Introduction

Mortality crises have a substantial impact on population processes in the short term (Vigezzi et al., 2022; Chandra et al., 2018), but few studies have explored their long-term consequences. These have however highlighted the potential for repercussions on various aspects. Exposure to pandemics in the late XIX and early XX century affected economic outcomes at the household and regional level (Hong et al., 2025; Karlsson et al., 2014). The Black Death may have had a redistributive effect on income and wealth (Alfani, 2022), but also on health practices and institutions, such as border controls and the creation of health boards, first in Southern Europe and then in the rest of the continent. Other studies have considered demographic consequences more specifically. Watkins and Menken (1985) simulate the effect of famines in South-East Asia on population size. Under the harshest conditions (roughly equivalent to the Irish Famine), they find that population size does not bounce back to pre-crisis levels for a full 50 years. When considering a counterfactual population that did not experience the famine, population sizes do not converge within 100 years after the shock. Studying the Irish Famine, Guinnane (1994) argues that these simulations ignore the larger effects of such shocks and the context in which they take place. In his words, the Irish Famine not only impacted population size directly, through mortality, but it also "shaped the conditions under which later generations of Irish people made decisions about migration and household formation", with more far-reaching consequences on population trends than numerical simulations alone could capture. Finally, Seltzer and Nobles (2017) considered a much more recent case, showing that in the five years after Hurricane Katrina, the proportion of Black women in New Orleans declined. Moreover, their fertility became lower than that of White women, suggesting continued changes in the future racial composition of the city.

While still scarce, these studies suggest that the impact of mortality crises on populations could last longer than the crises themselves. In this study, I aim to push this exploration by comparing three mortality crises, one epidemic and two famines, in Denmark, Finland and Sweden, and by investigating whether population trends at the local level changed in their wake and, if so, for how long. I will also quantify the contribution of mortality, fertility and migration changes to gain more insight into the mechanisms of post-crisis population trends. Population change could go in two directions. Higher mortality in a parish or region compared to the surrounding areas may engender a cycle of emigration, poor economic chances and low fertility, as argued by Guinnane (1994). Alternatively, high mortality may free resources for survivors, decreasing economic inequality and boosting fertility (Alfani & Ammannati, 2017; Ryckbosch, 2016). These opposing dynamics may depend on the level of mortality (Alfani, 2022), but this question has not been extensively studied before.

Context

The first crisis I will studi is the cholera epidemic that hit Denmark during the second half of 1853. Before that year, the Danish population had been fairly well protected from previous cholera pandemics by a strict quarantine legislation (Bonderup, 1994). As the miasmatic theory gained traction, this legislation was deemed ineffective and repealed in 1852. The following June, cholera hit Copenhagen and quickly spread to the rest of the country, finding a largely unimmunised population. By the end of the epidemic in the autumn, it is estimated that more than 60.000 people had died of cholera, with mortality rates of 5.3% in Aalborg, 3.8% in Copenhagen and up to 8.3% in the hardest-hit neighbourhood of the city (Bonderup, 2008).

The second crisis is the Finnish famine of 1866 – 1868. A series of poor harvests during the 1860s culminated in a particularly late sowing season in 1867, which was followed by unexpected frost in early September and the failure of harvests across the country. While areas in the North were initially more affected, the famine soon gripped the entire country. The Finnish autonomous government framed the famine as a divine lesson in self-sufficiency, especially for the poorest parts of the population. As a consequence, the government refused to ask for help from Russia and little public relief was offered (Newby, 2023). It is estimated that in the deadliest year, mortality grew to around 8% for the whole of Finland, largely due to nutrition-related diseases, such as typhus and typhoid fever (Häkkinen & Forsberg, 2015).

The third crisis is the Swedish famine of 1867 – 1869. During the 1860s, Sweden was also affected by the same poor weather that led to the famine in Finland. However, in Sweden the famine remained confined to the Northern region, especially around Västerbotten. Relief from the central government was more substantial than in Finland, both in terms of food shipments and loans, although it varied across parishes and was tied to moral considerations (Nelson, 1988). Mortality still increased to a little over 3% in the county of Västerbotten, while it was not affected at the national level (Forsberg & Bohman, 2024).

Data and methods

The analyses will be based on a specific dataset for each crisis, all three based on historical parish records and comparable through the Intermediate Data Structure (IDS). For Denmark, I will use the recently constructed Link-Lives dataset. It contains longitudinal individual-level information on the population of all Danish parishes from 1787 to 1917, including date and place of baptisms, marriages and burials. These have been further linked to the censuses, which also started in 1787, adding information ('About Link-Lives', n.d.). The Katiha database covers the population of the ceded part of Karelia from 1681 to 1949. This region was a part of Finland until it was largely relinquished to the Soviet Union in the aftermath of World War II. The Katiha dataset also includes longitudinal individual-level demographic information for all residents, including information about in- and out-migration (Saarti et al., 2019). For the Swedish famine, I will focus on the Northern parishes, which were the most affected. I will use the POPUM dataset, which includes information on 78 Northern parishes from 1680 to the XX century. It includes longitudinal individual-level demographic information, including in- and out-migration from each parish (Edvinsson, 2000; Brändström, 1998).

My objective is to examine how local populations bounced back from a crisis and how long this took. To answer this question, I will take two approaches. For both of them, I will aggregate data for births/baptisms, deaths/burials and (net) migration at the parish level. If data series at the parish level prove too volatile, I may aggregate the data further at the county or regional level. In my first approach, I will focus on population size. For Sweden and Finland, I will reconstitute it backwards from the available censuses, taking advantage of the in- and out-migration information in the databases. For Denmark, I will use the Generalised Inverse Projection method (Oeppen, 1993), using the information available in the Danish censuses. Once I have obtained initial population sizes, I will estimate annual population sizes from 20 years before the crisis until the end of the dataset (at least 50 years after each crisis). With this data series, I will first check when the pre-crisis population size was reached again. If possible, I will construct a counterfactual population, e.g. by forecasting population size from the data series up to the year before the crisis, and confront the annual size of this counterfactual with that of the actual population. This will show whether local populations

managed to completely overcome the impact of the crisis on population size. The second approach focuses instead on the population growth rate. Once again, I will calculate this rate by parish and year and examine whether, and when, it converged to pre-crisis values (either from lower or higher post-crisis values). Once again, I will create a counterfactual series of annual rates and compare it with the actual yearly values, and quantify the contribution of birth, death, immigration and emigration rates (or net migration rates). If I am able to carry out this analysis by age, I will use a modified Kitagawa decomposition to further quantify the contribution of the age structure.

For both of these approaches, I will explore whether it is more informative to group parishes by region or by the magnitude of the crisis impact (e.g. increase in mortality). This will allow more general patterns to emerge. The creation of the counterfactual data series will require the identification of a suitable forecasting method. If I cannot identify one, I will either focus on the first part of the analysis, or find a suitable empirical counterfactual. For example, I could explore using Southern Swedish parishes, covered by the SEDD database, as a counterfactual for the famine-stricken parishes in the North of the country.

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