

A socially neutral disease? Individual social class, household wealth and mortality from Spanish influenza 1918–19 in two socially contrasting parishes in Kristiania 1918–19

Introduction

Studies of historical epidemiology have shown that poor populations suffer more from the burden of disease and death from epidemics, with cholera and tuberculosis being two good examples. However, much of the literature since 1918 has favored the view that the Spanish influenza pandemic of 1918–19 struck victims independent of class or other social indices. This view has prevailed although contemporary household surveys after the 1918 pandemic showed that there were indeed clear differences between the classes in disease incidence and that case fatality rates from influenza and pneumonia also varied according to socioeconomic status.

Method and hypothesis

This analysis is the first to combine multivariate event history analysis with unique individual and household-level data to test the conservative hypothesis that Spanish influenza was a socially neutral disease with respect to mortality.

Data

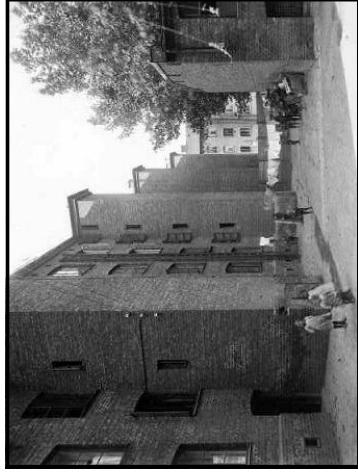
The analysis uses mortality and census data from two intentionally selected socially contrasting parishes in the Norwegian capital of Kristiania (renamed Oslo in 1924), namely Frogner and Grønland-Wexels. The nominal censuses for 1918 and 1919 used here allow a very close follow-up of individuals from the start of the pandemic in the early spring of 1918 through to the end of it in the winter of 1919. Finally, registration of deaths and the carrying out of the censuses were on the whole undisturbed by the First World War, as Norway was a neutral country.

Table: The study population in the parishes of Frogner and Grønland-Wexels combined from 1 February 1918 to 1 February 1919

From	To	Cases	Percent
02.01.1918	02.01.1919	34.127	72.7
02.01.1918 or inter-censal date of birth	Date of death	608	1.3
02.01.1918	Date of moving out of parish	6087	13.0
Date of moving into parish	02.01.1919	5591	11.9
Date of intercensal birth	02.01.1919	559	1.1
Number of observations		46.972	100.0

Source: Oslo City Archive, Censuses of 1918 and 1919 for the parishes of Frogner and Grønland-Wexels, and Anneliedeide i Oslo 1918-21.

Data digitized by Norwegian Historical Data Center at Tromsø and Bardufoss



Gråbeinsgård

Photo taken in Grønland in 1915

Source: Oslo City archives, photographer: Anders B. Wilse

Model

The hazard rate for individual i with n covariates, $X_i=(X_{i1}, X_{i2}, \dots, X_{in})$, is modeled as

$$h_i(t) = h_0(t)e^{\beta_1 X_{i1} + \beta_2 X_{i2} + \dots + \beta_n X_{in}}$$

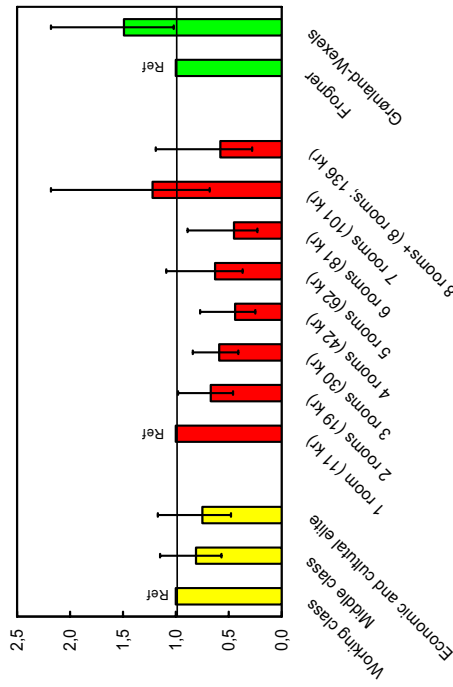
t is time elapsed from 1 February 1918 ($t=0$) to death from Spanish influenza, and $h_0(t)$ is a hazard function for an individual who scores zero on all n covariates.

Reference

Mamelund, Sverre-Erik (2006). 'A socially neutral disease? Individual social class, household wealth and mortality from Spanish influenza in two socially contrasting parishes in Kristiania 1918-19.' in *Social Science & Medicine* 62:923-940.

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Figure: Results from Cox regressions for mortality from Spanish influenza in Kristiania in 1918–19 (with 95 percent CI), controlled for age, gender and marital status. The average monthly rent (in 1918 NOK) by apartment size is shown in parentheses.



Results and Conclusion

The figure shows that there is a 19–25 percent lower mortality in the two upper classes vs. the lowest class, but the estimates are not statistically significant. The results also show that there is a partly linear decline in mortality by size of apartment. Households residing in apartments with 2, 3 and 4 rooms, for example, have 34, 41, and 56 percent lower mortality rates, respectively, than those residing in 1-room apartments. Finally, we see from the figure that there is a 49 percent higher mortality rate for those residing in the poor parish of Grønland-Wexels compared with the affluent parish of Frogner, all other factors being the same.

This study is the first to show that there are indeed independent effects of social factors on 1918 flu mortality. The results for the capital of Norway may be of international relevance as few other countries have similar data available. The study finds indications of a class gradient in individual-level mortality, but the relationship was not statistically significant. However, size of apartment, which is a perfect proxy for rent ($r=0.98$) and therefore probably also for income, is negatively and significantly associated with mortality.