Infant Mortality Among German Settlers in the Nineteenth-Century Russian Empire

Trends in infant mortality in Europe followed a variety of pathways from and to different levels. At the turn of the twentieth-century, for example, infant mortality rates [IMRs] were still high, albeit with a high degree of variation across Europe. For example, while IMRs in Norway and Sweden were around 100 deaths per 100 live births around 1900, figures as high as 200 or even 250 were seen in parts of Germany and Austria (Corsini and Viazzo 1993). Meanwhile, at the sub-national level such variation was even higher.

While the transition from high to low infant mortality in the twentieth-century has been well studied, fewer studies have sought to examine long-run trends over the nineteenth-century and before. Such studies have come to divergent conclusions about the shape of the trend over time – not least because of different socioeconomic, climatic, environmental and policy contexts. In Sweden, for example, IMR fell in an almost linear fashion from 1900 through to the middle of the twentieth-century (Brandstom 1993). In England and Wales, meanwhile, the rates stayed remarkably constant at around 150 infant deaths per 100 live births over the entire nineteenth-century, before declining sharply after the turn of the twentieth-century (Woods, Williams and Galley 1993) (although this does, of course, mask sharp regional and socioeconomic differences, see Woods, Williams and Galley 1993 and Wrigley et al. 1997 for England; Gehrmann 2011 for Germany).

The orthodox view for the nineteenth-century Russian Empire, however, is that it experienced worse mortality conditions than other European settings, with only modest declines in infant and childhood mortality reported at the very end of the century. A quote typical of this view is as follows: 'Between 25 and 30 per cent of all infants born in the European provinces of the empire in the last third of the nineteenth century died before they were a year old: an infant mortality rate of 250-300 per thousand live births…The death rate among infants and children under five seems to have been at a similar level in the rest of the nineteenth century and, in all likelihood, in earlier times' (Moon 1999, p. 25).

However, this orthodox view is problematic in three ways.

Firstly, it masks substantial heterogeneity within the European provinces of the Russian Empire in the later nineteenth-century. According to Patterson (1995), for example, the infant mortality rate (deaths in the first year per 1000 live births) in the period 1867-81 ranged from below 150 in Vilna province through 200-250 in most of modern-day Ukraine up to over 400 in Moscow. Secondly, the data upon which these figures are calculated may not be consistent either across space or time. In particular, we know that different religious groups adopted different patterns of registration which can affect the relationship between the numerator and the denominator. Thirdly, the period before 1867 is extremely poorly understood, not least because of a lack of consistent mortality reporting across the empire. This leads Dennison and Nafziger (2007) to remark that 'information on health conditions in pre-1861 rural Russia is almost entirely lacking' (see, also, Dennison and Nafziger (2013). Indeed, this final quote points to the scarcity of information about health in nineteenth-century Russia more generally; although evidence from the later nineteenth-century suggests that there was higher infant mortality in the summer months (e.g. Patterson 1993).

Bessarabia was a province of the Russian Empire bordering the Black Sea, roughly sharing the same borders as modern-day Moldova. According to Rashin (1956), infant mortality rates in Bessarabia were somewhat lower than the regional average in 1867-81 at 177. However, these rates increased to 181 by 1886-1897 and 196 by 1908-1910.

In many parts of the Russian Empire, settlers from other parts of the world established 'colonies', bringing with them cultural, social and religious traditions (Bartlett 1979) (although these colonists were later the victims of land expropriation, purges and violence, see for example Lohr 2003, and Rempel 1932). In Bessarabia, a number of colonies were established by settlers from Germany. In Glückstal, a village near modern-day Grigoriopol in Transnistria (Moldova), Lutheran settlers predominantly came from Wuerttemberg in Germany in the very early nineteenth century (for an early history of the colony, see Rapp (1848). Some of these colonies appear to have maintained high-quality registers of births, marriages and deaths for an extended period of time well before the late 1860s. The presence of death date and comprehensive information regarding parents means that it is possible to produce a long-term run of infant mortality rates (1833-85 for Glückstal) using a consistent methodology which can detect and partially control for aspects of under-registration. Furthermore, apparently precisely recorded dates of deaths allow for investigation as to the extent to which the nature of infant mortality changed in the first year of life over the nineteenth century, potentially illuminating aspects of changes in health.

Using data from the Glückstal colony, it is then possible to generate estimates of infant mortality for a region of the Russian Empire in the mid- to late- nineteenth century. To reiterate, the value of these estimates is based on (a) the dearth of reported IMRs for the period prior to 1861 – especially for a largely rural area; and (b) the ability to systematically produce transparent IMRs based upon nominative linkage at the micro-level, rather than relying on printed macro-level data.

Data and Methods

Data

The data used in this analysis is publicly available via an internet repository (odessa3.org 2018). Transcribed data for births and deaths for the period 1833-1885 were made available. In total, there are 20,985 birth records for the period, and 7,194 death records.

Methods

There are numerous methods to calculate infant mortality rates [IMR] (see, for example, Pozzi and Farinas 2015). In this exercise, we apply a three-step approach which draws on the analysis of infant mortality in historical settings. The first is the so-called *crude*, or *gross* IMR. This is simply taken as the number of deaths below age one divided by the total number of births multiplied by 1000. This procedure can be performed simply using aggregate figures. While this can be very quick to calculate, in many settings characterised by under-registration the denominator and the numerator may not be equivalent (i.e. if births are not registered, then the infant mortality rates will be inflated, *cf* Huck 1995)). In equation terms this is:

$$crudeIMR = \frac{recorded\ deaths\ aged < 1year}{total\ births\ in\ same\ year} \times 1000$$

It has been suggested that a better practice is to calculate infant mortality (and other indicators of infant health using individual-level historical data based upon the principle of nominative linkage (Basten 2008). This procedure has been applied in numerous studies of historical infant health and mortality, including Basten (2008) and Williams (1992) for Northern England, Mühlichen and Scholz (2015) for Germany, Jaadla and Puur (2015) for Estonia, and so on. While different studies employ different procedures, this study follows Basten (2008) as follows:

(1) **Input all fields** in birth and death registers into spreadsheets and compile database in MS Access
(2) **Perform data cleaning** by, for example, standardising dates, transforming age at death into number of days,
(3) Standardise names through a series of SQL queries linking to look-up tables which manually correct and standardise names (e.g. Smith, Smithe, Smyth, Smythe are standardised to *Smith*).
(4) Create 'dummy birth dates' in a new column in the death table by calculating the age of infant death in days and subtracting from the date of death.
(5) **Link infant deaths to their respective births**. This time-consuming procedure is performed by a series of hierarchical SQL commands in MS Access. Firstly, 'tight' links are sought – based upon Child's actual name, both parent's forenames and surnames. The links are then manually checked (and multiple links refined) against dummy vs actual date of birth and other information where possible) and, when verified, the appropriate linked birth ID is inserted into the deaths table, and vice versa. After this, links are made on the standardised names. Then, links become 'looser' until, for example, one is only linking child's forename and surname. This process is essential to account for discrepancies in spelling that the standardisation process misses.
(6) When the linkage process is exhausted, **create 'dummy births'** for all non-linked infant deaths
(7) Create *linked* and *net* IMR as per the following equations. The 'linked' IMR' is simply regards as an interim' measure which indicates the extent to which under-registration is an issue. If, for example, there were complete registration of births and deaths (with no migration), then the linked IMR would be the same as the *crude* and *net* IMR. If, however, in the more likely scenario that there is under-registration of births, then the *linked* IMR will be lower than the crude IMR. Under these circumstances, then, it is necessary to create a *net* IMR by utilising the dummy births created above. Finally, the differentiation between the three rates can tell us more about the nature of event reporting over time.

$$linked\ IMR = \frac{linked\ infant\ deaths\ aged < 1 year}{total\ births\ in\ same\ year} \times 1000$$

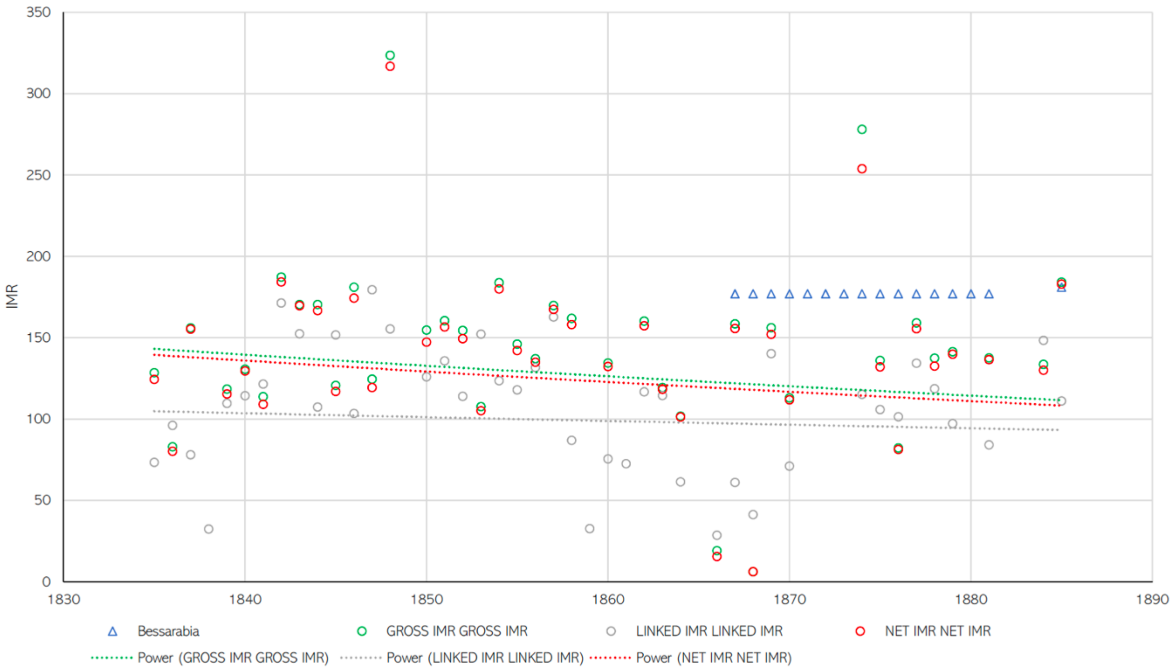
$$net\ IMR = \frac{linked\ infant\ deaths\ aged < 1 year}{total\ births\ in\ same\ year + dummy\ births} \times 1000$$

Results

Figure 1 shows the results of the exercise. A few trends are in evidence. Firstly, the gap between the *linked* IMR and the *crude* and *net* IMR shows that a relatively high degree of under-registration is in evidence. However, this is not consistent over the period. Comparing the figures for Glückstal with the benchmark regional figures for Bessarabia derived from

Rashin (1956), we can see that the figures for this rural area are somewhat lower, but within a range to be expected. Also, related to data quality, there are clearly some years where registration failure is apparent. For example, in the late 1860s, some unrealistic IMRs can be identified. Secondly, the overall IMRs at significantly lower than the widely-held view of national rates over 200 which some studies have presupposed for this period. The general trend derived from the power regression line is one of a general, steady decline over the period. Despite this, there are clearly years of crisis mortality in the later 1840s and early 1870s. In the early 1840s, for example, a measles epidemic took hold in the colony, while in 1847 a very poor harvest was recorded (Rapp 1848). NB: note that these are 'conventional measures' of IMR. In the final analysis to be presented at PAA, *adjusted* IMRs will be presented.

Figure 1: Gross, linked and net infant mortality rates, Glückstal Colony, Bessarabia, 1835-1885



Discussion and conclusion

This paper presents a very rare estimate of infant mortality in the Russian Empire for the early to middle part of the nineteenth-century. The IMRs presented contrast the widely helped position that Russian IMRs were uniformly high across the Empire and across the nineteenth-century. In fact, these figures for Glückstal appear to be close to those reported for the Province of Vilna in the mid-nineteenth-century, as well as the national figures for England and Wales over the same period. Taken together, then, the evidence presented here further suggests that there may have been a high degree of heterogeneity in the Russian experience of infant mortality over the course of the nineteenth-century.

Methodologically, the figures presented are one of the very first to present a systematic, individual-level analysis based upon the principles of nominative linkage. The presence of other Imperial-era church records in various archives – most notably held in the St Petersburg Archives – points to the possibility of expanding the geographical scope of studying infant health in the nineteenth-century Russian Empire. Furthermore, while this descriptive finding simply presents the overall trends in IMR, more sophisticated statistical and demographic analysis could be performed on this and other data sets to explore further aspects of infant health such as seasonal variations, the changing distribution of first-year mortality and so on. However, the gap between the *linked* and *crude* IMRs demonstrate the importance of the performing the (time consuming) nominative linkage exercise especially if further analysis is to be performed. As Patterson (1995) observed his ‘reconnaissance’ of mortality in late-Tsarist Russia, ‘Many questions await research and further studies addressing specific diseases, regions, cities, and ethnic and social groups are essential’ (p.179). This short study moves us on a fraction in terms of our understanding of regional trends of IMR in this period; but also in terms of presenting what appears to be a reliable data-set which could be exploited more systematically.

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