

Social Factors, Mortality and the Spanish Influenza in Kristiania 1918–19

Introduction¹

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 (Hanssen 1923, Sydenstricker 1931).

This paper 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 and methods

The data have been taken from nominal censuses and death registers for two parishes in the Norwegian capital Kristiania in 1918–19 (renamed Oslo in 1924): the affluent parish of Frogner on the west side and the poor parish of Grønland-Wexels on the east side. The two parishes cover 16 percent of a total population of 260 000 in 1918. The data are superior for three reasons. First, influenza was a reportable disease in Norway in 1918, but that was not the case in many other countries. Second, there are no gaps or errors in the censuses or registration of vital events confounded by the First World War. Finally, in contrast to belligerent countries, there are few or no problems distinguishing flu deaths from war deaths in neutral Norway.

The analysis includes 250 deaths from influenza and pneumonia, 81 in Frogner and 169 in Grønland-Wexels. Four independent variables at the individual-level (age, sex, marital status, and occupation-based social class), one independent variable at the household-level (size of apartments), and one independent variable at the parish-level (Grønland-Wexels, Frogner) are included in the analysis. The analysis is carried out



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1: This paper is an abridged version of a study previously published in *Social Science & Medicine* (Mamelund 2006).

using Cox proportional hazard models. To simplify the presentation of the results, estimates (with 95 percent CI) are only shown for social class, size of apartments and place of residence.

Results

Figure 1 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 Figure 1 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.

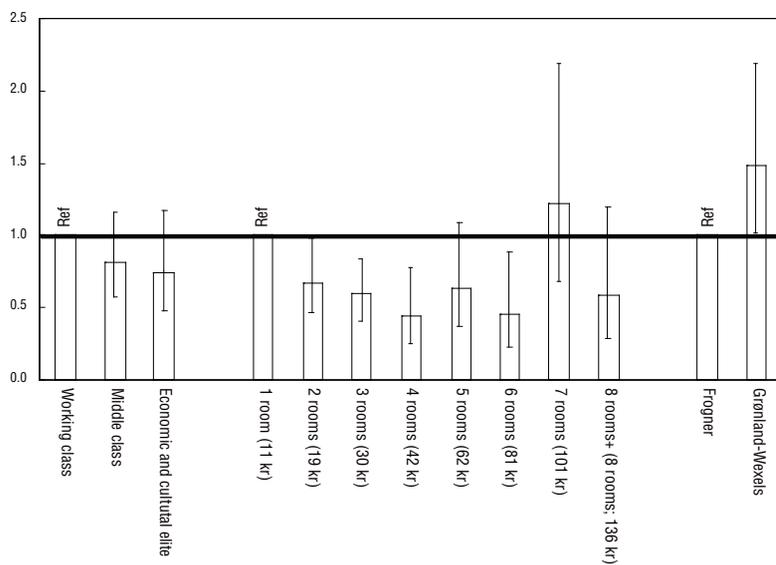


Figure 1. Results from Cox regressions for mortality from Spanish influenza in Kristiania in 1918–19 (with 95 percent CI), controlled for age, gender and marital status. The average monthly rent (in 1918 NOK) by apartment size is shown in parentheses.

Discussion

Previous studies of the possible role of socioeconomic status in explaining mortality during the 1918 pandemic have generally argued that death victims were picked randomly among the different social strata. One reason why the ‘socially neutral view’ has survived in the literature as well as in people’s collective memory might be that the contemporary world mass media as well as subsequent academic and popular accounts of the 1918 influenza pandemic emphasized that not even royals, world political leaders, or members of the economic or cultural elites escaped. For instance, King Alfonso XIII (1886–1941) of Spain was early reported to be laid low by influenza, Prince Erik of Sweden (1889–1918) died 29 years old, and the famous Norwegian painter Edvard Munch (1863–1944) was severely ill and barely survived.

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 ($r=0.98$)² and therefore probably also for income, is negatively and significantly associated with mortality.

The wealthy and highly educated probably had lower mortality from influenza and pneumonia than the poor and less educated because the former benefited from earlier (self) diagnosis, bed rest and quiet nursing (thanks to saved capital and health insurance, which enabled them to be away from work), fewer pre-existing lung (tuberculosis) or heart diseases, and few or no nutritional problems. Further, a low intake of nitrogen weakens the immune response which is known to increase susceptibility to bacterial and viral diseases. The study also finds that living in a 'poor area' (Grønland-Wexels) increases mortality above and beyond characteristics at the individual and household level. There might be two reasons for this seemingly contextual effect. First, the analysis may not capture unaccounted characteristics of material deprivation in the 'poor area'. For example, the analysis does not account for why housing conditions were much poorer in Grønland-Wexels than in Frogner: poor housing conditions are in turn known to be associated with respiratory symptoms and reduced lung function. Second, the variables included may not fully capture the variation in mortality. Furthermore, several variables have been omitted from the analysis. For example, the database used in this study does not include information about pre-existing diseases, in particular tuberculosis, and the working environment and experience (work load, type, hours worked per day, overtime, shift work, etc.), all of which are factors that may have a bearing on individual mortality levels.

Important today?

This study contests the conservative view that the 1918 flu was socially neutral with respect to mortality. In this respect, the 1918 flu was no different from other historical epidemics when it comes to the role of poverty and wealth in explaining mortality. The topic of this paper is timely since the world now awaits the rise of a new pandemic. Many elements of importance for mortality outcomes are different today from in 1918. For example, the global monitoring of influenza is much better than before. Contingency plans have also been developed by the World Health Organization and at national levels. However, the world remains vulnerable. Poor countries will probably suffer the most once again due to co-morbidity (tuberculosis, HIV/AIDS, malaria, etc.) and poor nutrition. Furthermore, poor countries cannot afford to stockpile vaccines, antiviral drugs and antibiotics to the same extent as the rich ones. Murray *et al.* (2006) predicts 62 million deaths world-wide should a 1918-like virus reappear today, with 96 per cent of the deaths occurring in poor countries. Although most deaths might occur in the poor countries, there is reason to believe that there will be significant social variation in mortality within rich countries. Our recent past has shown that social differences in mortality and longevity are widening dramatically in Western welfare states (Marmot 2004).

2: This correlation was estimated using aggregate-level data for 19 parishes covering the whole city of Kristiania.

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