CVD disparities**
- Education, income, and occupation, ... shape **lifestyle** and **health behaviour** (Deboosere & Gadeyne, 2002)
- **Extended Fundamental Cause Theory**: Disparities shift over time due to unequal access to health information and preventive resources (Clouston et al., 2016)
- CVD mortality **varies** across spatial and individual levels (de Mestral & Stringhini, 2017; Grimmeau et al., 2015)

2. Spatial Inequalities in CVD Mortality

- **Temporal changes** in local CVD mortality patterns
- **Environmental factors** explaining historical local variations in CVD mortality:
    - High pollution levels since industrialization (Buijsman, 2023; Jacobs et al., 2018)
    - Historical cases, e.g., 1930 Maasdal smog, indicate pollution's impact on CVD mortality (Zimmer, 2014)
    - Dublin's coal ban led to a 10.3% drop in CVD mortality (Clancy et al., 2002)

3 What is the impact of socioeconomic and environmental factors on CVD mortality over time?
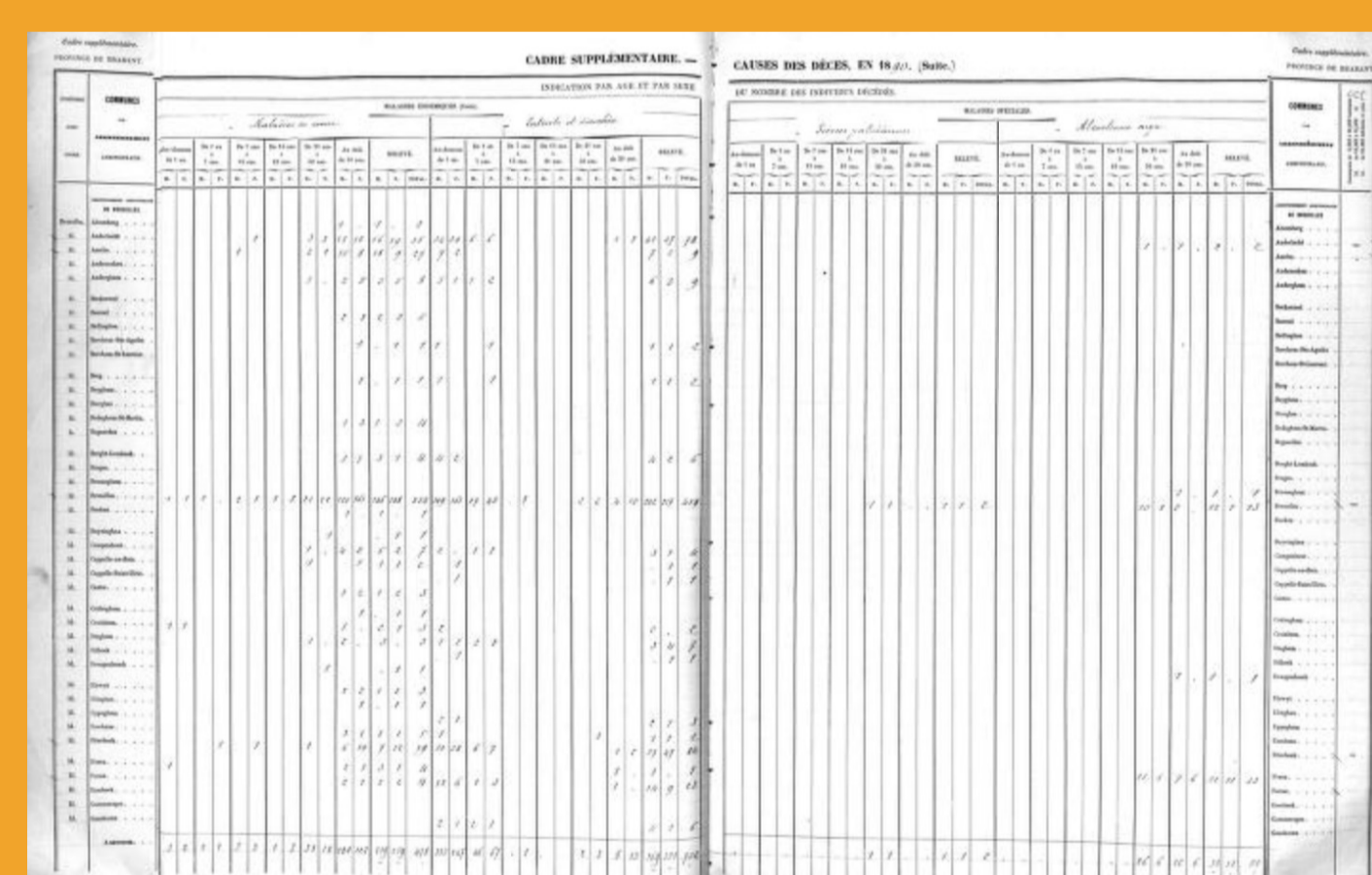### Cross-sectional analyses, 1910 and 2011 (Belgium)

Data

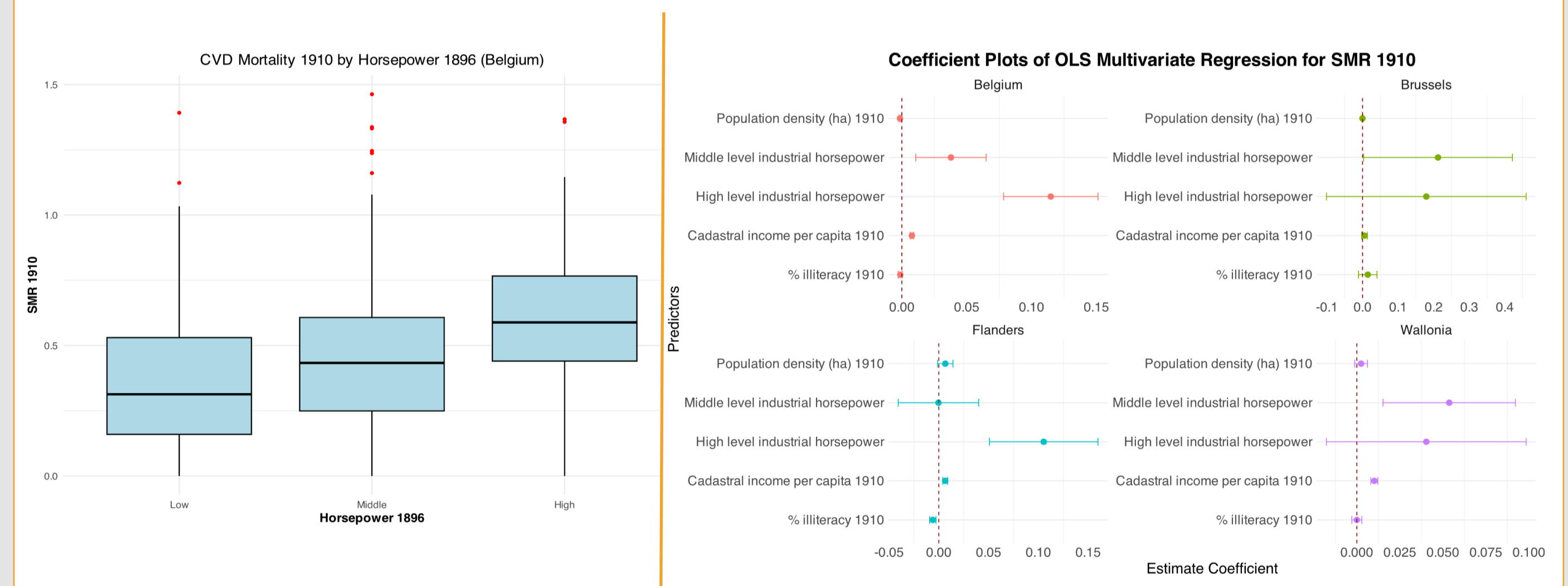| Year	Variables	Source/Repository
• 1910	• SMR CVD • Population density (ha) • Cadastral income per capita • Illiteracy (%)	• Le Mouvement de la Population et de l'État Civil – Belgian State Archives • Published census records – LOKSTAT
• 2011	• SMR CVD • Population density (km2) • People with high income (%) • Low educated (%)	• Cause of death registers linked to census data - Statistics Belgium (STATBEL)
• 1896	• Level of industrial horsepower	• Industrial Census 1896 – LOKSTAT
• 2008	• Air pollution (NO2, O3, PM10, PM2.5)	• Belgian Environment Agency (Irceline)

Methods

- SMR with standard mortality scheme of Belgium 1961
- Multivariate linear regression (OLS)
- Spatial regression analyses to account for spatial autocorrelation
    - Spatial Lag Model (SLM)
    - Spatial Error Model (SEM)

Sources

Le Mouvement de la Population et de l'État Civil

4 Results 1910

CVD Mortality 1910 by Horsepower 1896 (Belgium)

Coefficient Plots of OLS Multivariate Regression for SMR 1910

5 Results 2011

	Belgium						Flanders		Wallonia		Brussels	
	OLS		SLM		SEM		OLS		OLS		OLS	
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Population density (km²)	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
% people with high income	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	-0,01	0,01
% low educated	0,01***	0,00	0,01***	0,00	0,01***	0,00	0,01*	0,00	0,01**	0,00	0,00	0,00
Average PM2.5 pollution 2008	-0,01***	0,00	0,00***	0,00	-0,01	0,00	-0,02***	0,01	0,00	0,01	0,00	0,03
Intercept	0,32**	0,10	0,26*	0,10	0,33**	0,11	0,60***	0,17	0,04	0,19	0,64	0,68
R²	0,09						0,08		0,07		0,09	
Adjusted R²	0,09						0,07		0,05		-0,17	

6 Conclusions

1910

- **Positive social gradient** evident in 1910
- **Higher pollution** correlates with **elevated SMR** in 1910

2011

- Low education significantly increases SMR in 2011, reflecting **negative social gradient**
- Air pollution's impact on CVD mortality in 2011 is minimal at aggregated level
- **Future approach it to look at individual level**

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