Chapter. 11

INFANT MORTALITY IN THE LATE NINETEENTH AND EARLY TWENTIETH CENTURIES URALS: MACRO AND MICRO ANALYSES¹

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Introduction

Infant mortality rate (IMR), which reflects the chances of survival for an infant under one year of age, is an important indicator of the society's welfare. The IMR is also considered as one of the most accurate indicators of health care and the country's overall socio-economic development and stability (Thorvaldsen). The IMR is particularly significant for studying transition periods, in our case – modernization of late Imperial Russia. In the late nineteenth and early twentieth century, the Russian Empire persistently occupied the first place in Europe in terms of infant mortality rates, which estimated 250 pro mille or higher while in Scandinavian countries it had already dropped to 70–80 pro mille (Kurkin, p. 6).

Demographic development in the Russian Empire after the abolition of Serfdom in 1861 attracted much scholarly attention both in Russia and abroad, however in most cases scholars focused their studies either on national or provincial levels-compatible in size with a small European country. Spatial and other differential analyses of infant mortality in Russia are underrepresented among international historical demography studies.

Our study analyses the late 19th – early 20th century Perm' gubernia's infant mortality trends and focuses on the urban population, which remains largely neglected by historical demographers. That was mainly because national demographic studies relied on the nineteenth and the early twentieth century zemstvo² and state statistics. While the zemstvo presented mainly aggregated data on rural areas with cities' population excluded, the state

¹ The research was sponsored by the Russian Foundation for Russian Foundation for Basic Research grant No. 19-09-00292

² Zemstvo – self-government elected sub-province level institution introduced in 1865 to manage local affairs, such as road building and maintenance, improvement of economic development, oversaw medical services and sanitation, public education and other socially important activities.

statistics in its turn did not distinguish between the rural and urban data. Thus, aggregated data made it difficult and in most cases impossible to separate urban statistics from the core of the official data. Meanwhile, the rural population accounted for up to 80% of the Empire's population in the late 19th century and of infant mortality studies did not take into account a 'hidden' minority – urban infants and their mortality rates.

Researchers traditionally focused their studies on the western and central Russia or the main Russian cities – Moscow and St. Petersburg, with eastern parts and provincial cities of the Empire left neglected. Therefore, the study of regional and local differentials is of crucial importance, for it allows looking beyond national averages. While there have been several research efforts made on infant mortality in late 19th to early 20th century Russia (Andreev & Kvasha, 2002; Kvasha, 2003; Avdeev, 2010) and in its regions including the Urals (Golikova, 2012; Kornilov, 2014), none considered urban populations. The usual approach has been to analyse the aggregated data from the source material without considering individual characteristics.

The creation of the "Ural Population Project" (hereafter UraPP) with nominative data transcribed from the Ekaterinburg parish registers (*metricheskie knigi*) allowed conducting our study on the individual level. Our previous analyses showed that in the decade leading up to World War I infant mortality rates among the Ekaterinburg Catholics and Jews were rather low: 57‰ and 87‰ correspondently, compared to the IMR among the Orthodox majority at 352‰ (Glavatskaya, Borovik, Thorvaldsen). While that article was being prepared for publication, a part of the database that included the nominative data on the Russian Orthodox Church parish members was not ready yet, and we had to use tables prepared by the priests annually for comparison. Now, when the data was transcribed we can study how the IMR varied among the urban and rural population in the late 19th – early 20th century and its dynamics; what were possible reasons for the Perm' gubernia's (province) leading position in high IMR.

Perm' province: geographic and medical setting

Perm' province with its 12 uezds (sub-provinces): seven in the European part and five in the Asian, embraced a vast territory over 330 000 sq km stretching on both slopes of the Ural mountains. It was the fourth biggest gubernia in Russia with a population of 2 994 302, and only 179 339 of them (6%) were city dwellers in 1897. It was also one of the least densely populated provinces in the European part of Russian Empire with

about 13 persons per sq km. The two biggest cities were Perm' – the administrative center of the province with a population of 45 205 and Ekaterinburg – a rival city due to its status of the Ural mining and metal production headquarter with a population of 43 239 according to the 1897 Census.

Russian official medical statistic stated that Perm' province had extremely high infant mortality in the late 19th to early 20th century. According to the health reports collected and published by the local doctors, the infant mortality rate in Perm' province reached 425‰ compared to a national mean of 270‰ in 1895. We should, however, be aware of the fact that the Russian national IMR calculations included the data only on 50 most western Russian gubernias, including contemporary Estonia, Lithuania, Latvia, Belarus and Ukraine, who had IMR similar to France; and excluding Siberia and Central Asia, whose rates were considerably higher. The deplorable infant mortality rates looked even gloomier as the Russian IMR dynamics compared with other European countries left much to be desired. In 1867–1881, the IRM in Russia, though very high, was better than in Württemberg and Bavaria. By 1901, however, these regions' IMR decreased, like in other European countries; while in Russia it remained on the same level, which turned it into the European leader in this grim indicator (see Figure 1). A recent international overview ranked Russia with the highest European infant mortality rate also in 1910 (Klüsener et al., 2014).

	IMR, ‰	
	1860-1880s	1900s
Württemberg	312	191
Bavaria	308	223
European Russia	271	272
Saxony	270	228
Austria (Cisleithania)	255	189
Italy	210	140
Prussia	208	188
Switzerland	195	105
Holland	193	137
France	166	143
Finland	165	118
England and Wales	149	130
Belgium	148	134
Denmark	138	104
Sweden	132	75
Scotland	122	108
Norway	105	67

Figure 1. Infant mortality rate dynamics in the late 19th and early 20th century

*Russian data in second column for the 1901. Source: (Statistics, p. III–IV).

Figure 2. Infant mortality rate in European Russia, 1893–1896
Source: (Nikitenko, p. 60–61).

Naturally, there were also significant regional disparities in terms of the IMR even within the European part of the Russian Empire. As figure 2 shows, Perm' province had the worst IMR at that time. In 1896–1897, its IMR was 437 ‰, while the national average was 274 ‰.

Even if the Perm' province's IMR fell to 320 ‰ during the first decade of the twentieth century, it remained one of the highest in European Russia (see Figure 3).

Figure 3. Dynamics of the IMR in Russia, 1867–1910, ‰

Source: (Rashin, p.195–196).

The growing awareness of the high infant mortality in Russia sparked debates in political and medical circles already in the late nineteenth century (Sokolov, Grebenshikov, p.1–25). Ural doctors regularly discussed the problem of high infant mortality in the region at national medical forums. Doctor Nikolai Russkikh employed by Ekaterinburg zemstvo, presented his paper ‘On Combatting Child Mortality’ at the Twelfth International Doctors’ Congress in Moscow in 1897 and cited the most horrifying figures of infant mortality in Okhansk uезд, where IMR reached 600‰ in 1890s (Sokolov, Grebenshikov, p. 26).

In addition to regional differences in infant mortality rate varied depending on the type of settlements. The IMR was at its lowest in small towns, usually centers of uyezds (sub-provinces), and much higher in rural areas. The highest IMR was recorded in large cities, centers of guberniyas (Gundobin, p. 8). Thus even within a given gubernia IMR had a fragmentary, mosaic-like character with extremely high and low figures, which aggregated together, resulted in an average similar to the metaphoric ‘temperature of patients across the hospital’. The Ural region, which for decades demonstrated high IMR levels, belonged to the type of ‘feverous patients’ and deserves more detailed research, which we shall start with this Ekaterinburg city case study.

Ekaterinburg: population, sanitation and medical services

Ekaterinburg was an important trade and industrial center, being a worthy rival to Perm' – the administrative center of the province. As a booming center of business and culture, Ekaterinburg at that time was already given an unofficial title of the 'Ural capital'. In the course of the Great Reforms of the 1860s, the government abolished Ekaterinburg's status as a mining-factory center, which restricted in-migration and free business in the city. After the mining administration's control was lifted, Ekaterinburg enjoyed considerable entrepreneurial growth, enhanced even more by the railroad, which was built through the city and connected European and Asian parts of the Empire. The city's population increased dramatically due to in-migration: between 1873 and 1917, the number of city dwellers rose from 30,000 to 70,000. After the abolition of serfdom, thousands of peasants surged to the city in search of employment, others as the contemporary observer wrote, moved to Ekaterinburg in search of the urban life comforts and benefits: schools and colleges, hospitals and clinics, theatres and museums (Vesnovsky, 14–18). A steep population increase due to peasant in-migration and the lack of the necessary infrastructure aggravated the already inadequate sanitary conditions. Streets of the city were covered in litter, wells were polluted by sewage, trash and raw sewage were dumped into the river used by the city's poor as a source of drinking water (Mikityuk, Yakhno, 132–140).

The Ascension Church parish of Ekaterinburg, whose vital events records we used for this study, was one of the city's five Orthodox Church parishes, established in 1770. Originally, it had a wooden building but in the late eighteenth century it was rebuilt in stone and has survived to this day along with a few other church buildings in Ekaterinburg. In the early twentieth century, the parish was the second largest in the city with 3536 parishioners in 1909. In general, the parish combined all classes of Russian society with peasants and meschane (townsmen) composing its majority. It also included retired soldiers, a small number of clerics and merchants from the urban poor to the eminent millionaires' family – the Zlokazovs.

Ekaterinburg's medical services improved by the end of the 19th century due to the zemstvo's activities. To target the high infant mortality, the zemstvo initiated the first city's maternity home foundation in 1877, sponsored by local philanthropists. There were eight midwives officially practicing in the city and many private doctors to help during

delivery. Later they added an ambulance and a gynecology department to the maternity home, which made it more popular. According to local statistics, more than 15000 women stayed there to deliver babies, 4000 got treatment because of gynecological disorders and in all, 71000 had doctors' appointments within the first 25 years of its operation. Two newly founded schools trained 16 midwives annually (Mikitiuk & Iakhno, 2014, p. 92). In the beginning of the 20th century, the maternity home was reconstructed and got an additional building (see Fig. 4).

Figure 4. The first maternity home in early 20th century Ekaterinburg

Generally, the number of births conducted with doctors' or midwives' assistance steadily increased in the course of 1880–1910 (See Table 1).

Table 1

Number of births conducted with doctors' or midwives' assistance

	1890		1900		1910	
Ekaterinburg uezd	819 (3.8%)	21397 (100%)	1678 (6.7%)	25103 (100%)	5110 (17.7%)	28871 (100%)

Doctor Nikolai Russkikh, employed by the Ekaterinburg zemstvo, attained national fame for fighting child and infant mortality. While

working as a doctor in Ekaterinburg, he studied European experiences from diminishing infant and child mortality and to promote this knowledge cofounded the Society for fighting child mortality in Russia. He also edited the journal focusing on protection of maternity and infants. In general, Ekaterinburg had an elaborate network of medical facilities that surpassed most other Russian cities in both quality and quantity (Glavatskaya, Borovik, Thorvaldsen).

Sources and methods

Despite the existence of relevant monographs on infant mortality in the Urals and Siberia, none of them allows easy comparison. The method of calculating rates has been different from the standard international approach, since they measure infant mortality as a fraction of all deaths, including adults. Instead, we use individual data transcribed from the Ekaterinburg Ascension Church' parish register to compute infant mortality rate, and other city's parishes' data is on the way.

Tsar Peter the Great introduced vital events registration in parish register (*metricheskie knigi*) in 1722 and priests all over the Russian Empire registered baptisms, weddings and burials until the October Revolution in 1917, when the Bolsheviks conveyed this competence to the secular state office. However, some priests, as was the case of the Ekaterinburg Ascension Church, kept making records even a few years later. The *metricheskie knigi* had three parts – about baptisms, about weddings and about burials.

We found the Ekaterinburg's Ascension Church parish registers in the State Archive of Sverdlovsk oblast' (GASO) for the period of 1880–1919 relatively well preserved: only records made in 1904 are missing. We then transcribed them into the 'UraPP' (Ural Population Project) database, which so far includes 7786 baptism records and 8281 death records, among them the data on 3287 infants (See Table 2).

Table 2

Number of records analyzed

	Baptisms of newborns, 1889–1919	Deaths, 1881–1884, 1889–1919	Infant deaths, 1881–1884, 1889–1919
Male	4012	4338	1804
Female	3774	3943	1483

The entries on burials in the parish registers provide names, death date, the age of the deceased and death cause. In the case of children aged under 16, there is also information about the parents: their names, social status/occupation, place of origin and marital status. In addition, death records contain data on priests conducted a funeral service and occasionally death certificate extracts verified by a doctor or police officer. Records on baptisms provide information on dates and places of birth and baptism, parents' names, their social status/occupation, place of origin and marital status and the same information on godparents. In addition, it included names of priests conducted a baptism service and occasionally godparents' signatures. In our previous research on ethno-religious minorities we checked the accuracy of the information on infants' age as registered by the priests during the burial ceremony. We identified buried infants who were not entered in the baptism records, as can be expected in a rapidly growing city with heavy in-migration. With functioning railway transport this means that even a baby which died a month old could have been baptized on the way to Ekaterinburg. According to our controls, the infants' ages reported by the city's Rabbis, Old Believers' leaders and Catholic priests were correct for 75% of the Jews, 86% of the Old Believers and 70 % for the Catholics. The rest were correct to the nearest month, however, the corrections did not affect the results (Glavatskaya, Borovik, Thorvaldsen). Since record linkage of the Ascension Church parish register has not yet completed, we have not managed checking of how accurate the priests reported the infants' ages. However, most Russian scholars agree that the quality of information provided by the late 19th – early 20th centuries *Metricheskie knigi* is satisfactory (Mironov, p. 101).

The registration of the stillborn varies from country to country (Klüsener et al., 2014). In the case of Ekaterinburg's Catholic and Jewish parish registers we have found neither stillborn nor babies who died after a few hours or during the first day, which could have been interpreted as stillborn. Burial service was to be performed only for the baptized, which is why in case a baby died before baptism there was no records left in the church book. At this stage we do not take them into consideration.

Infant mortality in the Urals: main findings

As expected, the Ural IMR was significantly higher than the national figures both in rural and urban areas. Infant mortality in 1889–1917 Ekaterinburg with its 360‰, corresponded more to the big Russian city model, even though its population was smaller than that of

a conventional ‘big city’ category with a population over 100,000 at that time. We have, however, to take into consideration the industrial specialization of Ekaterinburg: the city encompassed a large number of enterprises and workshops, which was detrimental to the environment and the sanitary conditions of the city. In this respect, Ekaterinburg was closer to the level of pre-revolutionary Russian ‘megapolises’. This explains why in the late nineteenth century mortality among the Ascension Church parish’ newborn never went below the level that by half exceeded the average IMR in other cities of the Empire.

In distinction to most European countries, Urals’ urban infant mortality was lower than rural. Ekaterinburg IMR was also lower than IMR in the rural area around it, although the difference between the urban and rural IMR in the Urals was smaller compared to the rest of the European Russia (see Figure 5).

Figure 5. Urban and rural IMR in the Russian Empire and the Urals³, 1890-1894, ‰

Source: (Pokrovsky, Richter, p. 97–98, 100–101; *Population dynamics in Perm guberniya*) UraPP.

These can be explained by the Ascension Church parish mixed – urban/rural character. Apart from the north-eastern part of the city, it also included parish members from the nearby villages Pyshma and Vladimirskoye, therefore, in 1900, almost every fourth parishioner (24%) was a peasant from one of these two villages. The general IMR decline in the late 19th – early 20th century Urals started with postneonatal infants (Golikova, 2012, p. 137–138). Babies in the neonatal pe-

³ For the Russian Empire urban/rural areas we used data on cities and uezds and for the Urals – Ekaterinburg uezd as a sample of rural case and Ascension Church parish – as a case of urban population.

riod were exposed to the highest risk of dying; infants who managed to get through this period, given adequate treatment, stood much better chances of survival. Monthly analysis of the IMR has shown a decrease in postneonatal mortality in Ekaterinburg's Ascension Church parish from 295‰ in 1891–1900 to 259‰ in 1901–1910. (see Fig. 6).

Figure 6. IMR in the Ekaterinburg's Ascension Church parish according to the infant's age in months, ‰. Source: *UraPP*.

The study of the IMR dynamics in Ekaterinburg Ascension Church parish in comparison with the synchronous indicators of Perm' guberniya and Ekaterinburg uезд provide the main trends in the infant mortality rates decline (see Table 3).

Table 3

IMR in Perm' province, Ekaterinburg sub-province and Ekaterinburg city*

	1891–1899, ‰,	1901–1910, ‰,	1911–1916
Perm' province	417	327	n/a
Ekaterinburg sub-province (rural)	405	305	n/a
Ekaterinburg (urban)	389 (N = 1024)	353**(N = 765)	347(N = 520)

*Ascension Church parish case

**without 1904 data

Source: (*Poiasnitel'nyi tekst*, p. 7; *UraPP*).

The table shows the more advantageous starting position of Ekaterinburg in terms of IMR compared the whole Perm' province and rural sub-province subordinated to Ekaterinburg in the late 19th century. However, when both the province's and sub-province's IMR dropped down by more than 100% in just two decades, IMR in Ekaterinburg itself decreased only 36% on average. To a certain extent, this could be blamed on the anomalously high IMR of 1909 – 479% (see figure 7), which has not been explained yet. However, IMR in the three pre-war years (1911–1913), was 369% – equal to the average in the 1890s and 1900s. We unfortunately cannot compare IMR dynamics after 1910, due to the lack of the necessary data on the Perm' province and Ekaterinburg sub-province rural area.

Reasons for high infant mortality rates in Russia and in the Urals

The majority of doctors and statisticians at the time explained the disastrous IMR in Russia by mass poverty, engagement of peasant mothers in field work, low level of hygiene, the lack of access to medical services and the lack of solid knowledge about infant care. The latter was particularly significant since the early weaning practice widely spread among Orthodox peasants, was harmful to babies' immune systems and digestion and resulted in the low infant survival rate (Sokolov, Grebenschikov, 37–43; Novoselsky, 1911, 17).

The situation in the Urals, compared with European Russia, was exacerbated by the geography: the Perm' province's vast territory, comparable in size to a European country was far from densely populated. While the average population density in European Russia was approximately 28 people per sq.km, in Perm' province was less than 13 people per sq.km (Statistical Yearbook, p.44, 49). That affected people's access to doctors' and health care, which diminished infants' chances to survive. Furthermore, while inhabitants of European territories for decades were being enlightened by medical professionals and thus improved their infant care practices, the peasant in-migrants to the Urals and Ekaterinburg in particular brought their archaic folk pediatrics with them. Sufficient evidence comes from accounts on infant care among Ural peasantry recorded by contemporaries in the late 19th century (Golikova, 2005, 99–104).

Nikolai Gundobin hypothesized that the Urals' high IMR was aggravated by the significant number of Old Believers in the region. Ac-

cording to his hypothesis, in their daily life, Old Believers strictly adhered to numerous anti-sanitary religious practices, which were harmful to the health of both the mother and the child. Their pregnant women observed long fasts throughout the year; they often performed baptism ceremonies in cold chapels; their rituals included kissing deceased person, who, for instance, possibly died from a highly infectious disease, etc. (Gundobin, p. 10). However, our analysis of the two Old Believer parish registers in Ekaterinburg did not confirm this hypothesis: their IMR was considerably lower than in the neighboring Orthodox parish (Glavatskaya, Borovik and Thorvaldsen). However, in this case we might need to make allowance for the fact that the Old Believer community was quite diverse: Gundobin wrote about the Old Believers in general, the majority of whom belonged to peasants or factory workers, while Ekaterinburg Old Believers were the urban dwellers.

Conclusion

The results of our study have confirmed our hypothesis that the level of infant mortality is closely connected with the type of settlement. It became evident when we compare the corresponding data of the uezd and the city parish. In the late nineteenth century Ekaterinburg had a moderate level of infant mortality, but in 1889 to 1917 it demonstrated only a slight decrease in the post-neonatal infant mortality rate. This decrease, however, was nullified by a slight increase in neonatal mortality: 1909, 1911 and the first year of war (1914) were grievous years for infants, which affected the uezd statistics (see Figure 7)

Figure 7. IMR dynamics in the Ascension Church parish, 1889-1916, ‰*

*instead of missing 1904 data we used aggregates. Source: *UraPP*.

The first epidemiological transition started to develop in Russia later than in most European countries and soon after the start was interrupted by socio-political disasters (Isupov). Even if slow, this process had a steady effect, which was noticed and reported by the doctors at once (Novoselsky, 1916, p.180–187). Although Perm' guberniya had an extremely high level of IMR, when it entered the epidemiological transition, it soon became one of the leaders in terms of declining infant mortality rates. While from 1886–1897 to 1908–1910, the IMR declined on average at a pace of 21‰ across the country, the Perm' guberniya IMR dropped down by 117‰. The comparative analysis of uezd and city dynamics shows that the IMR dropped down in rural areas while in the city it remained on the same level.

We believe that this effect was due to the zemstvo doctors' activity, who focused predominantly on promoting knowledge and medical care in rural areas. This movement was particularly influential in the Urals, which had a large number of zavody – metal producing factories with a population around, generally more open to innovations. These settlements had a relatively developed medical network, system of district doctors (Shestova, p. 38) and nurseries (Golikova, Dashkevich). Spatial analyses of the IMR in Ekaterinburg uезд supports this hypothesis. The uezds' subdivisions with zavod settlements in their territories had lower IMR, than agricultural units (Bakharev).

The situation in Ekaterinburg itself was influenced heavily by the mass influx of peasant in-migrants and numerous industrial and craftsman enterprises, which worsened the already poor environmental and sanitary conditions. The city administration was unable to provide urban dwellers with health care, access to information and sometimes even food, which resulted, among other things, in the high level of infant mortality rates, in which Ekaterinburg was lagging more and more behind the regional standards of that time. The role of ethnic and religious affiliation was a significant factor as it determined either a high level of education (Jews, Catholics, Lutherans) or strict hygiene rules adherence (Jews, Muslims). These factors, in their turn, determined the quality of infant care and increased the baby's chances to survive in the city. Peasants who constituted the majority of Orthodox parishes had lower level of education and were suspicious of doctors, preferring folk healing practices or simply having no time or money to obtain professional medical assistance.

Finally, the UraPP data allowed us to find out that the Ascension Church parish members on average baptized their babies within first 3 days of their life (See table 4).

Table 4

Average baptism age of infants in the Ascension Church parish,
1889–1918, days

	1889–1899	1900–1910	1911–1918
Average baptism age	3.7	4.6	5.2

This practice was based on the Orthodox Church strong belief that babies would not end up in paradise if they died before being baptized. This belief made both the parents and the priests to hurry up with baptism, whether a baby was well or not. Given the fact that the ritual required the baby's complete immersion into a vessel full of water three times, it is easy to believe that the whole procedure could have affected the babies' health. It is interesting to note, that Ekaterinburg Catholics, who generally believed in the very same idea that only baptized babies access the Heavens, on average baptized their newborn at the age of 41 days.

Further development of the UraPP and record linkage will allow us to check our findings made on the Ascension Church parish data and answer other research questions.

References

Avdeev, A. (2010). Mladencheskaya smertnost' i istoriya okhrany materinstva i detstva v Rossii i SSSR [Infant mortality and the history of motherhood and childhood protection in Russia and the USSR]. In: Denisenko, M. B., Troickaja, I. A. (eds.). *Istoricheskaya demografiya: sbornik statey* [Historical demography: collected papers]. *Demograficheskie issledovaniya*. [Demographic research]. 14. Moscow, MAKSS Press. p. 13–72.

Bakharev, D. S. (2017). Mladencheskaya smertnost' v Ekaterinburgskom uezde v kontse XIX veka: opyt kartografii [Infant mortality in Yekaterinburg uезд in the late XIX century: experience of mapping]. In: Kornienko, S. I. (ed.) *Tsifrovaya gumanitaristika: resursy, metody, issledovaniya: materialy Mezhdunar. nauch. konf. (g. Perm', 16–18 maya 2017 g.): v 2 ch.* [Digital humanities: resources, methods, and research. International scholarly conference proceedings: in 2 parts]. 2. Perm': Perm. gos. nats. issled. un-t. p. 10–12.

Glavatskaya, E., Borovik, J. & Thorvaldsen, G. (2018). Urban infant mortality and religion at the end of the nineteenth and in the early twentieth century: the case of Ekaterinburg, Russia. *The History of the Family*. 1 (23). p. 135–153.

Golikova, S. V. & Dashkevich, L. A. (2014). Spasenie zhizni detey: opyt ural'skikh guberniy v kontse XIX – nachale XX veka [Saving children's lives: the Ural provinces' experience in the late XIX – early XX centuries]. *Vestnik Permskogo universiteta. Seriya: Istoriya*. 1 (24). p. 124–134.

Golikova, S. V. (2001). *Sem 'ya gornozavodskogo naseleniya Urala XVI–II–XIX vekov: demograficheskie protsessy i traditsii* [Family of the mining population of the Urals in the XVIII–XIX centuries: demographic processes and traditions]. Ekaterinburg: UrO RAN, 2001.

Golikova, S. V. (2005). Vysokaya smertnost' na dorevolutsionnom Urale: struktura, prichiny i sledstviya [High mortality in the prerevolutionary Ural: structure, causes and consequences]. *Dokument. Arkhiv. Istoriya. Sovremennost'*. Sb. nauch. tr. 5. p. 99–110.

Golikova, S. V. (2012). *Detskaya smertnost' v Permskoy gubernii (vtoraya polovina XIX – nachalo XX v.): istochnikovedcheskiy i metodologicheskii aspekty* [Child mortality in the Perm province (second half of 19th – early 20th centuries): source study and methodical aspects]. Ekaterinburg: UrO RAN.

Gundobin, N. P. (1906). *Detskaya smertnost' v Rossii i mery bor'by s neyu* [Child mortality in Russia and control measures]. St. Petersburg: Lit.-med. zhurn. d-ra Oksa.

Isupov, V. (2016). Epidemiologicheskii perekhod v Rossii: vzglyad istorika [The epidemiological transition in Russia: a historian's view]. *Demograficheskoe obozrenie*. 2016. 3 (4). p. 82–92. Available from: <https://demreview.hse.ru/article/view/3207/2789>. (Accessed: 02.03.2018).

Klüsener et al. (2014). Spatial inequalities in infant survival at an early stage of the longevity revolution: A panEuropean view across 5000+ regions and localities in 1910. *Demographic Research*, 30, 1849–1864.

Kornilov, G. E. (2014). Evolyutsiya mladencheskoy smertnosti na Urale v pervoy polovine XX v. [Evolution of infant mortality in the Ural during the first half of the 20th century]. *Ural'skiy istoricheskii vestnik*. 3 (44). p. 80–89.

Kurkin, P. I. (1911). *Smertnost' malykh detey. Statistika detskoy smertnosti* [Mortality of small children. Statistics of child mortality]. Moscow: O-vo bor'by s detskoy smertnost'yu.

Mikityuk, V. & Yakhno, O. (2014). *Povsednevnyaya zhizn' Ekaterinburga na rubezhe XIX – XX vekov: Ocherki gorodskogo byta* [The daily life of Yekaterinburg at the turn of the 20th centuries. Essays on urban life]. Ekaterinburg: AMB.

Mironov, B. N. (2007). Novaya istoricheskaya demografiya imperskoy Rossii: analiticheskii obzor sovremennoy literatury (Ch. 2) [New historical demography of the Russian Empire: The analytical review of modern literature. Part II]. *Vestnik Sankt-Peterburgskogo universiteta. Seriya 2: Istoriya*. 1. p. 100–126.

Nikitenko, V. P. (1901). *Detskaya smertnost' v Evropeyskoy Rossii za 1893–1896 god: Dis. na step. d-ra med* [Infant mortality in European Russia in 1893–1896: MUDr. thesis]. St. Petersburg: T-vo khudozh. pechati.

Novosel'skiy, S. A. (1911). *O razlichiyakh v smertnosti sel'skogo i gorodskogo naseleniya Evropeyskoy Rossii* [Differences between mortality of urban and rural population of European Russia]. Moscow.

Novosel'skiy, S. A. (1916). *Smertnost' i prodolzhitel'nost' zhizni v Rossii* [Mortality and life expectancy in Russia]. Petrograd: tip. M-va vn. del.

Pokrovskiy, V. & Rikhter, D. (1900). *Naselenie Rossii* [Population of Russia]. In: *Rossiya. Ee nastoyashchee i proshedshee* [Russia' present and past]. St. Petersburg: Tipografiya Akts. Obshch. «Izdatel'skoe delo», Brokgauz-Efron. p. 73–128.

Rashin, A. G. (1956). *Naselenie Rossii za 100 let (1811–1913 gg.)* [The population of Russia for 100 years (1811–1913)]. *Statisticheskie ocherki* [Statistical essays]. Moscow: Gosstatizdat.

Sanitarnoe Byuro Permskogo Gubernskogo Zemstva. (1913). *Vserossiiskaya gigienicheskaya vystavka v 1913 g. Poyasnitel'nyi tekst k eksponatam Permskogo gubernskogo zemstva* [All-Russian exhibition on hygiene in 1913. Notes on exhibits presented by the Perm' province zemstvo]. St. Petersburg: Permskoe Gubernskoe Zemstvo.

Sanitarnoe byuro pri Permskoy gubernskoy zemskoy uprave. (1906). *Dvizhenie naseleniya Permskoy gubernii s 1882 goda po 1901 god* [Population movement of Perm' province in 1882–1901]. *Ch. 2. Ekaterinburgskiy uезд* [Part II. Ekaterinburg sub-province]. Perm': Elektrotipografiya gubernskoy zemskoy upravly.

Shestova, T. Yu. (2017). *Razvitie zdravookhraneniya v Permskoy i Vyatskoy guberniyakh v kontse XIX – nachale XX vekov* [The development of the public health service in Perm' and Vyatka provinces in the late 19th – early 20th century]. *Historia Provinciae. Zhurnal regional'noy istorii*. 1 (1). p. 24–39. Available from: <http://hpchsu.ru/upload/iblock/ac8/ac8bc50a3dc94afe0ed-32a8f700d2cde.pdf>. (Accessed: 01.04.2018).

Sokolov, D. A. & Grebenshchikov, V. I. (1901). *Smertnost' v Rossii i bor'ba s neyu* [Mortality in Russia and the fight against it]. St. Petersburg: Tipografiya M. M. Stasyulevicha.

Tsentral'nyy statisticheskiy komitet MVD. (1911). *Statisticheskiy ezhegodnik Rossii 1910 g. (god sed'moy)* [Statistics yearbook. Russia in 1910 (year seventh)]. Petrograd: Tsentral'nyy stat. kom. MVD.

Thorvaldsen, Gunnar (2018). *Infant Mortality Now and Then. The Dual Role of Economic Resources. Transylvanian Review*. Vol. XXVII, N.2. P. 104–122.

Tsentrāl'nyy statisticheskiy komitet MVD. (1914). *Smertnost' mladentsev v vozraste ot rozhdeniya do odnogo goda v 1909, 1910 i 1911 godakh v evropeyskoy Rossii* [Infant mortality in European Russia. 1909–1911]. *Statistika Rossiyskoy imperii*. [Statistics of Russian empire]. LXXXII. St. Petersburg: Tipografiya Shtaba voysk Gvardii i Peterburgskogo voennogo okruga.

Vesnovskiy, V. A. (1903). Ekaterinburg v proshlom i nastoyashchem [Ekaterinburg in the past and present]. In: Vesnovskiy, V. A. (ed.) *Spravochnik-ezhegodnik «Ves' Ekaterinburg» s planom goroda Ekaterinburga* [Annual guide “The entire Ekaterinburg”, city plan attached]. Ekaterinburg: Tipografiya gazety «Ural'skaya zhizn'». p. 3–24.