Looking for a Semi-Urban Penalty

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BACKGROUND

- Sweden experienced a **rapid industrialisation during the end of the 19th century**, not only in cities but also in several rural areas.
- In cities, industrialisation has become associated with increased mortality rates (especially among children and infants). This phenomenon is referred to as ***urban penalty***. (Vögele 2000; Woods et al 2000; Bourdelais & Demonias 1997)
- The literature on urban penalty is **unclear when it comes to its driving forces** and what part urbanisation and density played. The aim of this project is to begin to approach these issues by **testing for a lower bound of urban penalty** in a semi-urban environment, i.e. a semi-urban penalty.

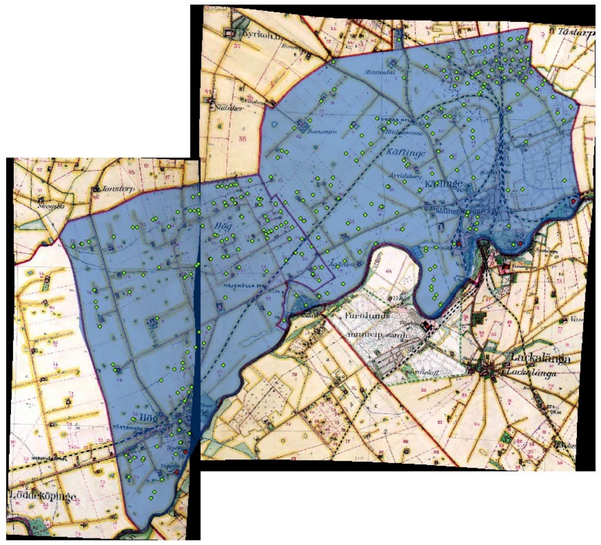
HYPOTHESES

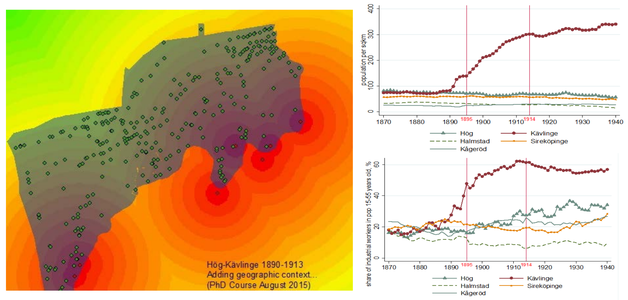
A. There will be **a (small) urban penalty in Hög-Kävlinge** during the rural industrialization 1890-1913, meaning temporarily ”increased” mortality correlated to population density (”urban” influence) and closeness to factories (”industrial” influence)

B. …or, if there isn’t, this suggests that there is a **lower bound for the urban penalty phenomena**

OUTLINE & METHOD

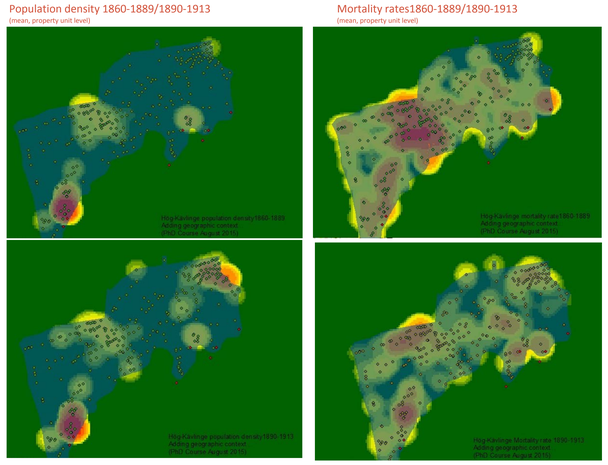
- The purpose of the study is to test for semi-urban penalty, i.e. urban penalty in semi-urban or rural environments.
- From previous research, we identify three possible types of influence: Urban, industrial and migrational. Due to the scope of the project, we will focus on the first two and omit migrational factors since these put quite different demands on data sets and time frames for the analysis.
  - Urban (population density) (Keszentbaum & Rosenthal 2011)
  - Industrial (distance to factories) (Szreter & Mooney, 1998)
  - Migrational (rapid changes/disease) (Lee 1997)
- We assign **proxies for urban (population density) and industrial (distance to factories) influence**. We use the following data sets provided by the Department of Economic History, Lund University. Our variable of interest is the **mortality rates, divided into infants, adults and elderly**. Data sets:
  - Population density – mortality 1860-1889/1890-1913
  - Distance to factories – mortality 1890-1913
  - Mortality: overall + 3 categories (infant / adults / elderly)
  - Parish level data + disaggregated data on property unit level för Hög-Kävlinge
  - Coordinates for seven industrial factories
- We use a **Cox proportional hazard regression model**.
  - For **population density** we apply the model to a property unit level within Hög-Kävlinge, as well as to macro level including Hög-Kävlinge and four other local parishes without expressed industrialisation.
  - For **distance to factories**, we apply the model to the property unit level in Hög-Kävlinge exclusively. We also use interaction terms with SES.
  - In the model we also include **controls** for socio-economic status, sex and year effects.



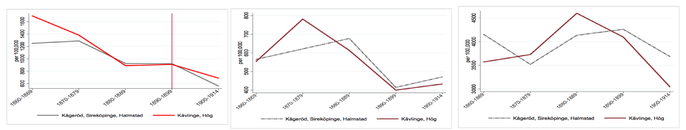


Population density 1860-1889/1890-1913
(mean, property unit level)

Mortality rates1860-1889/1890-1913
(mean, property unit level)



Mortality rates divided by age groups



RESULTS

- The results show **no significant effects from proximity to factories**.
- However, there is an **effect from population density**, especially for young people aged 1-14, both in Hög-Kävlinge and in the other non-industrialised parishes.
- Accordingly, we find **no clear evidence of a semi-urban penalty driven by rural industrialisation**. Instead, the results are **consistent with the possibility of a lower bound of urban penalty effects**.
- There are several caveats to this model and the results that need to be taken into account. The scope of the study does not allow us to fully control for effects originating outside the observed parishes, and migrational factors are not taken into account. Having said that, the results make a good case for further investigating the lower bound of urban penalty effects, as well as other phenomena associated to urbanisation.

	1-14 years	15-49 years	50+ years
Logged Pop. Density (LPD)	-0.00274	-0.0408	-0.0365
Property ID level	(0.0564)	(0.0589)	(0.0366)
LPD * 1890-1913	-0.00819	0.0254	0.000249
Interaction term	(0.0670)	(0.0681)	(0.0455)
1890-1913	-0.601	-0.514	-0.256
Time dummy	(0.417)	(0.398)	(0.259)
Controls (SES, sex)	Yes	Yes	Yes
Deaths	237	212	526
Individuals	4 213	7 025	1 332
Time at risk	24 350	40 989	14 267

Table 1a.

	1-14 years	15-49 years	50+ years
Logged Pop. Density (LPD)	0.211**	-0.0890	-0.0563
Parish level	(0.0823)	(0.0863)	(0.0593)
LPD * 1890-1913	-0.251***	0.0516	0.0258
Interaction term	(0.103)	(0.105)	(0.0689)
1890-1913	-0.103	-0.402**	-0.252**
Time dummy	(0.183)	(0.185)	(0.112)
Controls (SES, sex)	Yes	Yes	Yes
Deaths	824	679	1 971
Individuals	14 301	20 732	4 270
Time at risk	85 732	126 429	50 863

Table 1b.

Robust SE in parentheses
*** p<0.01, ** p<0.05, * p<0.1

SES (Socioeconomic Status)
The reference group in Table 1a-1c is the time period 1860-1989.

	1-14 years	15-49 years	50+ years
Logged Pop. Density (LPD)	0.0575**	-0.0318	-0.00681
Property ID level	(0.0287)	(0.0345)	(0.0221)
LPD * 1890-1913	-0.0702*	0.0286	-0.0262
Interaction term	(0.0372)	(0.0422)	(0.0279)
1890-1913	-0.144	-0.484**	-0.103
Time dummy	(0.203)	(0.216)	(0.138)
Controls (SES, sex)	Yes	Yes	Yes
Deaths	824	679	1 971
Individuals	14 301	20 732	4 270
Time at risk	85 732	126 429	50 863

Table 1c.

	1-14 years	15-49 years	50+ years
Distance to nearest factory	0.211**	-0.0890	-0.0563
	(0.0823)	(0.0863)	(0.0593)
Controls (SES, sex)	Yes	Yes	Yes
Deaths	116	104	262
Individuals	3 025	4 849	968
Time at risk	15 377	24 526	7 691

Table 1d.

CONCLUSIONS & FUTURE RESEARCH

There are several steps and measures to be taken to improve further research into urban penalty and rural industrialisation:

- This study used parish level and property unit level population densities, but there is a case to **further disaggregate data to study households and proximities between homes as well as public places** since this is imperative to interaction driven outcomes, such as the spread of infectious decease.
- Future research should also **differentiate between different causes of death** to bring further clarity to the effects of population density in rural areas.
- More information on factories and sectors would provide important information on the characteristics of the industrial influence in the area. For instance, **different types of factories produce different kinds of waste and pollution** that could affect local population.
- **Better distance measures could be used to capture actual mobility** and proximity between households, factories and public places. For instance considering roads would greatly improve this measure.
- **Testing for urban penalty in other geographies**, scaling from small town to large cities, provides an important approach to actually finding a lower bound of urban penalty effects. A first promising step would be to study the industrialisation of Landskrona.