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CONTENTS

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MORTALITY IN RUSSIA: THE SECOND EPIDEMIOLOGICAL REVOLUTION THAT NEVER WAS*

ANATOLY VISHNEVSKY

The article looks at different approaches to the conceptualization of the modern stage of mortality reduction (the "new stages" of the epidemiological transition, "the second epidemiological revolution", the "health transition"). During this stage, which has lasted for at least half a century, revolutionary changes have taken place in most developed countries. These changes manifest themselves in the drastic expansion of the degree of control over non-infectious causes of death—particularly over diseases of the circulatory system, neoplasms, and other non-communicable diseases, as well as over external causes of death. As a consequence of these changes, there has been a rapid shift of deaths from the abovementioned causes to older ages, an increase in the mean age of death from these causes, and, ultimately, a significant rise in life expectancy.

Russia, unfortunately, is watching this revolution from the outside, without taking any part in it. The age distribution of deaths from major classes of causes of death in Russia has not changed over the past half-century, life expectancy has stagnated, and Russia has increasingly lagged behind the majority of developed countries with respect to this indicator. Thus, the "second epidemiological revolution" has yet to occur in Russia.

Key words: *epidemiological transition, epidemiological revolution, second epidemiological revolution, health transition, causes of death, non-communicable diseases, injuries.*

1. THE EPIDEMIOLOGICAL TRANSITION, THE EPIDEMIOLOGICAL REVOLUTION, THE HEALTH TRANSITION

The concept of an epidemiological transition was formulated by the American demographer Abdel Omran in his 1971 article, "The epidemiological transition: a theory of the epidemiology of demographic change" [Omran 1971].

The term "epidemiology" generally refers to the science that studies the laws of the incidence and spread of diseases. This definition, which most likely goes back to Hippocrates and his teachings about epidemics, is especially relevant to the field of medicine. Within a medical framework, the meaning of epidemiology has changed, as the term is interpreted more broadly now than in the past. While epidemiology initially referred to the study of infectious diseases only, it has since been expanded to encompass the study of non-communicable diseases and injuries. The term is also used outside of medicine. For example, references are occasionally made to the epidemiology of crime. These newer uses of the word do not, however, contradict the original meaning of the Greek word *ἐπιδημία* (affecting a whole people), which is not directly related to medicine.

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Omran also interpreted the term "epidemiology" in a broad sense, as referring to the essence of any mass event. He observed that “many epidemiologic techniques that have heretofore been limited to the examination of health and disease patterns can be profitably applied as well to the exploration of other mass phenomena”[Omran 1971: 509].

According to Omran, the epidemiological transition is a historic shift from an era when mortality was critically dependent on epidemics and famine and the average life expectancy ranged from 20 to 40 years; through an intermediate era during which the factors that contribute to crisis mortality—and especially to epidemics—became less important, mortality decreased, and life expectancy increased by about 50 years; to an era of diseases caused by the ageing of the body (degenerative diseases) or by human activities (man-made diseases) [Omran 1971: 516], when "life expectancy reaches an unprecedented high of 70+ “ [Omran 1971: Table 4].

At this last stage “morbidity comes to overshadow mortality as an index of health as degenerative and chronic disease problems prevail and mental illness, addictions, accidents, radiation hazards and other pollution problems become more prevalent”[Omran 1971: 516].

Thus, Omran’s concept points to which causes of death policy-makers should focus on after infectious diseases—the main source of high mortality in the past—have been largely brought under control. It appears that the direction of Omran’s thinking was prompted by the situation in developed countries in the 1960s, when the rise in life expectancy had slowed and the expert communities in these countries came to realise that the previous strategy for raising life expectancy—i.e., controlling infectious diseases—had been exhausted, and new approaches were called for.

Omran was not the only scholar who acknowledged the need to develop new strategies in the fight to further extend human life. Almost at the same time as Omran’s article appeared, the American Journal of Public Health published an editorial entitled, "The Epidemiological Revolution", which stated that “the new epidemiology … has extended the concept of public health control from the limited area of infectious diseases to encompass all causes of illness, disability and death” [Editorials 1972: 1440]. The focus of this editorial, which was written by the American hygienist Milton Terris, was on the revolution in epidemiological thinking. But in a later article in which Terris outlined his concept in more detail, he clearly pointed to objective changes that had occurred in the structure of morbidity in the previous century as societies gained control over infectious diseases, and which contributed to the first epidemiological revolution. He added that this development in turn led up to a “large and difficult task…, nothing less than the implementation of the second epidemiologic revolution and the rescue of literally millions of men and women from preventable illness, disability and death” [Terris 1976: 1159]. “During the first epidemiologic revolution, health departments achieved miracles of prevention of infectious diseases despite their separation from treatment services. The same can be true for the second epidemiologic revolution in the prevention of non-infectious diseases” [Terris 1976: 1156]. Although the discussion here is about diseases, from the general context it is clear that Terris is referring to all non-infectious causes of death. He noted at the outset that “epidemiologists have moved beyond a preoccupation with disease to include violence – accidents, homicide and suicide – among their concerns” [Editorials 1972: 1440].

Non-infectious causes of disease and death are of a different nature. As some of these causes are related to endogenous factors that cannot be separated from age-related changes of the human body, the ability of policy-makers to reduce death and disease from these causes is limited. The main opportunities to minimise mortality and morbidity from these causes appear to be related to the fact that the endogenous factors of human longevity are never separated by an impenetrable barrier from the exogenous factors – i.e. a person never lives in isolation from the natural and social environment. Thus, his natural longevity necessarily depends on conditions such as his work environment, his eating and sleeping habits, and his access to health care. Changes in these conditions could, to a certain extent, slow the ageing process, limit premature wear-and-tear on the body, and even help to "repair" the body. However, while death can be pushed to a later age, mortality from endogenous causes cannot, in principle, be eliminated.

By contrast, other non-infectious causes of death depend largely on exogenous, external factors, and can cut short the lives of otherwise healthy people long before their natural vitality has been depleted. Most exogenously caused and hence avoidable deaths now are deaths from external causes. As in the case of infectious diseases, these causes can be brought under control. Though the level of control cannot be absolute, mortality due to external factors is, in principle, avoidable and can be reduced to a minimum.

In part because many medical traditions developed during the successful fight against infectious diseases, the aims and successes of the second epidemiological revolution are often viewed primarily through the prism of disease control. When scholars note the undeniable progress made in recent decades in reducing mortality, their focus is usually on the fight against non-communicable diseases, especially cardiovascular diseases. Researchers tend to emphasise that the beginning of the decline in mortality from chronic degenerative diseases in the latter half of the 20th century was “a milestone in the history of medicine” [De Flora et al. 2005: 896]. Scholars frequently identify the cardiovascular revolution as the main epidemiological change [Meslé, Vallin 2002: 444], and point to the progress that has been made in the fight against cancer. By contrast, reductions in mortality from external causes of death are mentioned far less often.

It is however clear that the reduction in the risks associated with external causes of death is a very important component of the second epidemiological revolution. It is hardly surprising that Terris has placed external causes of death near the top of his list of the leading causes of death that must be brought under control first of all - after cardiovascular diseases and cancer.

“Accidents are a particularly tragic cause of mortality because they so often kill children and young people. Indeed, they are the leading cause of death up to the age of 35 years. For all ages, they are fourth in importance; if the attention paid to them were on a par with their significance to the nation's health, they could undoubtedly be driven out of the list of ten leading causes of death. Epidemiologic research has deepened our understanding of the host, agent, and environmental factors involved in various types of accidents and indicated the preventive measures that can and should be employed” [Terris 1976: 1156].

Curiously, Terris did not refer to Omran, and in the demographic literature that abundantly cited Omran there was no mention of Terris. However, both scholars—apparently independently of each other—clearly pointed out that the world has entered a new era, the era of non-

communicable causes of death, and both noted that these non-communicable causes include not just diseases, but also what in modern terms are called "external causes of death."

More recently, as scholars have come to understand better the special status and independent role of external causes of death in mortality trends, these causes have been assigned to a separate group. "Deaths were classified using a tree structure. The first level of disaggregation comprises three broad cause Groups: • Group I: Communicable, maternal, perinatal and nutritional conditions; • Group 11: Noncommunicable diseases; and • Group Ill: Injuries" [Murray, Lopez 1996: 14].

As Omran observed in his seminal article of 1971, the epidemiological transition ends with the era of degenerative and man-made diseases and causes of death. This proposed chain of events is consistent with the patterns observed today, at least in developed countries. This era was seen as the last stage of the epidemiological transition. Omran argued that the first steps towards this new era were taken mainly in the second half of the 19th century in the countries of western and northern Europe, with the first stage being the "pre-modern pattern of health and disease", and the last stage being the fall in childhood mortality: "In England, childhood mortality has obviously been dropping steadily since the late nineteenth century**"** [Omran 1971: 517, 524]). When we compare Omran's interpretation of these trends with that of Terris, we can see that Terris regarded the first epidemiological revolution as an early stage of this era, which ended in the developed countries by the middle of the 20th century. According to Terris, awareness of the new situation emerged in the 1940s. Writing in the 1970s, he argued that "the findings, the potentials, and the strategies and tactics required to implement the second epidemiologic revolution are not only not understood; they have hardly been discussed" [Terris 1976: 1155]. However, judging by subsequent trends, it is clear that a new strategy for reducing mortality was already being implemented around this time.

In later decades, a number of scholars – including Omran himself [Omran 1998] — proposed refining this periodisation by adding a few more stages, or even suggested that the approach to the classification of stages should change. They proposed, for example, adding a fourth stage of "delayed degenerative diseases", or a "stage that will propel life expectancy into and perhaps beyond eight decades" [Olshansky, Ault in 1986: 386]. But as Omran himself had initially talked about reaching a life expectancy of 70+ in the third stage of the transition [Omran 1971: Table 4], which does not exclude 80 +, this adjustment can hardly be considered a good basis for highlighting yet another stage. In Omran's conception what mattered was not the quantitative, but the qualitative characteristics of each stage: as the presence of degenerative and man-made diseases was the main determinant of the third stage, any additional stages might have been redundant.

Other authors who described the idea of simply adding another phase to Omran's periodisation as "unconvincing" suggested viewing the epidemiological transition as part of a more general "health transition" [Meslé, Vallin 2006: 249], and including "within the wider concept of health transition an initial phase (that described by Omran) of life expectancy gains, attributed mainly to the decline in mortality due to infectious diseases, followed by a second phase dominated by the decline in cardiovascular diseases, leaving open the possibility of identifying later phases" [Meslé, Vallin 2006: 250].

Omran objected to "renaming" the concept, based on his broad interpretation of epidemiology, which "incorporates the scientific capacity to analyze social, economic, demographic, health care, technological and environmental changes as they relate to health outcomes. Classifying all the changes in these variables under the "health transition" would, however, be confusing. Health is a dependent variable of epidemiology, not vice-versa" [Omran 1998: 99].

However the scholars who promoted the idea of the "health transition" stressed that the concept was intended to complement, not replace, the concept of the epidemiological transition. The health transition, they explain, consists of the epidemiological transition – i.e. the long-term process of change in the health conditions of a society, including changes in the patterns of disease, disability, and death, and of a *health care* transition which can be seen as the emergence of patterns of social response to these changes [Frenk et al. 1991: 23]. Such an approach can be useful in analysing the mortality situation in Russia.

A widely expressed view is that this situation is a manifestation of an incomplete epidemiological transition [Vishnevsky, Shkolnikov 1997: 12-15; Demographic modernization 2006: 257-259, 382-395; Vishnevsky 2009: 56-63] resulting from the catch-up nature of Soviet modernisation, or even a "reverse epidemiological transition" [Semenova 2005]. It may, however, be more accurate to describe these developments as indicative of an incomplete *health care* transition. The patterns of social response to the requirements of the time generated by the changing patterns of morbidity and mortality reflected, in particular, in the generalisations of Omran and Terris in the late 1960s and the early 1970s, led to the development in many countries of new strategies for preserving health and life in response to changing conditions. These strategies represent practical responses to the new challenges in further reducing mortality after the fight against infectious diseases had been decisively won. Although these diseases have not yet entirely disappeared, their incidence is far lower than in the past. These strategies have enabled countries to embark on the second epidemiological revolution predicted by Terris. Unfortunately, in Russia such adequate patterns of social response to the new challenges were not found.

2. HAVE THE CHALLENGES ASSOCIATED WITH THE SECOND EPIDEMIOLOGICAL REVOLUTION BEEN OVERCOME?

Several decades have passed since Omran and Terris first made their pioneering generalisations. It is now possible to judge whether the era they predicted has indeed begun, and how effective efforts to control non-communicable causes of death have been.

In the 1960s, mortality in western European countries and in the then not so far behind them Russia was (and still is) mainly determined by the "big four" causes of death: cardiovascular diseases, neoplasms, respiratory diseases, and external causes. In 1970, the total contribution of the four classes of causes to the standardised mortality rate from all causes was close to 80% in the countries of Western Europe and continued to rise in the following years, whereas in Russia the total contribution had already reached 90% (Figure 1).

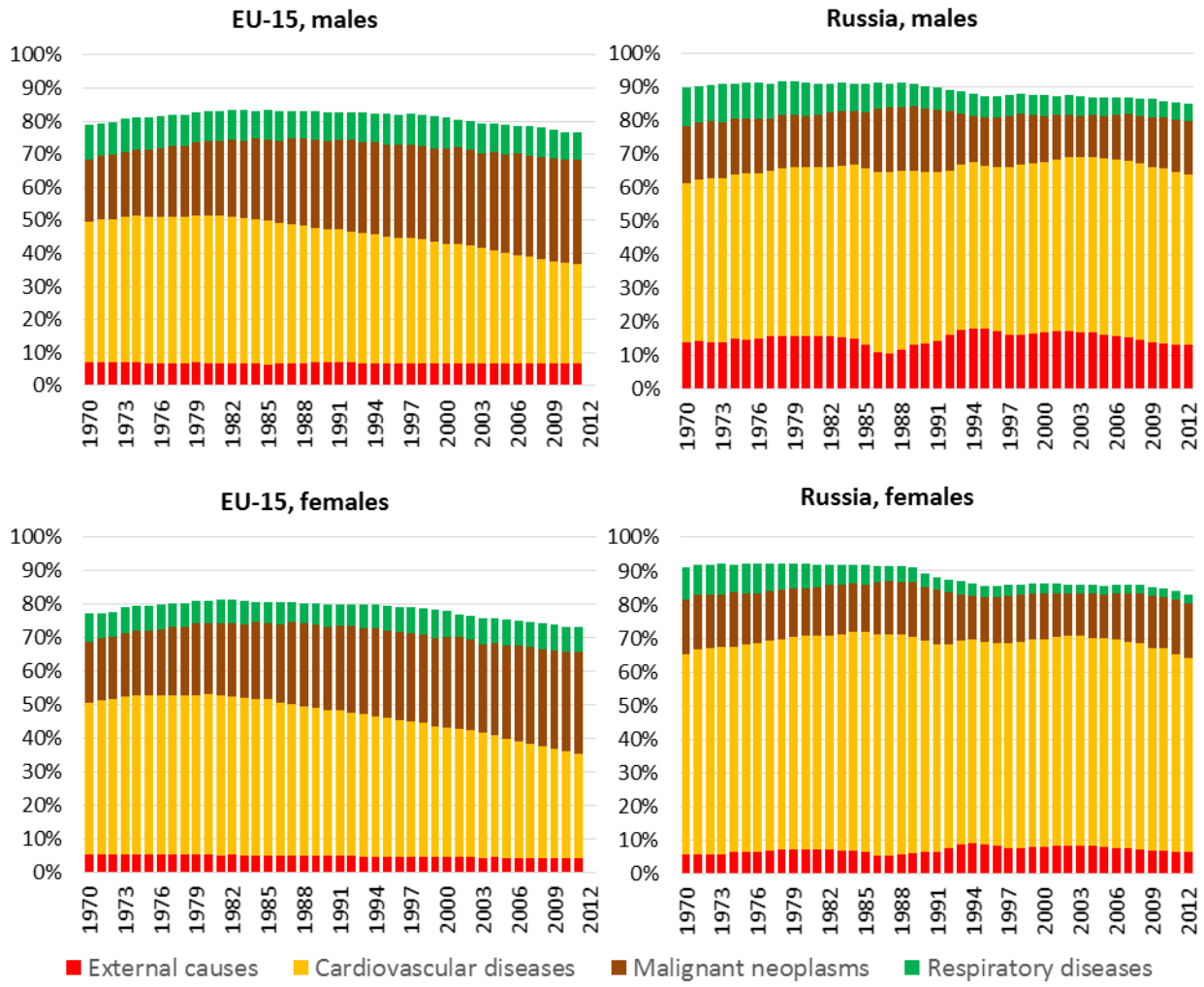

Figure 1. The total contribution of diseases of the circulatory system, neoplasms, respiratory diseases, and external causes to the standardised mortality rate from all causes in 15 countries belonging to the EU before May 2004, and in Russia[1]

Sources: [WHO HFA-DB 2014]; Rosstat.

Accordingly, the main challenges associated with reducing overall mortality levels were—and still are—reducing mortality from these four classes of causes. Judging by the dynamics of the standardised mortality rate, these problems have been largely solved in western European countries. The standardised mortality rates from three of the four main classes of causes of death have displayed nearly synchronous and rapid declines that can indeed be seen as representing a new epidemiological revolution. The exception to these general trends is mortality from cancer. Although cancer mortality has declined in the past two decades, it has not yet deviated substantially from early 1970s levels. (Figure 2).

[1] Austria, Belgium, the UK, Germany, Greece, Denmark, Italy, Ireland, Spain, Luxembourg, the Netherlands, Portugal, Finland, France, Switzerland

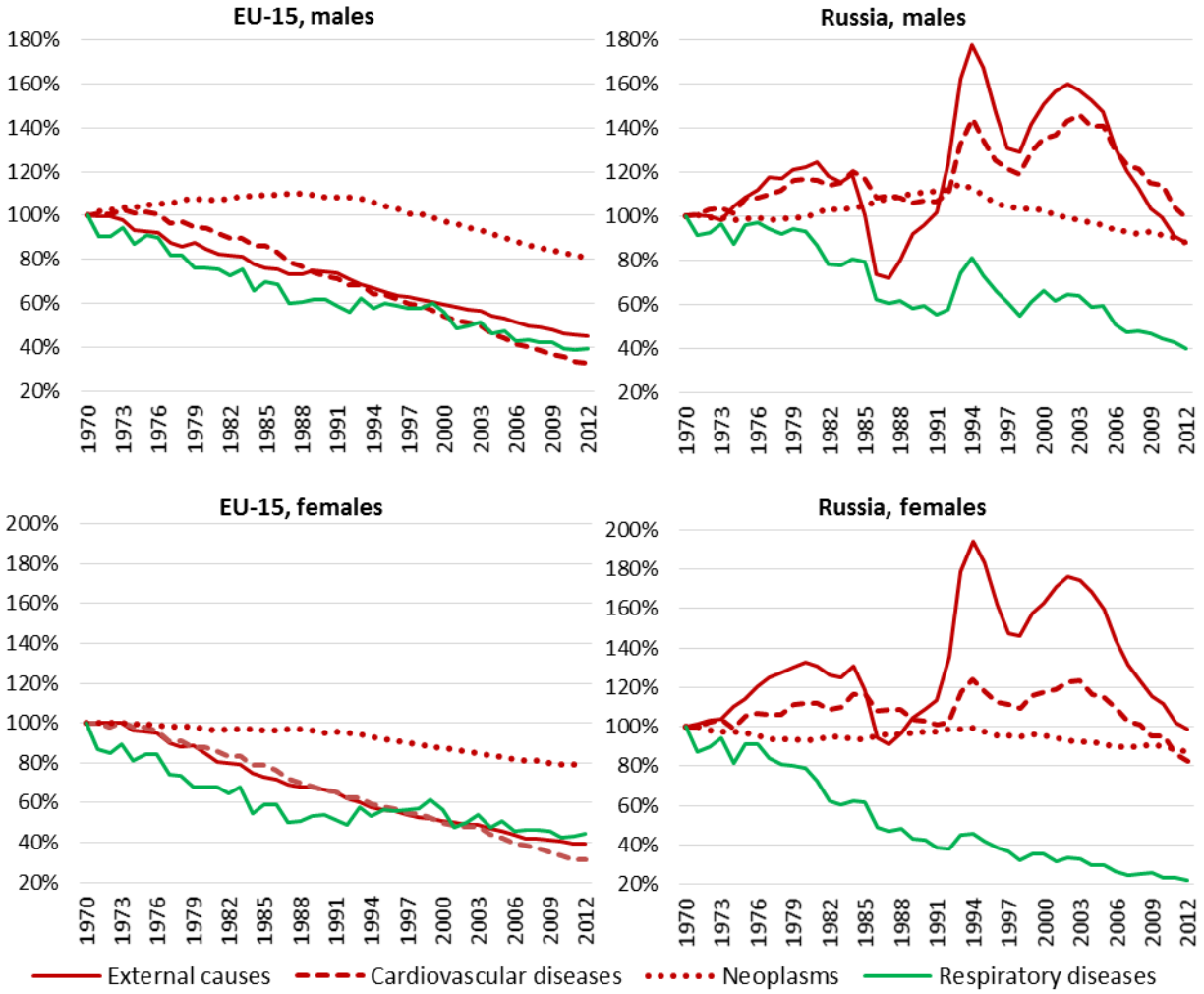

Figure 2. Dynamics of standardised death rates from diseases of the circulatory system, neoplasms, respiratory diseases, and external causes in Russia and 15 countries belonging to the EU before May 2004, 1970 = 100%

Sources: [WHO HFA-DB 2014]; Rosstat.

In Russia, these trends unfolded differently. Although there are significant structural similarities between western European countries and Russia, death rates in Russia from these four causes differed from those in Western Europe in 1970, and further diverged in subsequent years.

Although the total contribution to the standardised mortality rate of the causes of death included in the "big four" in the EU-15 has not changed very much (see Figure 1)—and these changes are not of a fundamental nature—the internal structure of this total contribution has undergone a major transformation. The main elements of this transformation are a drastic reduction in the contribution of circulatory diseases (from 45% in 1980 to 30% in 2011 among men and from 48% to 31% among women) and simultaneous growth in the contribution of cancer (from 19% in 1970 to 32% in 2012 among men and from 18% to 30% among women). Notably, the total contributions of these two classes of causes have become equal, albeit with cancer among men representing the largest share. The contributions of the other two classes of causes have not changed considerably.

In Russia, by contrast, no significant changes in the structure of the causes of death have occurred since 1970. The only change that can be seen in the Russian part of the graph is a certain decrease in the contribution of respiratory diseases. The establishing of control over the causes of death in this class can be attributed rather to the tasks of the first epidemiological revolution, of which it was a continuation and was therefore in Russia relatively more successful.

At the same time, what draws attention is the monstrous gap between Russia and the EU-15 in the dynamics of mortality from external causes of death (Figure 2). If in the EU-15 over the four decades from 1970 to 2010 the standardised mortality rate from causes of this class decreased by more than half (by 55% among men and by 60% among women), in Russia, after passing through several sharp fluctuations, the rate has returned to its 1970 level.

In Western Europe, external causes of death have been persistently in fourth place in the list of the big four causes. In Russia, external causes of death in the 1980s came in third place among women, but never dropped below third place among men, and often climbed up to second place (Figure 1). And yet the overall standardised mortality rate from the these four causes of death among both men and women in Russia in 1970 was much higher than in Europe, and later the gap only grew (Figure 1).

Enough has been said to argue that the second epidemiological revolution has been very successful in Western Europe, but has not yet taken place in Russia.

However, our analysis should be continued.

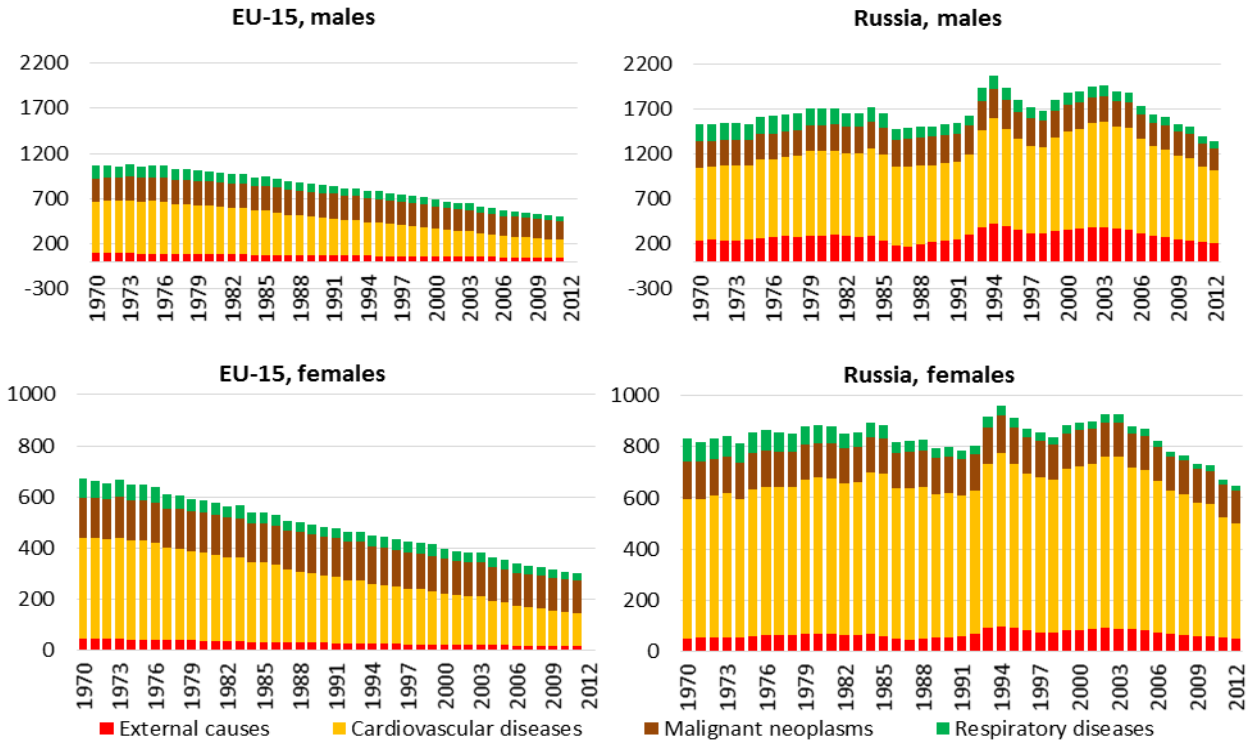

Figure 3. Standardised mortality rate from cardiovascular diseases, malignant neoplasms, respiratory diseases, and external causes in the 15 countries belonging to the EU before May 2004, and in Russia, per 100,000

Sources: [WHO HFA-DB 2014; Rosstat.

3. IS THE REVOLUTION REALLY ONLY CARDIOVASCULAR?

While recent demographic studies do not use the term "second epidemiological revolution", they frequently refer to the "cardiovascular revolution" in discussing the changes in mortality that have been taking place over the last half-century.

It would seem that the above graphs leave no doubt that this is what happened, that it was precisely the reduction in mortality from circulatory diseases which determined the whole picture of changes in mortality over the past "revolutionary" decades. When we look at the EU-15 countries, we can see that the sharp reduction in the standardised mortality rate from diseases of this class and its share in the big four causes of mortality led to an overall reduction in mortality from the four causes combined. Since the proportions of the big four causes in total mortality changed little over these decades, it makes sense to assume that the reduction in mortality from diseases of the circulatory system had a decisive influence on the decrease in the standardised mortality rate from all causes.

We should, however, recall the limited analytical capabilities of the standardised mortality rate. This indicator, though a convenient tool for the comparison of different countries or different periods in the same country, is nevertheless not perfect, especially because it does not allow us to take into account the age profile of the changes – a drawback that is easily illustrated by the example of mortality from respiratory diseases.

We have seen that the standardised mortality rate from this class of causes of death was the only class among the big four causes that declined steadily in Russia. Indeed, the rate decreased even faster in Russia than in the EU-15 countries: in 2011, for example, the standardised mortality rate from respiratory diseases was 33% lower among Russian women than among women in the EU-15. While this trend appears to represent a positive achievement for Russia, should it really be described as such?

The reduction in mortality from respiratory disease over the past 50 years in all developed countries was due to the exclusion of more and more minors, especially children, from this class of causes. Respiratory diseases largely retained their role as a dangerous threat to life only for the very elderly, whose vitality was already essentially exhausted. As a result of this, the mean age of death from causes of this class from 1960 to 2010 increased for women in the US by 10.2 years, in France by 10.3, in Italy by 17.4, and in Japan by 21.4 years, while in Russia growth was only 5.1 years. Women in Russia in 2010 died from this cause, on average, at the age of 68.6 years, while in the US it was 82.2 years, in Italy 87.5, in France 87.7, and in Japan 89.8. From a demographic point of view, dying from this cause in these countries was "profitable". We should therefore consider how positive a reduction in mortality from this cause really is, and in general reflect on what should be understood in this case by "decline in mortality." To do so, we need to move away from the standardised mortality rate and take advantage of some other analytical tools.

At least one such tool has been well known to demographers for several centuries: mortality tables by causes of death. These tables allow us to consider both the changes in the age profile of mortality of each individual cause or group of causes of death, and the probability of a newborn in each birth cohort - fictive or real (in practice, of course, we are more likely to have to deal with

fictive cohorts) - dying from this cause. In other words, the indicators of such tables enable us to examine changes in causes of death in two dimensions.[2]

The familiar expression "mortality reduction" is highly misleading, as the probability of death for all people is the same and is always equal to 100%. When we speak of "mortality reduction", we simply mean the delaying of deaths to older ages. But when we are talking about reducing mortality from selected causes, the argument changes. An individual may avoid death from this cause, but he will die from some other cause, and it is important to understand which causes of death are considered preferable. Different people may have different answers to this question, but from the perspective of demography, which investigates the impact of changes in mortality on the growth of life expectancy, there can be only one answer: the outcome that is preferable is an increase in the number of deaths from those causes from which, on average, people die later in life.

Since causes of death compete with each other, real changes can go in two directions: the mean age of death from each cause (groups of causes) of death can change, or the probability of dying from each of these causes can change.

In the first case, an increase always contributes to a "mortality reduction", while a decrease always contributes to a "rise in mortality". In the second case, the effects are less clear. The only unconditionally beneficial case is a fall in the probability of death from causes with a lower mean age of death. A decline in the probability of death from causes with a higher mean age of death is beneficial only in two cases: first, when such reductions are compensated for by an increase in the mean age of death from this cause, so that the total time lived by a person dying from the cause increases at least a little; or, second, when this cause is replaced by others with a higher or increasing mean age of death. As a rule, both happen, but complex interactions whose results cannot always be easily evaluated can arise.

Let us take for example the changes in French male mortality in the 50 years between 1960 and 2010, and try to understand these changes in terms of causes of death.

The total time lived by a generation consists of the total time lived by those who have died from each of the causes (or groups of causes) of death. Accordingly, the changes that occurred over the 50-year period can be clearly illustrated by a diagram [Andreev, Vishnevsky, Shaburov 1986; Vishnevsky, Shkolnikov, Vassin 1991: 82-91] that represents the distribution of the entire time lived by a generation according to the time lived by those who died of the large classes of causes of death. Along the horizontal axis in this chart are the probabilities of a newborn dying at some point in his life of one of the causes ($\boldsymbol{P_i}$). Along the vertical axis is the mean age of death from this cause, or the life expectancy of the people who will die from it ($\boldsymbol{\bar{x}_i}$). The area of each selected coloured rectangle is the total time lived by those who died of the *i*-th cause, and the sum of these areas is the total time lived by some hypothetical generation. Clearly, if $\sum P_i = \boldsymbol{1}$, then

$$\sum P_i \bar{x}_i = e_0. \qquad (1)$$

[2] The present article uses mortality tables by cause of death for Russia and other countries drawn up and provided by E.M. Andreev.

Figure 4 shows two such diagrams related to the male population of France at the beginning and the end of the period.

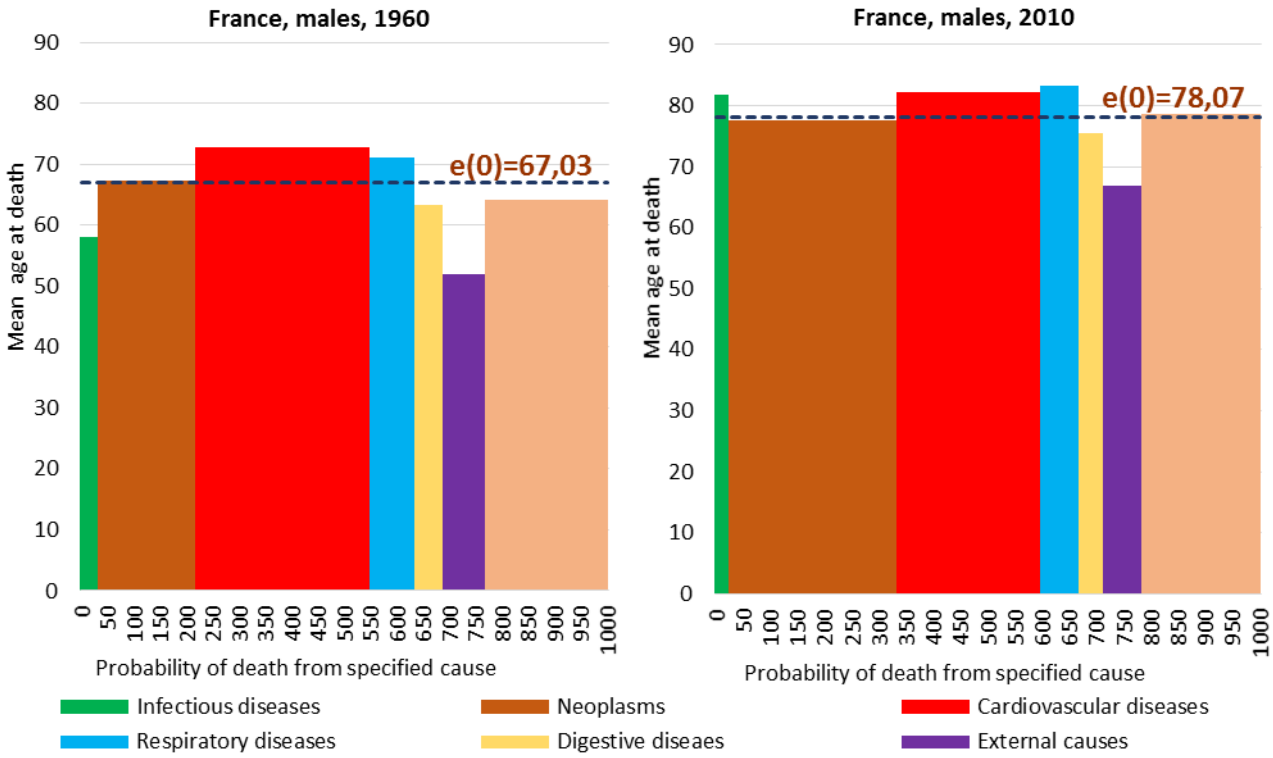

Figure 4. Distribution of the total time lived by a hypothetical cohort by the time lived by those who died from the large classes of causes of death. France, males, 1960 and 2010.

Note: The dotted line corresponds to the life expectancy at birth - e(0)

A comparison of the two graphs in Figure 4 shows that the proportion of deaths from circulatory diseases in the total hypothetical cohort declined from 33.1% to 26.4%, and that the individuals who nonetheless died from these diseases died later, with the mean age at death from these causes increasing by 9.4 years. While the rectangle corresponding to this cause of death became narrower and higher, its overall area actually decreased slightly—meaning that its share of the total shaded area decreased, as the area itself increased. The most important achievement was that the increase in the mean age of death from cardiovascular disease was strongly supported by the increase in the mean age of death from the pathologies that replaced these diseases as the cause of death. Not including cancer, the mean age of death from all major causes increased more than the mean age of death from cardiovascular diseases. The mean age of death from diseases of the respiratory and digestive system increased by more than 12 years, and the mean age of death from external causes rose by almost 15 years. Diseases of the circulatory system lost their primacy in the mean age of death, giving way to respiratory diseases. When we look at cancer mortality among men in 2010, we see that the risk of dying from cancer was higher than the risk of dying from diseases of the circulatory system. The mean age of death from cancer increased less than the mean age of death from cardiovascular disease between 1960 and 2010; nevertheless, the increase in the mean age of death from cancer over the period was very significant (8.4 years). In 2010, the mean age of death from cancer was much higher than the mean age of death from any other class of causes in 1960, including cardiovascular diseases. Thus, over the study period the

area of the cancer rectangle on the graph almost doubled, and exceeded the area of the cardiovascular disease rectangle. Paradoxically, it was precisely the growth in life expectancy of those who died from cancer that made the decisive contribution to the overall increase in life expectancy of the hypothetical cohort over the study period: in total, the cohort's life expectancy grew by 11 years.

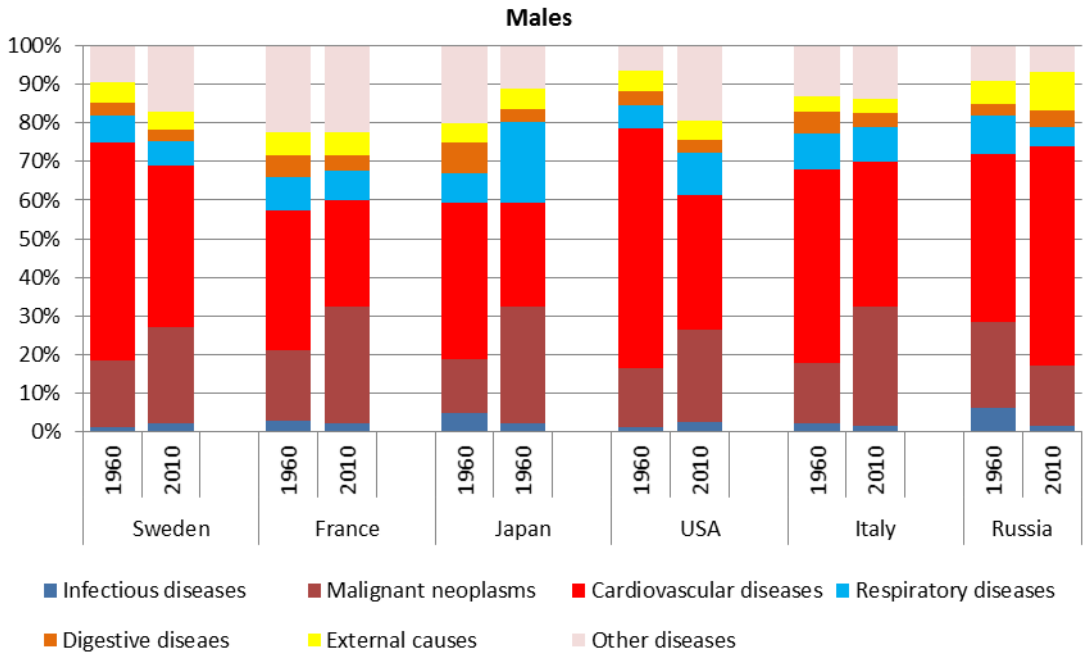

Figure 5. Distribution of the total time lived by a hypothetical generation by the time lived by those who died from large groups of causes of death in 1960 and 2010 in selected countries, males

The male population of France is not an exception among developed countries. In all these countries, both for men and women, the changes went in the same direction (Figures 5 and 6). While there are substantial differences between the countries shown in these figures (three European countries, the US, and Japan), they are more similar than different. We can see that the share of the total time lived by those who died from cardiovascular disease decreased, while the share of time lived by those who died from cancer and from "other diseases" increased – or as in the case of Japan, those who died from respiratory diseases increased, and in the case of the US, those who died both from "other diseases" and respiratory diseases increased. On the contrary, when we look at Russia, we see that these changes run in the opposite direction, and moreover that there is a conspicuous increase among men in the proportion of total time lived by those who died from external causes that is absent in other countries.

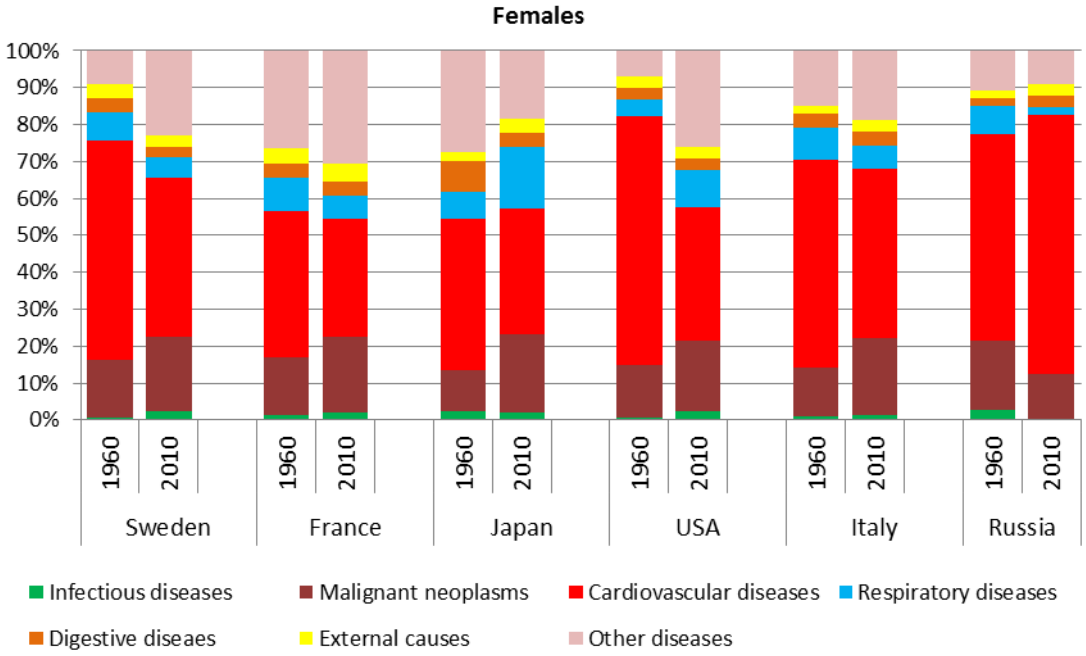

Figure 6. Distribution of the total time lived by a hypothetical generation by the time lived by those who died from large groups of causes of death in 1960 and 2010 in selected countries, females

The typical trend observed in the most developed countries (but not in Russia) led to a new cohorts' total lifetime distribution by lifetime of groups of those who die from different causes of death. It was the consequence of a significant increase in the mean age of death from all major classes of causes (Table 1). It is interesting that the rise in the mean age of death among those who died of cardiovascular diseases was, as a rule, not the largest of the improvements that occurred.

Table 1. Increase in the mean age of death in selected countries over 50 years (1960-2010), years

Cause of death	France	Italy	Sweden	USA	Japan	Russia
	Males					
Infectious and parasitic diseases	21.31	24.20	17.97	13.60	23.75	-8.39
Neoplasms	8.43	10.58	7.58	8.61	12.86	-2.47
Diseases of the circulatory system	9.39	8.82	6.78	7.38	10.46	-2.51
Respiratory diseases	12.15	18.70	6.14	14.53	19.89	4.66
Diseases of the digestive system	12.06	18.81	7.59	8.92	11.81	3.66
Other diseases	14.49	21.54	17.75	29.67	14.60	-2.10
External causes	14.86	16.69	12.48	7.35	20.35	2.62
All causes	**11.04**	**12.92**	**8.28**	**9.74**	**14.24**	**-0.59**
	Females					
Infectious and parasitic diseases	26.26	35.45	22.28	20.52	33.46	-6.33
Neoplasms	8.95	10.59	8.17	7.84	15.87	-4.55
Diseases of the circulatory system	10.35	10.83	8.01	6.27	14.83	0.85
Respiratory diseases	10.32	17.42	5.05	10.17	21.40	5.09
Diseases of the digestive system	16.76	24.39	8.68	10.53	16.10	5.75
Other diseases	14.05	20.91	20.01	28.32	15.79	5.76
External causes	12.75	16.75	6.82	2.90	23.81	1.42
All causes	**11.10**	**13.18**	**8.60**	**7.90**	**16.15**	**2.56**

If we leave out Russia, which will be discussed below, then such a significant increase in the mean age of death from each of the major groups of causes, and consequently from all causes taken together, signifies the realization of the "second epidemiological revolution" predicted by M. Terris, even though not as large-scale as the first.

But the "second" revolution can hardly be reduced to the "cardiovascular revolution" that is now so frequently cited as the main reason why mortality has continued to decline in recent years. Truly revolutionary changes can be observed when we look at all of the big four causes, and at most of the other causes of death. Thus, reductions in mortality from cardiovascular disease are not exceptional.

4. CHANGES IN MORTALITY OVER HALF A CENTURY IN RUSSIA AND IN FRANCE

We now turn to Russia, where, as we have already pointed out, the second epidemiological revolution has not yet taken place. What form does Russia's stagnation take, and in what areas are the missed opportunities the greatest?

First, let us consider the distinguishing features of changes in mortality in Russia over the past half-century.

We have seen that in France tremendous changes occurred between 1960 and 2010 in the distribution of the lifetime of the male generations according to time lived by those dying from different major causes of death. Some changes also took place in Russia. However, if in France these changes give reason to talk about a second epidemiological revolution, in Russia, on the contrary, they are more likely evidence of its absence.

To begin with, we compare the situations in the two countries with the help of the graphs in Figures 4 (France) and 7 (Russia).

The differences are immediately apparent. In Russia there is virtually no growth in height of the main columns which in France show significant growth; an expansion of the base of the rectangle corresponding to diseases of the circulatory system along with a narrowing of the base of the rectangle of neoplasms (in France it is the reverse); a significant expansion of the low column of external causes, which in France became somewhat narrower but much higher; and a narrowing and shortening of the column "other causes" - the exact opposite of what was observed in France. As a result, the sum of shaded areas (i.e., the total time lived by a fictive generation) on the Russian chart did not change, indicating total stagnation, while on the French chart it significantly increased, indicating a growth of life expectancy of 11 years.

The current (2010) picture for Russia is much worse than that for France fifty years ago (the upper part of figure 8), and its comparison with the picture for modern France (the lower part of the same figure) clearly speaks of a lost 50 years: whereas a second epidemiological revolution occurred in France, it did not occur in Russia.

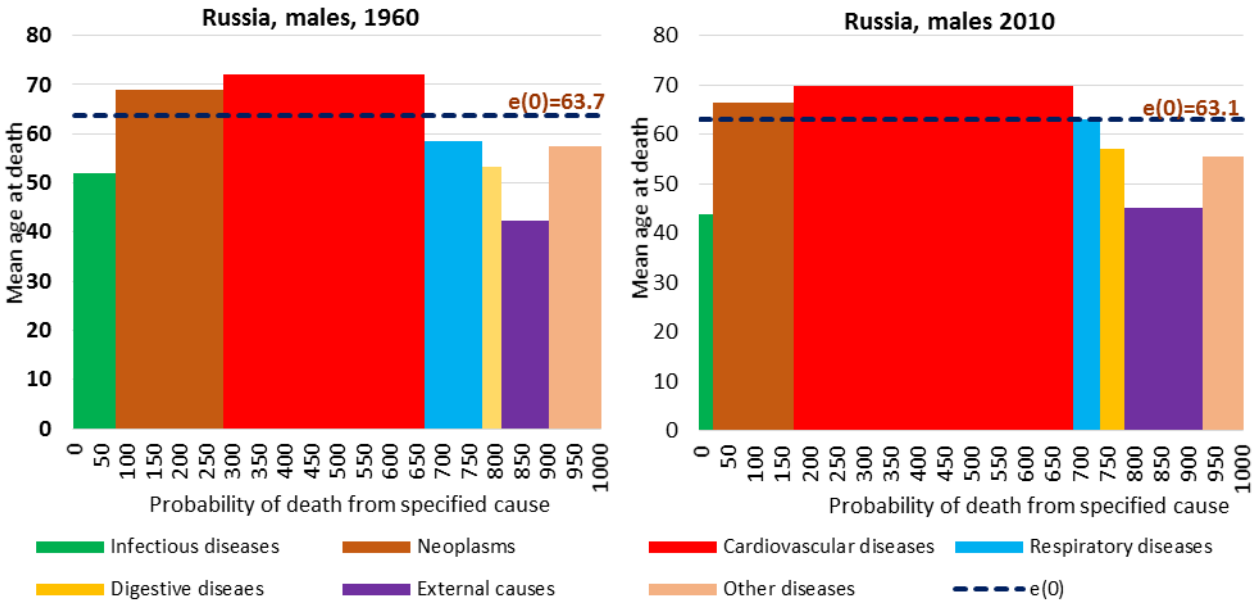

Figure 7. Distribution of the total time lived by a fictive generation according to the time lived by those who died from major classes of causes. Russia, males, 1960 and 2010

Note: The dotted line corresponds to the life expectancy at birth - e (0)

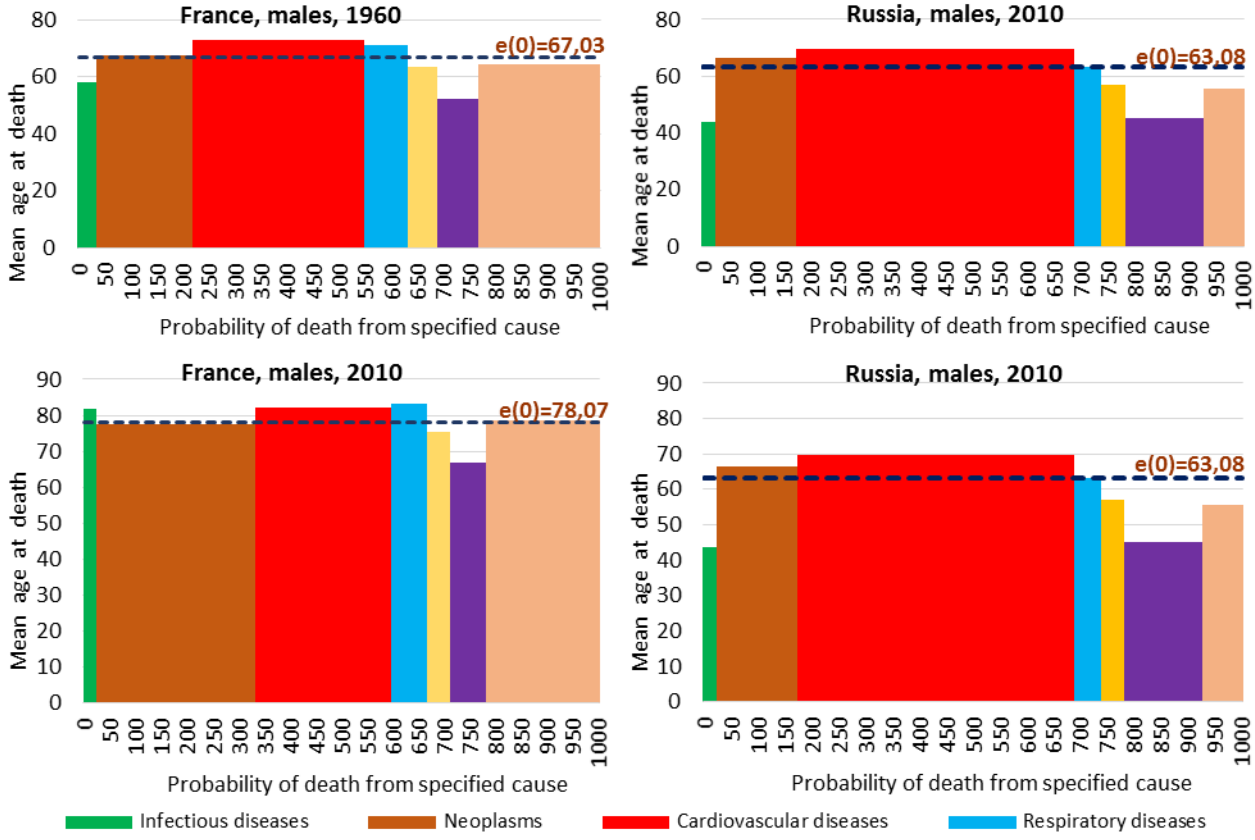

Figure 8. Distribution of the total time lived by a fictive generation according to the time lived by those who died from major classes of causes. France, males (1960 and 2010) and Russia (2010)

Note: The dotted line corresponds to the life expectancy at birth - e (0)

Let us try to examine the changes that have occurred in the two countries in more detail. For this we will also make use of the opportunities provided by the mortality tables by causes of death, which contain, in particular, data on the distribution of numbers of deaths by age and cause of death - the numbers d_{xi} (where *x* is age and *i* is the cause of death). These are so-called 'table numbers', independent of the actual age structure.

Let us compare the matrices of changes in d_{xi} in the two countries $({}_{2010}d_{xi} - {}_{1960}d_{xi})$ (Table 2-5).

The negative values in the table signify a reduction in the number of deaths between 1960 and 2010, while the positive values signify an increase.

Let us consider first the changes that interest us from the point of view of age.

Table 2. Changes in the numbers of deaths by age groups and causes of death between 1960 and 2010 $({}_{2010}d_{xi} - {}_{1960}d_{xi})$. The male population of France, per 100,000 deaths

Age	Infectious and parasitic diseases	Neoplasms	Diseases of the circulatory system	Respiratory diseases	Digestive diseases	External causes	Other diseases	All causes
0	-73	-6	-20	-291	-72	-54	-2165	**-2681**
1-4	-38	-43	-13	-69	-15	-96	-159	**-434**
5-9	-11	-35	-6	-9	-9	-68	-31	**-169**
10-14	-4	-25	-7	-9	-8	-58	-33	**-144**
15-19	-7	-31	-17	-11	-3	-149	-29	**-247**
20-24	-16	-29	-19	-10	-7	-138	-33	**-251**
25-29	-32	-37	-36	-8	-23	-212	-29	**-377**
30-34	-79	-44	-61	-19	-41	-197	-75	**-516**
35-39	-107	-54	-104	-40	-69	-158	-68	**-600**
40-44	-145	-60	-171	-48	-106	-186	-85	**-802**
45-49	-201	-116	-380	-95	-200	-220	-166	**-1378**
50-54	-273	-65	-689	-187	-327	-283	-272	**-2096**
55-59	-317	-41	-1259	-261	-439	-335	-405	**-3057**
60-64	-351	-99	-2005	-408	-514	-324	-696	**-4397**
65-69	-296	353	-2956	-535	-526	-217	-1006	**-5184**
70-74	-218	852	-3754	-692	-399	-118	-1276	**-5605**
75-79	-40	2034	-3362	-671	-76	96	-1108	**-3127**
80-84	198	3278	-727	-136	248	396	-31	**3226**
85+	805	6929	8903	2115	1100	1686	6301	**27839**
Total	**-1205**	**12760**	**-6683**	**-1385**	**-1486**	**-634**	**-1367**	**0**

On the right, in the summary column of the French table for males, all of the figures except the last two (aged 80 years and older) are negative. This means that at all ages up to 80 years, the total number of deaths decreased: out of every 100,000 deaths, more than 31,000 shifted to the oldest age groups.[3]

[3] Note that the current estimates of the numbers d_{xi} for older ages may not be entirely accurate, due to the traditional calculation of indices for the "open" interval of 85 years and older, which was justified when this interval had a relatively small number of deaths. When it began to grow, a more detailed elaboration was required of the data within this interval. Now some developed countries (not yet all) are shifting to the elaboration of mortality indices by cause of death using separate groups for ages 85-89, 90-94, 95+, which will perhaps in the future lead to a refinement of estimates existing today.

Table 3. Changes in the numbers of deaths by age groups and causes of death between 1960 and 2010 ($_{2010}d_{xi}$ - $_{1960}d_{xi}$). The male population of Russia, per 100,000 deaths

Age	Infectious and parasitic diseases	Neoplasms	Diseases of the circulatory system	Respiratory diseases	Digestive diseases	External causes	Other diseases	All causes
0	-416	-2	12	-1506	-541	-17	-674	**-3144**
1-4	-297	-10	0	-287	-46	-92	-77	**-808**
5-9	-83	-20	-16	-35	-13	-182	-35	**-384**
10-14	-47	-11	-14	-20	-10	-99	-22	**-223**
15-19	-41	-17	-35	-9	-11	-52	-33	**-197**
20-24	-74	-19	4	-5	3	136	-6	**40**
25-29	-15	-23	122	37	75	375	83	**653**
30-34	27	-70	290	91	181	662	167	**1349**
35-39	-107	-56	520	106	240	439	190	**1331**
40-44	-164	-302	651	52	277	811	218	**1541**
45-49	-330	-217	1193	60	301	596	207	**1810**
50-54	-376	-452	1460	-105	318	895	234	**1974**
55-59	-685	-459	1935	-228	283	498	151	**1495**
60-64	-271	296	1014	-434	354	742	-325	**1375**
65-69	-385	139	1103	-562	181	396	-569	**303**
70-74	-480	-297	1456	-668	90	204	-788	**-483**
75-79	-489	-846	1668	-654	-28	25	-721	**-1046**
80-84	-452	-1315	872	-750	-87	-93	-205	**-2030**
85+	-511	-2006	498	-959	-174	-186	-219	**-3557**
Total	**-5197**	**-5687**	**12734**	**-5876**	**1391**	**5058**	**-2424**	**0**

Table 4. Changes in the numbers of deaths by age groups and causes of death between 1960 and 2010 ($_{2010}d_{xi}$ - $_{1960}d_{xi}$). The female population of France, per 100,000 deaths

Age	Infectious and parasitic diseases	Neoplasms	Diseases of the circulatory system	Respiratory diseases	Digestive diseases	External causes	Other diseases	All causes
0	-62	-6	-17	-212	-46	-45	-1635	**-2024**
1-4	-35	-32	-6	-59	-13	-64	-139	**-349**
5-9	-11	-25	-6	-9	-6	-33	-36	**-127**
10-14	-8	-20	-11	-8	-5	-15	-20	**-87**
15-19	-8	-22	-12	-9	-6	-50	-35	**-141**
20-24	-22	-36	-25	-10	-6	-55	-62	**-216**
25-29	-37	-25	-32	-15	-20	-51	-78	**-259**
30-34	-56	-52	-45	-15	-39	-44	-100	**-352**
35-39	-65	-122	-67	-21	-69	-39	-113	**-496**
40-44	-58	-148	-111	-28	-108	-11	-122	**-586**
45-49	-59	-236	-230	-38	-136	-26	-135	**-860**
50-54	-64	-220	-448	-51	-200	-23	-181	**-1187**
55-59	-69	-213	-752	-76	-239	-65	-306	**-1719**
60-64	-78	-332	-1378	-181	-283	-88	-508	**-2848**
65-69	-94	-342	-2612	-377	-319	-125	-959	**-4827**
70-74	-86	-296	-4192	-689	-303	-176	-1495	**-7237**
75-79	-16	108	-5548	-1085	-166	-216	-1893	**-8818**
80-84	155	1199	-4113	-1177	92	-102	-1333	**-5279**
85+	1154	6214	12978	1222	1815	1905	12125	**37412**
Total	**478**	**5393**	**-6626**	**-2838**	**-59**	**677**	**2975**	**0**

Table 5. Changes in the numbers of deaths by age groups and causes of death between 1960 and 2010 ($_{2010}d_{xi}$ - $_{1960}d_{xi}$). The female population of Russia, per 100,000 deaths

Age	Infectious and parasitic diseases	Neoplasms	Diseases of the circulatory system	Respiratory diseases	Digestive diseases	External causes	Other diseases	All causes
0	-379	-1	10	-1195	-466	-14	-511	**-2557**
1-4	-291	-13	0	-285	-38	-63	-83	**-773**
5-9	-77	-9	-19	-33	-10	-66	-33	**-247**
10-14	-47	-9	-21	-18	-7	-24	-23	**-149**
15-19	-56	-12	-35	-8	-8	-6	-35	**-161**
20-24	-78	-14	-36	-4	3	27	-70	**-171**
25-29	-46	-11	-17	10	38	129	-77	**26**
30-34	-27	-49	14	27	81	182	-37	**190**
35-39	-97	-19	59	20	117	164	-67	**177**
40-44	-63	-191	87	10	141	213	17	**215**
45-49	-116	-175	196	6	158	177	0	**246**
50-54	-106	-210	178	-40	201	233	50	**306**
55-59	-172	-301	596	-58	304	205	62	**636**
60-64	-73	566	-451	-290	274	249	-220	**55**
65-69	-124	422	74	-414	194	195	-441	**-94**
70-74	-214	1	604	-689	132	125	-856	**-897**
75-79	-275	-624	3004	-834	111	83	-885	**580**
80-84	-327	-1457	4087	-1008	38	11	-15	**1328**
85+	-521	-3394	6283	-1652	-149	-100	821	**1288**
Total	**-3090**	**-5501**	**14612**	**-6454**	**1115**	**1719**	**-2402**	**0**

In the Russian table, there were fewer changes. The negative numbers refer to ages up to 20 and over 70. Among these groups the number of deaths decreased, although these declines tended to be small. But the number of deaths increased quite significantly among people between ages 20 and 70. Nearly 12,000 out of every 100,000 deaths shifted into these age groups.

In the French Table for females, in the right column all the values up to age 85 are marked with a "minus" sign. Here the shift of deaths to an older age is more noticeable than in males, with more than 37,000 out of every 100,000 deaths shifting to the group beyond age 85. The Russian table for females, even more than the one for males, is characterized by a long-term stagnation of the mortality situation. Changes are hardly noticeable, but where they are, they are not always favourable. Negative values, indicating a reduction in the number of deaths, can be found in the right column only up to the age of 25 years and between 65-74 years. In the older age groups (75 years and older) there was a shift of only (in rounded figures) 3,200 deaths per 100,000, of which fewer than 1,300 per 100,000 were to the age group of 85 and older. At the same time, there was an increase of 1,850 for every 100,000 deaths in middle age (from 25 to 65 years). The whole picture is clearly reflected in Figure 9.

Let us now look at how the life-table numbers of deaths varied in accordance with the major classes of causes of death.

In the last, summary line of the French table for males, all numbers except for the number of deaths from cancer are negative, and the whole increase in deaths from cancer occurred at ages over 65, and especially over 75, years. In the last line of the Russian table the number of deaths from cancer is negative, and, in contrast to France, their largest decline occurred precisely in the

oldest age groups. On the other hand, in France the number of deaths from cancer (12,760 per 100,000) increased by about as much as in Russia the number of deaths from diseases of the circulatory system (12,734 per 100,000). The only difference is that in Russia nearly 90% of this increase came from deaths before age of 80, including 62% between ages of 35 and 70 ears.

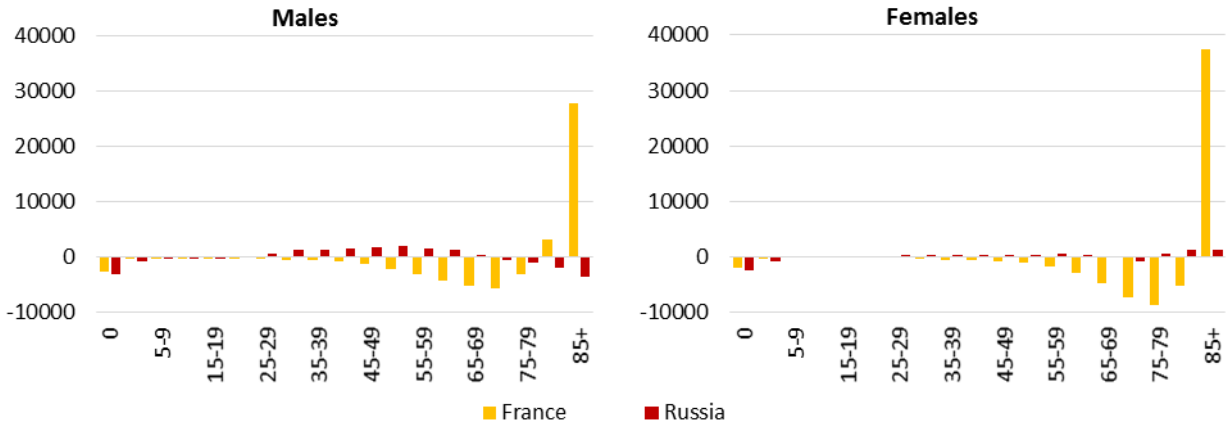

Figure 9. Changes in the table numbers of deaths (d_x) for 1960-2010, by age groups in France and Russia, per 100,000 deaths

We will now address the issue of external causes of death. Among the French male population, the numbers of deaths from external causes declined overall, increasing only at ages 75+, and especially at ages 85+. Among the Russian male population, the numbers of deaths from external causes significantly increased, with growth occurring in all age groups from 20 to 80. Among men between ages 20 and 45, the increase in deaths from these causes was greater than the increase in deaths from diseases of the circulatory system.

The nature of the differences in the last lines of the French and Russian tables for females is about the same as for men. The changes go somewhat more often not in the opposite, but in the same direction, although the scale of changes is different. For example, the number of deaths from external causes among women increased both in Russia and in France, but in France the increase was significantly lower (see also figure 10).

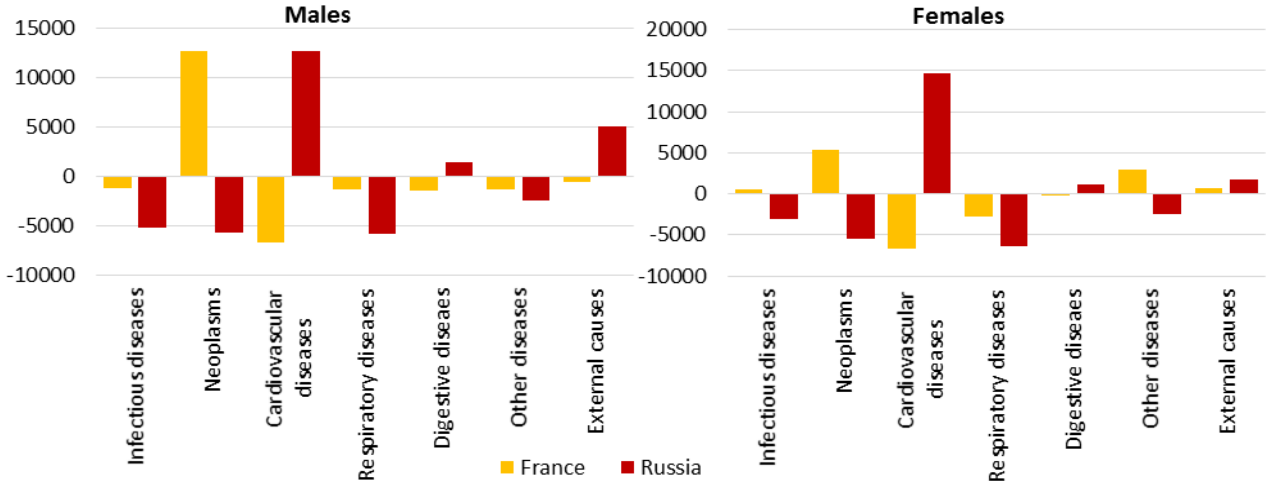

Figure 10. Changes in the table numbers of deaths (d_x) for 1960-2010, by major groups of causes of death in France and Russia, per 100,000 deaths

To briefly summarize the results of our comparative analysis of changes in mortality in the two countries, we find that while France, like most developed countries, has made significant progress in the shifting of death from all causes to old age, the situation in Russia seems to have been hopelessly stuck in place for half a century.

5. WHERE IS RUSSIA FALLING BEHIND?

Were there any changes for the better in the last two decades of the study period? A negative answer to this question has already been given in our previous comparison of standardized mortality rates in Russia and in the EU-15 countries. In order to get a more detailed understanding of the trends in the past decade, we will continue this comparison, analyzing the evolution of age mortality curves of major groups of non-communicable causes of death: cardiovascular diseases, neoplasms and external causes. It is in persisting and even increasing differences between the curves in the EU-15 countries and in Russia that lies the key to understanding why Russia is lagging behind.

Let us start with the leading cause of death in Russia and (at least until recently) in the EU-15: diseases of the circulatory system.

In Russia, the number of male deaths from this cause begins to increase rapidly after reaching the age of 25. The majority of deaths from these causes is concentrated at the age of 70-75 years, after which their share even goes down (Figure 11). In the countries of Western Europe the growth starts later (Russian indices, fixed at 25 years, there are not reached even by age 40) and the curves rise far less sharply, but this increase lasts until a very late age, so that the peak of deaths from circulatory diseases is not accounted for by those aged 70-75 years, as in Russia, but is closer to 90 years. Among females the age distribution of deaths from diseases of the circulatory system is more similar to Western Europe's, but is nonetheless shifted far toward younger ages.

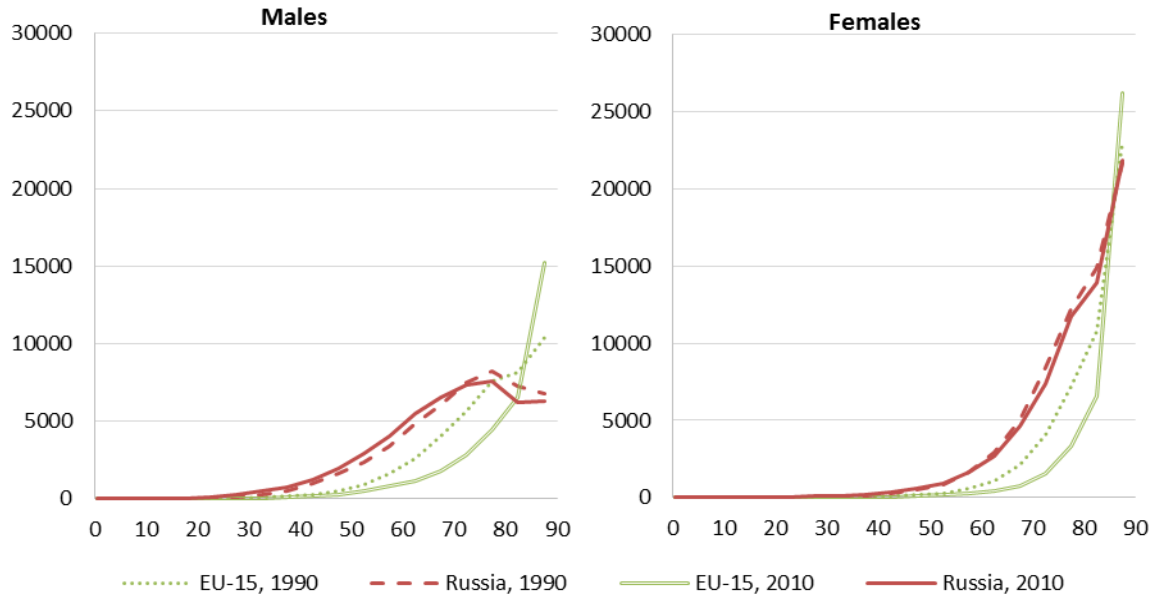

Figure 11. Age distribution of table numbers of deaths (d_x) from diseases of the circulatory system

The age distribution of deaths from cancer (Figure 12) looks somewhat different. In this case to the peak number of deaths is reached at younger ages in Russia than in the EU-15 countries, but the age of the onset of growth as well as the steepness of the curve until ages 60-65 are about the same in Russia and in the EU-15 countries. At older ages, the Russian and the western European curves diverge considerably, but the overall losses from cancer vary much less than the losses from cardiovascular diseases.

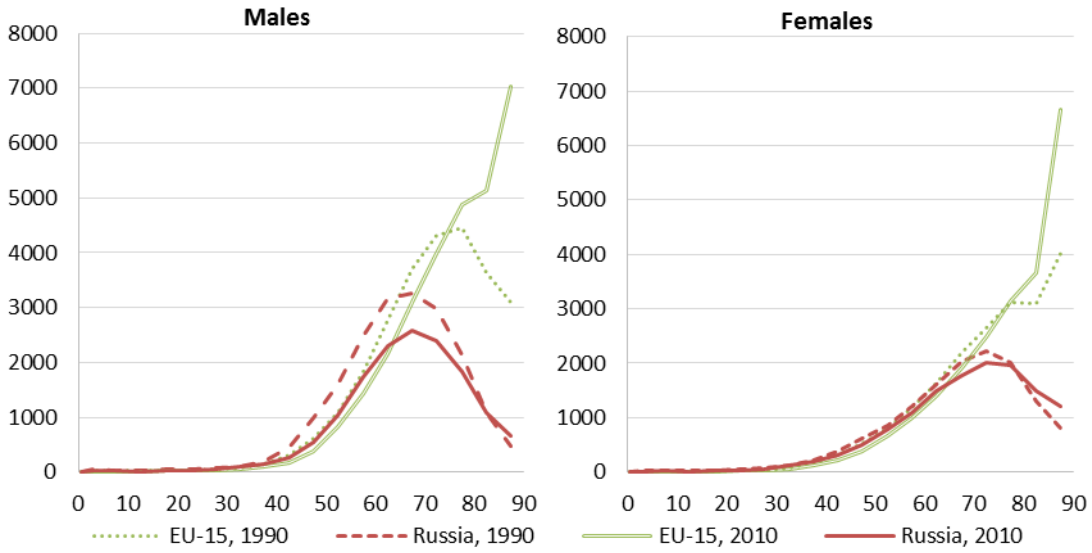

Figure 12. Age distribution of table numbers of deaths (d_x) from neoplasms

But the differences in the age distributions of deaths from external causes are particularly striking (Figure 13).

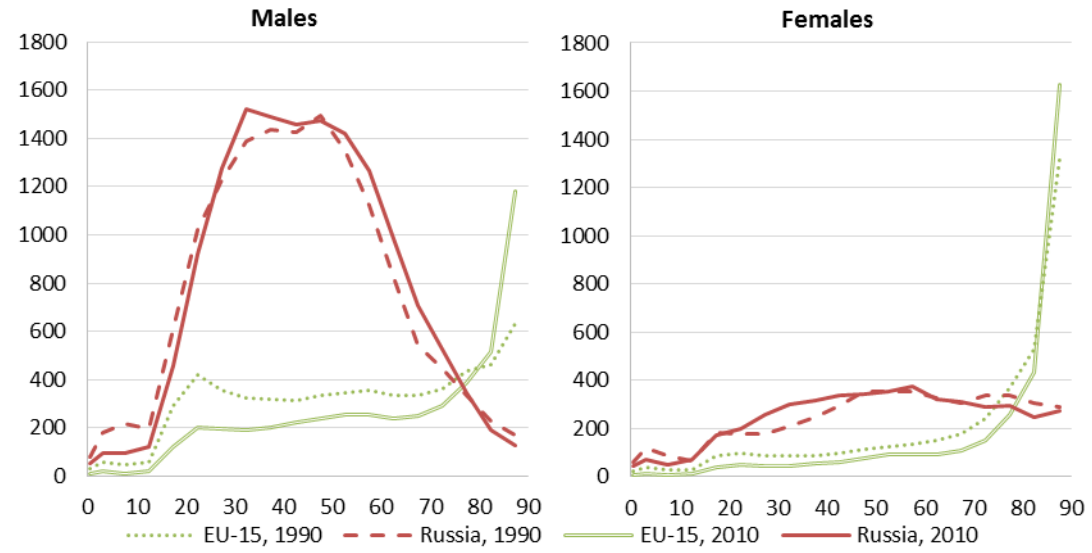

Figure 13. Age distribution of table numbers of deaths (d_x) from external causes

Here the differences between Russia and the EU-15 countries are exceptionally large, especially among males. Looking at these figures, it is possible to get the impression that Russia and western European countries belong to different civilizations. The mortality of adult males from

external causes of death in Russia is several times higher than in the countries being compared. Accordingly, the losses from this kind of mortality are extremely high.

Figures 11-13 also allow us to judge about the changes in the age distribution of the numbers of deaths over the two most recent decades (between 1990 and 2010). The curves for the EU-15 countries show a more or less pronounced tendency to shift down and to the right, "caving in" toward the lower right corner of the chart. When comparing the curves for 1990 and 2010, it is clear that the right end of the curves for 2010 move steadily upwards, indicating a shifting of an increasing number of deaths from each of the classes of causes considered to the very highest ages. These changes are most vividly apparent among males, especially in the age distribution of deaths from cancer, where there was a fundamental change in the direction of the curve in older age groups, although quite serious changes also occurred in the distribution of male deaths from cardiovascular diseases and external causes. Among females, the trend is the same, but less pronounced, possibly because such changes had occurred among them earlier, before 2010.

The Russian age curves of mortality, especially for males, generally show no shift towards the lower right corner of the graph that would indicate that a second epidemiological revolution had taken place.

6. "EXCESS MORTALITY" AND ITS DISTRIBUTION BY AGE AND CAUSES

As we did in comparing changes in mortality by cause of death in Russia and France over a 50-year period, we can take a closer look at the current differences in mortality rates between Russia and the EU-15 countries with the help of matrices of differences, or "diagnostic tables" (such tables were first presented in [Vishnevsky, Shkolnikov 1997: 78-81]). These tables allow us to compare the distributions of deaths by age and cause of death (the numbers d_{xi}), and to highlight the 'age-cause-specific risk groups' for the population of Russia, specifying for each group the excess number of deaths at age x from cause ***i*** (d_{xi}^{R} - d_{xi}^{EU-15}) compared to the corresponding figure for the EU-15.

We restrict ourselves to examining deaths that occurred before the age of 70 and consider as premature Russian losses only those deaths up to this age which are in excess in comparison with Western European countries (EU-15). Our analysis will consist of an evaluation of the contribution of each class of causes to the total number of such losses for the five-year age groups, and an identification of the major 'age-cause-specific groups' responsible for these losses.

Tables 6 and 7 show the excess number of deaths for all 'age-cause-specific groups' represented in these tables for males and females in 2010.

The number in the lower right corner of the table shows that in Russia in 2010 out of every 100,000 male deaths of all ages more than 46 000, and out of every 100,000 female deaths more than 21,000, could be considered in excess in comparison with the EU-15 countries; in the EU-15 these deaths would have come after the age of 70. The summary lines of the tables show that about 80% of the excess deaths (79.9% of males and 80.6% of females) were attributable to two classes of causes of death: circulatory system diseases and external causes. In general, of course, cardiovascular diseases are in first place, but before the age of 50 for men and 45 for women this

is not the case. Until these ages, the main source of our excess mortality is external causes of death. The contribution of all other causes of death is much smaller.

Table 6. Excess table numbers (d_{xi}^{R}-d_{xi}^{EU-15}) of male deaths up to 70 in Russia in comparison with the EU-15 per 100,000 males dying at all ages and from all causes, 2010

Age	Infectious and parasitic diseases	Neoplasms	Diseases of the circulatory system	Respiratory diseases	Diseases of the digestive system	Other diseases	External causes	All causes
0	99	6	6	176	6	936	97	**1326**
1-4	28	19	3	58	4	97	154	**362**
5-9	6	13	3	11	2	45	160	**240**
10-14	3	10	5	7	2	26	171	**225**
15-19	16	18	29	18	8	63	685	**837**
20-24	82	22	117	41	29	156	1603	**2049**
25-29	147	27	207	63	57	193	1744	**2437**
30-34	190	35	375	95	100	197	1752	**2742**
35-39	242	78	685	168	145	217	1845	**3380**
40-44	289	158	1225	248	179	258	1991	**4348**
45-49	298	317	1948	360	191	275	2013	**5402**
50-54	254	406	2762	442	176	243	1806	**6089**
55-59	196	483	3570	492	131	115	1474	**6462**
60-64	111	47	4403	507	59	-65	994	**6056**
65-70	2	-803	4649	386	-26	-353	534	**4390**
Total	**1964**	**836**	**19987**	**3068**	**1063**	**2402**	**17023**	**46344**

The number of excess deaths:	More than 1000	500-1000	300-500	100-300	50-100	Less than 50

Table 7. Excess table numbers (d_{xi}^{R}-d_{xi}^{EU-15}) of female deaths up to 70 in Russia in comparison with the EU-15 per 100,000 females dying at all ages and from all causes, 2010

Age	Infectious and parasitic diseases	Neoplasms	Diseases of the circulatory system	Respiratory diseases	Diseases of the digestive system	Other diseases	External causes	All causes
0	71	5	6	139	7	659	83	**970**
1-4	21	17	3	58	2	75	109	**284**
5-9	5	9	4	9	2	31	72	**133**
10-14	3	9	2	4	1	18	70	**106**
15-19	10	14	12	8	4	38	216	**302**
20-24	23	21	26	15	9	60	285	**440**
25-29	31	31	51	19	22	65	300	**518**
30-34	36	60	100	29	31	77	320	**653**
35-39	36	89	171	39	46	81	362	**825**
40-44	41	133	327	51	68	84	408	**1112**
45-49	35	191	613	73	83	107	466	**1568**
50-54	30	200	1117	73	109	119	504	**2152**
55-59	20	188	1981	71	162	124	506	**3051**
60-64	0	41	3065	43	122	44	380	**3696**
65-70	-28	-171	5182	30	102	-72	312	**5355**
Total	**333**	**837**	**12659**	**662**	**772**	**1510**	**4393**	**21165**

The number of excess deaths:	More than 1000	500-1000	300-500	100-300	50-100	Less than 50

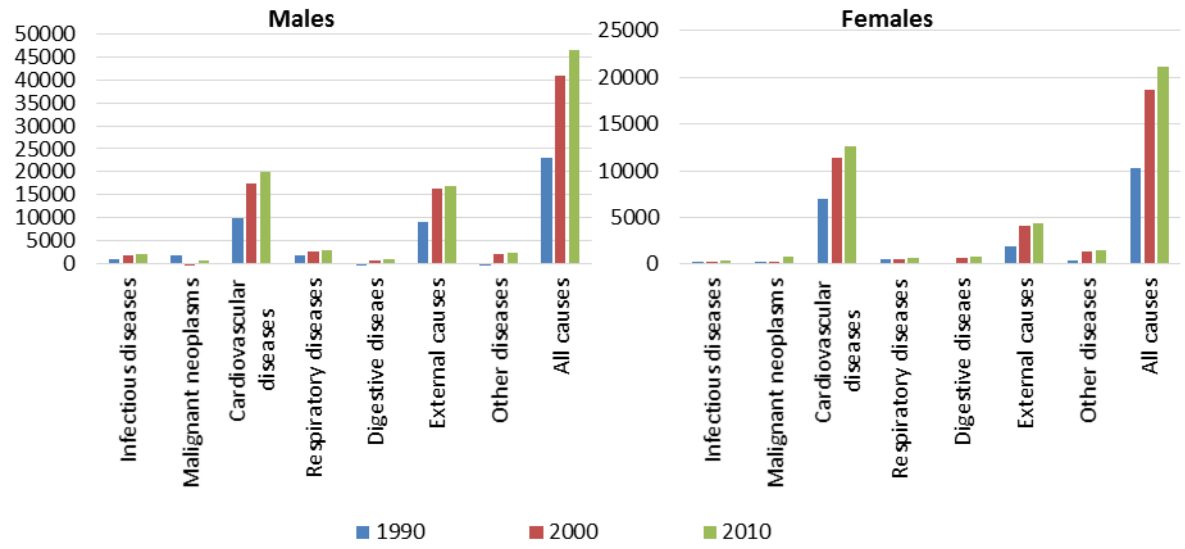

Figure 14. Excess table numbers of deaths from all causes (d_i) under the age of 70 years, per 100 deaths at all ages in Russia in comparison with the average values for the EU-15 countries, 1990, 2000 and 2010

Such "diagnostic tables" were also drawn up for the years 1990 and 2000 (see the appendix). A generalised picture of the extent to which Russia lagged behind the EU-15 countries due to differences in mortality from various causes of death on three dates (1990, 2000, and 2010) is shown in Figure 14. On the graph, the overall expansion of the lag is clearly visible, as well as the unacceptably high contribution to this lag of external causes of death, which almost compete with diseases of the circulatory system among males.

7. CAUSES OF DEATH AND LIFE EXPECTANCY

Excess mortality from some of the major causes of death at relatively young ages explains why life expectancy in Russia lags behind life expectancy in the EU-15 countries. In 2010, the difference was 15.4 years for males and 8.9 years for females. The decomposition of this difference by Andreev's method [Andreev 1982] gives an indication of the contribution of the major causes of death to this lag (Figures 15 and 16).

As expected, the main contribution to Russia's lag behind the EU-15 among both males and females comes from the same two classes of causes: cardiovascular diseases and external causes of death. Higher mortality from these two classes of causes accounts for 77% of Russia's lag in the life expectancy of males and even more (89%) for that of females. What's more, if we consider the differences in mortality throughout the age scale, the contribution of cardiovascular disease is substantially higher than of external causes. But if we limit ourselves only to the age of 70 years (Figure 16 and Table 8), the prevalence of diseases of the circulatory system becomes much less pronounced. This is especially true for males: the contribution of mortality from external causes to Russia's overall gap relative to the EU-15 is close to the contribution of diseases of the circulatory system (25.9% and 50.9% for all ages, but 31.2% and 38.6% for those under age 70).

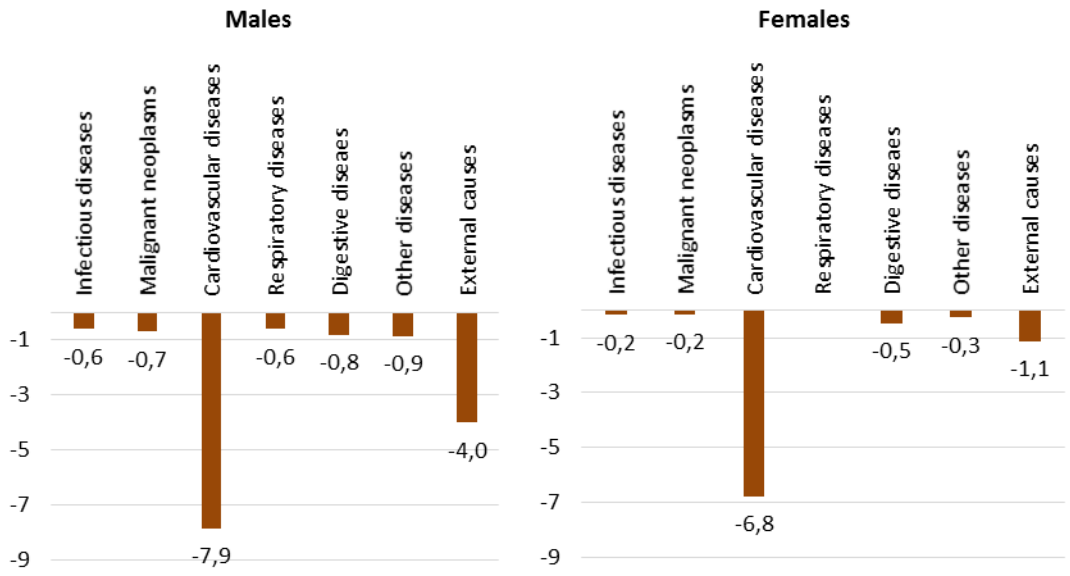

Figure 15. Total losses in life expectancy in Russia compared to the EU-15 as the result of differences in mortality from the major causes of death, 2010, years

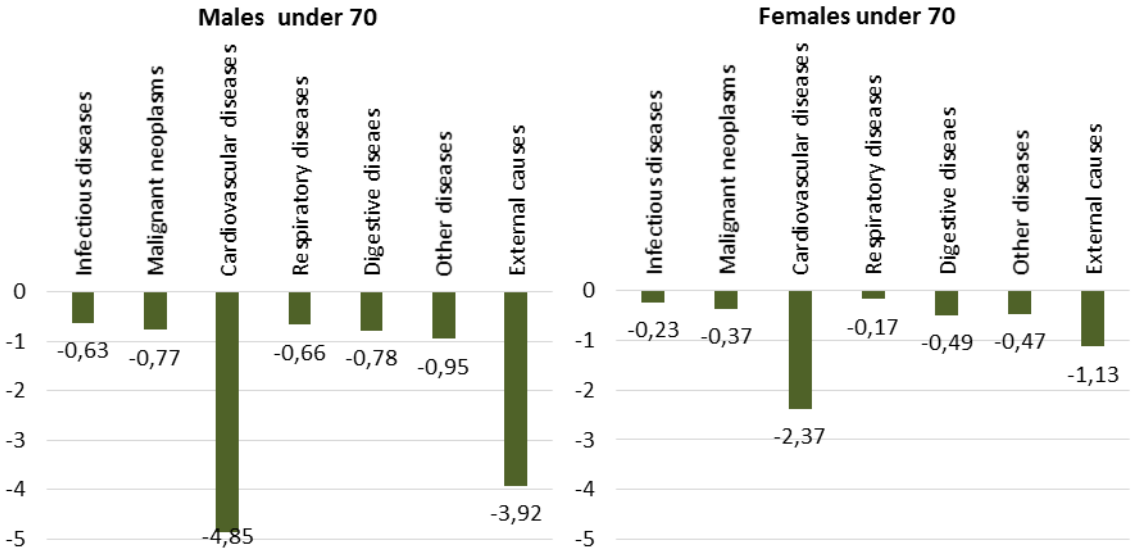

Figure 16. Losses in life expectancy in Russia under age 70 compared to the EU-15 countries as a result of differences in mortality from the major causes of death, 2010, years

Table 8. Contribution of higher mortality from cardiovascular diseases and external causes of death in Russia's overall life expectancy lag behind the EU-15, 2010, %

Cause of death	All ages		Under the age of 70 years	
	males	females	males	females
Diseases of the circulatory system	50.9	76.2	38.6	45.2
External causes of death	25.9	12.7	31.2	21.6
Total	76.8	88.9	69.8	66.8

CONCLUSION

In the first half of the 20th century, there was an unprecedented increase in life expectancy in developed countries. Despite the turmoil of two world wars, post-war devastation, and economic and social crises, life expectancy in the European countries for which data are available increased among both males and females by 20-25 years or more between 1900 and 1960 (Table 9). In Russia, life expectancy doubled over that period. After a thousand years of stagnation in life expectancy, such changes cannot be called anything other than revolutionary.

Table 9. Increase in life expectancy at birth in some countries, years

Country	Males		Females	
	1900-1960	1960-2010	1900-1960	1960-2010
Belgium	21.9	10.2	24.3	9.9
Denmark	20.2	5.6	20.5	6.5
Italy	25.1	11.9	29.9	12.3
Netherlands	24.4	7.1	25.5	7.5
Norway	19.6	7.5	20.7	7.5
Finland	25.1	11.3	29.2	11.2
France	23.8	10.5	26.8	10.7
Switzerland	22.5	10.7	25.3	10.0
Sweden	20.4	8.5	21.3	8.8
Russia	34.0	-0.3	40.3	2.9

After this dramatic surge in life expectancy, the more modest gains in life expectancy made in those same countries over the next half century (between 1960 and 2010) do not look particularly large: during this “second epidemiological revolution” life expectancy rose 10-12 years at most. But even if we use the word "revolution" only as a metaphor, and keep in mind that this trend is a continuation of the trends that began earlier, the achievements of the past 50 years look quite significant. They are all the more significant given that in the 1950s-1960s gains in life expectancy in many developed countries had slowed down, if not stopped altogether, leading many observers at the time to speculate that the options for further reducing mortality had been exhausted. These fears were not confirmed. While not of the same magnitude as the first, the second epidemiological revolution led to marked improvements in life expectancy in most industrialised, urbanised countries.

Russia, unfortunately, is watching this revolution from the outside, without taking any part in it. The question of why similar gains have not been realised in Russia is beyond the scope of this article. Our objective was to show which causes of death contribute the most to the gap in life expectancy between Russia and other developed countries. This knowledge is important, because otherwise it is impossible to identify the main weak points and to prioritise strategies for reducing mortality.

Our analysis shows that Russia still has roughly the same structure of causes of death as it did on the eve of the second epidemiological revolution. While the details of this structure—which we could not delve into given the scope of a single article—are not identical, the main features remain. It would not be an exaggeration to say that the gap between life expectancy in Russia and in other countries that are confidently following the path of the second epidemiological revolution is primarily attributable to our inability to solve two key challenges: to significantly shift mortality

from cardiovascular diseases to later ages and to drastically reduce the numbers of deaths from external causes.

ACKNOWLEDGMENTS

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ANNEX

Table A-1. Excess table numbers (d_{xi}^{R}-d_{xi}^{EU-15}) of male deaths up to 70 in Russia in comparison with the EU-15 per 100,000 males dying at all ages and from all causes, 1990

Age x	Infectious and parasitic diseases	Neoplasms	Diseases of the circulatory system	Respiratory diseases	Diseases of the digestive system	Other diseases	External causes	**All causes**
0	126	5	-2	244	7	672	48	**1100**
1-4	24	22	-4	56	3	34	124	**260**
5-9	4	18	-2	9	1	27	167	**224**
10-14	2	10	-2	1	2	8	143	**164**
15-19	5	18	14	9	6	5	316	**375**
20-24	13	14	21	8	10	-15	603	**654**
25-29	31	20	63	3	9	-67	876	**934**
30-34	56	30	165	14	8	-59	**1064**	**1277**
35-39	88	60	355	28	1	-32	**1118**	**1619**
40-44	101	145	665	60	6	2	**1116**	**2094**
45-49	127	375	**1107**	143	2	9	**1164**	**2928**
50-54	129	526	**1431**	212	-38	-49	**1005**	**3216**
55-59	108	657	**1781**	345	-90	-133	767	**3437**
60-64	75	398	**2234**	378	-92	-245	488	**3236**
65-70	28	-432	**2030**	226	-126	-466	209	**1468**
Total	**916**	**1866**	**9856**	**1737**	**-291**	**-307**	**9209**	**22985**

The number of excess deaths**:**	**More than 1000**	**500-1000**	**300-500**	**100-300**	**50-100**	**Less than 50**

Table A-2. Excess table numbers (d_{xi}^{R}-d_{xi}^{EU-15}) of female deaths up to 70 in Russia in comparison with the EU-15 per 100,000 females dying at all ages and from all causes, 1990

Age x	Infectious and parasitic diseases	Neoplasms	Diseases of the circulatory system	Respiratory diseases	Diseases of the digestive system	Other diseases	External causes	**All causes**
0	110	7	-1	189	3	419	41	**766**
1-4	21	17	-5	45	2	37	84	**202**
5-9	1	14	0	5	0	20	56	**96**
10-14	1	10	-3	3	2	10	35	**58**
15-19	2	13	6	4	4	28	96	**153**
20-24	8	19	11	5	7	28	80	**158**
25-29	8	25	14	3	2	8	92	**152**
30-34	8	34	27	4	0	20	125	**218**
35-39	12	37	55	8	-5	32	162	**300**
40-44	11	78	149	13	-6	34	193	**472**
45-49	10	100	322	27	-12	42	241	**730**
50-54	8	63	570	33	-8	28	230	**924**
55-59	6	29	**1095**	55	5	3	218	**1411**
60-64	0	-23	**1823**	48	6	-79	178	**1954**
65-70	-14	-176	**2897**	51	9	-262	127	**2632**
Total	**192**	**247**	**6961**	**492**	**10**	**367**	**1958**	**10227**

The number of excess deaths**:**	**More than 1000**	**500-1000**	**300-500**	**100-300**	**50-100**	**Less than 50**

Table A-3. Excess table numbers (d_{xi}^{R}-d_{xi}^{EU-15}) of male deaths up to 70 in Russia in comparison with the EU-15 per 100,000 males dying at all ages and from all causes, 2000

Age x	Infectious and parasitic diseases	Neoplasms	Diseases of the circulatory system	Respiratory diseases	Diseases of the digestive system	Other diseases	External causes	**All causes**
0	92	6	2	170	5	811	91	**1178**
1-4	24	14	1	56	3	87	143	**329**
5-9	6	9	1	10	2	40	147	**216**
10-14	2	8	4	5	2	22	153	**196**
15-19	15	12	26	15	8	50	586	**713**
20-24	80	16	112	38	29	133	**1471**	**1879**
25-29	142	20	201	61	55	163	**1644**	**2287**
30-34	178	28	366	92	93	165	**1682**	**2604**
35-39	222	57	659	162	128	183	**1784**	**3194**
40-44	284	73	**1148**	238	147	227	**1928**	**4044**
45-49	309	158	**1814**	346	153	265	**1967**	**5011**
50-54	265	235	**2571**	426	161	278	**1787**	**5722**
55-59	204	291	**3235**	464	118	174	**1459**	**5946**
60-64	115	-196	**3753**	427	9	-28	959	**5039**
65-70	2	-1191	**3493**	203	-113	-377	502	**2518**
Total	**1940**	**-460**	**17387**	**2712**	**800**	**2194**	**16303**	**40875**

The number of excess deaths**:**	**More than 1000**	**500-1000**	**300-500**	**100-300**	**50-100**	**Less than 50**

Table A-4. Excess table numbers (d_{xi}^{R}-d_{xi}^{EU-15}) of female deaths up to 70 in Russia in comparison with the EU-15 per 100,000 females dying at all ages and from all causes,2000

Age x	Infectious and parasitic diseases	Neoplasms	Diseases of the circulatory system	Respiratory diseases	Diseases of the digestive system	Other diseases	External causes	**All causes**
0	66	6	4	135	6	578	78	**873**
1-4	19	15	1	57	2	68	100	**263**
5-9	4	7	4	9	2	27	66	**118**
10-14	2	6	0	3	1	15	59	**87**
15-19	8	13	11	7	4	32	182	**256**
20-24	22	17	23	13	9	53	257	**394**
25-29	30	27	45	18	21	60	280	**482**
30-34	33	48	91	28	28	67	303	**597**
35-39	32	60	157	35	37	73	342	**737**
40-44	41	73	298	47	54	75	389	**975**
45-49	38	106	572	66	65	97	449	**1392**
50-54	34	125	**1057**	67	96	126	498	**2002**
55-59	22	92	**1863**	60	146	139	495	**2817**
60-64	-1	-47	**2767**	28	100	52	366	**3265**
65-70	-29	-245	4546	-38	61	-127	285	**4453**
Total	**320**	**301**	**11439**	**535**	**633**	**1335**	**4148**	**18711**

The number of excess deaths**:**	**More than 1000**	**500-1000**	**300-500**	**100-300**	**50-100**	**Less than 50**

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MORTALITY FROM UNDETERMINED CAUSES OF DEATH IN RUSSIA AND IN SELECTED COUNTRIES*

SERGEY VASIN

Deaths due to injuries and poisoning which experts cannot identify, such as homicide, suicide or accident, are registered in statistical databases as deaths due to an event of undetermined intent. The proportion of such deaths can indicate the quality of statistics on causes of death, above all of statistics on intentional self-harm and assaults. In Russia, the proportion of deaths due to events of undetermined intent among other external causes has been growing for almost four decades. Such a trend was observed in the past during periods of growing mortality from external causes. Yet the steady and long decline in mortality from external causes in Russia that began in 2003 has not stopped the trend. The displacement of other external causes continues, though mortality from events of undetermined intent has exceeded both suicide and homicide mortality, and its proportion has increased tenfold, reaching very high levels relative to those of other countries. In several studies done in Russia over the past decade, scholars have argued that such a high proportion essentially results from the manipulation of statistics on mortality from external causes, the so-called conversion of socially important causes of death to a latent form.

The factors behind the persistent rise of the proportion of deaths due to events of undetermined intent (EUI) are analysed on the basis of a review of relevant research and long-term trends in mortality from external causes in Russia and selected developed countries. This makes it possible to expand the contextual framework of the discussion about the factors of the persistent growth of this "technical" indicator and about the hypothesis of the "natural" character of such dynamics.

Key words: *mortality, Russia, external causes of death, homicide, suicide, event of undetermined intent, ill-defined and unknown causes of death, quality of external causes of death statistics.*

1. INTRODUCTION

Intention or "manner of death" is one of the axes of the classification of external causes, according to which such causes are divided into three main blocks: (a) accidents – unintentional events, the result of "a combination of circumstances"; (b) self-harm (e.g. suicide); and (c) attacks (e.g. murder). Blocks (b) and (c) include cases of the deliberate infliction of death.

However, in practice there are cases of death which are hard to assign to one of these three blocks, because "the available information is insufficient to enable a medical or legal authority to make a distinction between accident, self-harm and assault" [WHO 2003]. These cases relate to the fourth block: events of undetermined intent. In countries with well-developed coroner systems, this block comprises cases of death with an open verdict.

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THE STUDY CARRIED OUT WITHIN THE FRAMEWORK OF THE BASIC RESEARCH PROGRAMME AT THE NATIONAL RESEARCH UNIVERSITY HIGHER SCHOOL OF ECONOMICS (HSE) IN 2013-2014.

Despite the long history of the International Classification of Diseases (ICD), EUI as a separate group of external causes appeared only in the ICD-8, adopted in 1965. In the English edition, these causes are called "injury undetermined whether accidentally or purposely inflicted" and, in Russian, they are labeled as "injuries without specification (of intent/intention)". Before the switch to the ICD-10, Russian scientific literature used the terms "injury without specification of accidental or intentional nature" and "unspecified violent causes".

The second axis of the classification of external causes of death is determined by the mechanisms (means) resulting in death. Along this axis the EUI block is built similarly to other blocks of external causes and, moreover, identically to the block of self-harm (X60-X84). Homicides – which are also called assaults (H85-Y09) – differ from EUI to a lesser degree of detail regarding the means of poisoning, as well as in having their own unique categories (Y04-Y07), in which the mechanisms of death are the use of physical force and various forms of ill-treatment. Comparison of these three blocks with the block of accidents is the most problematic, as the classification of the latter has a number of differences. Nevertheless, for each category Y10-Y34 there is a "category-namesake" in each of the major blocks of external causes of a given kind, so that the EUI block is called a reservoir or collector of causes of deaths from the main blocks of external causes of a given kind.

The uncertainty which leads to classifying the cause of death as an EUI is inevitable not only because of the lack of information about the circumstances of death. As "death of undetermined intent" is a rather "mild" verdict in comparison with others, e.g. suicide, the EUI include incidents about which enough is known to suspect suicide, but not enough to meet the stiff requirements to be registered as self-harm. According to Lado Ruzicka, the concept of EUI originated from the problem of underreporting of suicides due to their misclassification as accidents [Ruzicka 1996]. "To register a death as suicide, it must be established that the death was due to unnatural causes and came as a result of deliberate human action with the intention to terminate his life. If you have any doubt of suicidal intent, it is very likely that *the death was recorded as an accident* (italics added)" [Ruzicka 1996: 188].

Introducing a special set of causes helps to improve the quality of mortality statistics on accidents and to assess the prevalence of questionable situations. It is no coincidence that in the nomenclature of causes of death in many industrialised countries, including the USSR, EUI existed even before their inclusion in the ICD-8. However, the transition to ICD-8 did not go smoothly in some countries: in the first years after the transition, there was a sudden increase in the number of deaths from EUI, followed by an equally sudden drop in the number of suicides [Kolmos 1987; O'Carroll 1989].

The specific nature of the formation of mortality from EUI determines the specific nature of its study, which focuses not on the levels and trends in mortality from EUI as such, but rather on relationships with the levels and trends of mortality from external causes of a certain kind: firstly – judging by the English-language literature – from suicides, and secondly from accidents.

The discussion of underreporting suicides has a long history and sheds light on the problem of excessive use of EUI categories in several developed countries. The general consensus is that suicides are underreported. Most studies in developed countries show that, in addition to deaths for which there really is not enough information ("true deaths from EUI"), suicides and accidents

also fall into this block. The percentage of erroneous diagnoses varies from country to country and over time, and it depends on the type of study.

A systematic review of studies of the reliability of suicide statistics published between 1963 and 2009 in English and six other European languages showed that in 52% of the publications underreporting was above 10%, and in 39% of them it exceeded 30% [Tøllefsen, Hem, Ekeberg 2012]. The completeness of suicide reporting depends on the method of suicide: more active methods (e.g. hanging, firearms and cold steel) are reported better than less active ones (e.g. poisoning and drowning).

The accuracy of the diagnosis of suicide is influenced by:

- Competence of forensic experts and coroners (i.e. qualification and training);
- Medical-legal ascertainment practices and procedures [Rockett, Kapusta, Bhandari 2011; Chang et al. 2010], including the percentage of forensic and postmortem studies [Kapusta et al. 2011];
- Regulation of confidentiality compliance procedures, legal restrictions and prohibitions [Rockett, Kapusta, Bhandari 2011];
- Funding and staffing [Whitt 2006];
- Cultural and religious context, i.e., sociocultural condemnation [Rockett, Kapusta, Bhandari 2011], which may include pressure from the authorities and the media [Whitt 2006].

Obviously, these very same factors affect the frequency with which forensic experts turn to the EUI categories. Among the aforementioned factors, a special place belongs to sociocultural censure. This factor, in contrast to others which also affect the accuracy of the diagnosis of suicide, leads to overt manipulation of the data, as an expert may – under pressure from others when assessing the available evidence – reject a harsh verdict ("suicide") in favour of a mild one ("death of undetermined intent"). In a number of countries, the verdict of "suicide" was, because of cultural and religious traditions, so shameful that it was avoided in any way; sometimes it was outright impossible [Ruzicka 1996: 188]. Social and cultural norms influence the formulation of a diagnosis, even in countries with impeccable mortality statistics. For example, in Sweden, a survey of relatives and friends of the victims, as well as of physicians, together with an analysis of death certificates, revealed that almost two-thirds of all deaths coded as EUI were actually suicides [Horte 1983].

The motives for categorising deaths as EUI when there is evidence of murder as the cause are different, because relatives are hardly interested in such a substitution of diagnoses. Consequently, it is only the authorities involved in the process of establishing the cause of violent death who "fall under suspicion". In developed countries, the scientific literature rarely touches on this topic, which is not surprising. First of all, intensive research into the underreporting of suicides is limited to a narrow range of countries [Tøllefsen, Hem, Ekeberg 2012] with low mortality rates from homicide, and often from EUI as a whole, so the problem of classifying murders as EUI is not a burning issue. Secondly, it is believed that in democratic countries the practice of manipulating statistics on mortality from homicide is not widespread. In other countries, some research on a wider topic – the accuracy of medical death certificates and coding the underlying causes of death – reveals a number of murders among unspecified accidents and EUI (see, for example, the summary of the article [Drummond et al 1999]). Nevertheless, even in democratic

countries the problem of underreporting murders exists, but it mostly concerns children of early ages and, above all, infants (see for the US [Sorenson, Shen, Kraus, 1997a, 1997b] and for Estonia [Väli et al. 2007]).

EUI also includes different categories of accidents – mainly poisonings, but also drownings, falls, traffic accidents and others.

In the WHO projects "Global Burden of Injuries" [Begg, Tomijima 2003: 2] and "Global Health Estimates" [WHO 2014: 4], deaths from EUI are distributed proportionally among other external causes. This is due to the fact that the EUI code columns are, to use a metaphor introduced in a recent publication by the WHO [2014: 4], "junk codes" of the class of external causes of death. In general, mortality from EUI and its proportion of mortality from other external causes are "technical" indicators which, along with other indicators adopted by the WHO, are characterised by the quality of the statistics on external causes of death. This – not in itself, but in the context of other external causes – is precisely how mortality from EUI is viewed in foreign literature.

The purpose of this article is to describe the overall picture of changes in mortality from EUI since 1956, particularly the current levels and recent trends, as well as to try to answer the questions of how unusual the levels of "technical" indicators reached in Russia are and what is behind the persistent increase in the proportion of mortality from EUI.

2. DATA AND METHODS

The analysis of mortality from EUI and other causes of death in Russia in 1956-1998 and in 15 developed countries from 1965 uses age-standardised death rates (the WHO European standard population), including all derivatives of these measures (e.g. mortality structure, rate ratios, etc.). Data on causes of death by age and sex in Russia prior to the introduction of the ICD-10 in 1999 result from the reconstruction of series of causes of death [Meslé et al, 1996;. Meslé et al. 2003], while those since 1999 were obtained from the national statistical agency Rosstat. For other countries, the analysis relies on data from the WHO Mortality Database using software developed by E.M. Andreev [Andreev 2010]. For the analysis of categories Y10-Y34 for Russia in the 2000s, we used anonymised data from death certificates which, though not official, are not significantly different from the official data, as demonstrated by an analysis of 2011 data.

3. MAIN FINDINGS

3.1. Trends in injury mortality from undetermined causes

Over the past half-century, the standardised mortality rate from EUI in Russia has increased eight-fold among men and seven-fold among women. Following the overall trend in mortality from all causes, including external causes, the changes were uneven, with alternating periods of decrease and growth. The whole time series can be divided into two periods: before and after the start of the growth of mortality from EUI (the end of 1960 for men and the middle of 1970 for women). Three segments in the time series are distinguishable, with a certain degree of conditionality in the second period: growth with some decline in the end of the period up to 1990; a sharp rise after

1990, with a peak in 1994; and a subsequent decline, rather modest compared to the growth of the previous period (Figure 1).

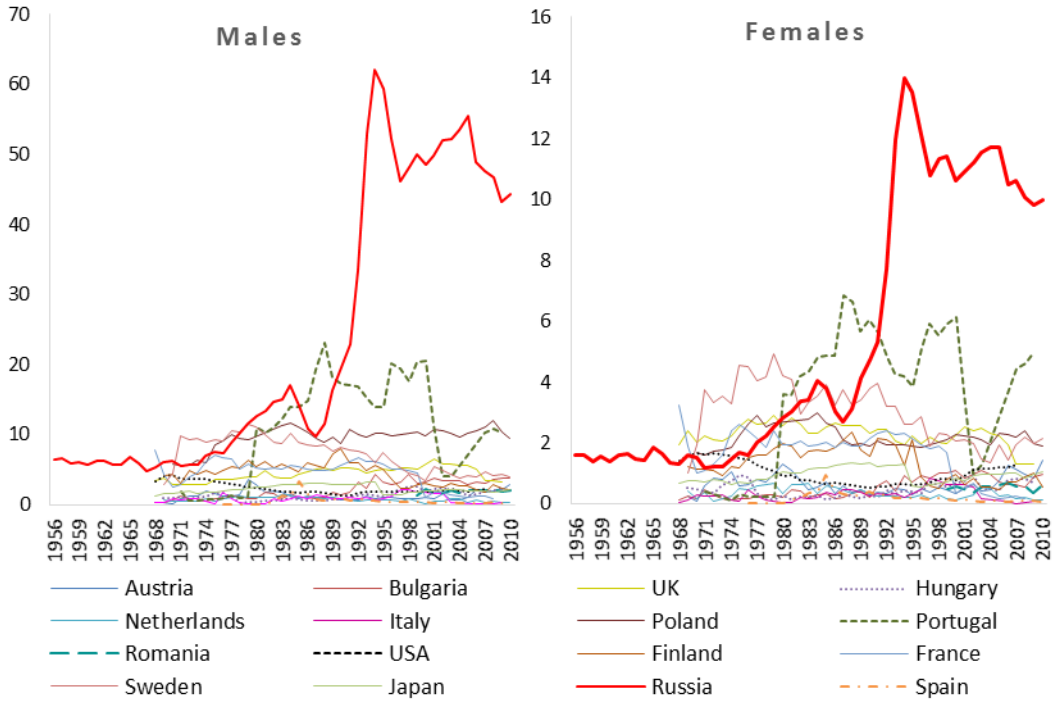

Figure 1. Standardised death rates from EUI in Russia (1956-2012) and in 15 developed countries (late 1960s-2010), per 100,000

In the 1950s and 1960s, the indicator showed a barely noticeable downward trend, mainly due to the 75 and older age group (Figure 2). During this period and against the background of 15 countries (Figure 1), Russia barely stood out. Since mortality from other external causes in these years increased, the contribution of mortality from EUI to total mortality from external causes – which was already low – decreased, including among both children and older age groups, by a factor of two or more.

The consequent period of changes in mortality from EUI was not uniform, and it can be divided into several stages, including a stage of decline during the anti-alcohol campaign, although overall growth prevailed. Even in the period of decline, the standardised death rate of EUI in 1987 was, among men, 1.7 times and, among women, 2.2 times higher than in 1973 – before the start of the upward trend. The six-fold growth by 1987 and 1994 changed the situation, leading to an unprecedented breakaway from the 14 countries taken for comparison and transforming the age curve of mortality from EUI. Among men there emerged a significant gap in the intensity of mortality between the age of maximum mortality (45-59 years) and other age groups, with the intensity of mortality at age 75 and older being lower than at age 60-74, which was in turn lower than at age 30-44 (Figure 2). Among women, the scale of change was smaller, but mortality in the 45-59 age group also increased more than in all other age groups.

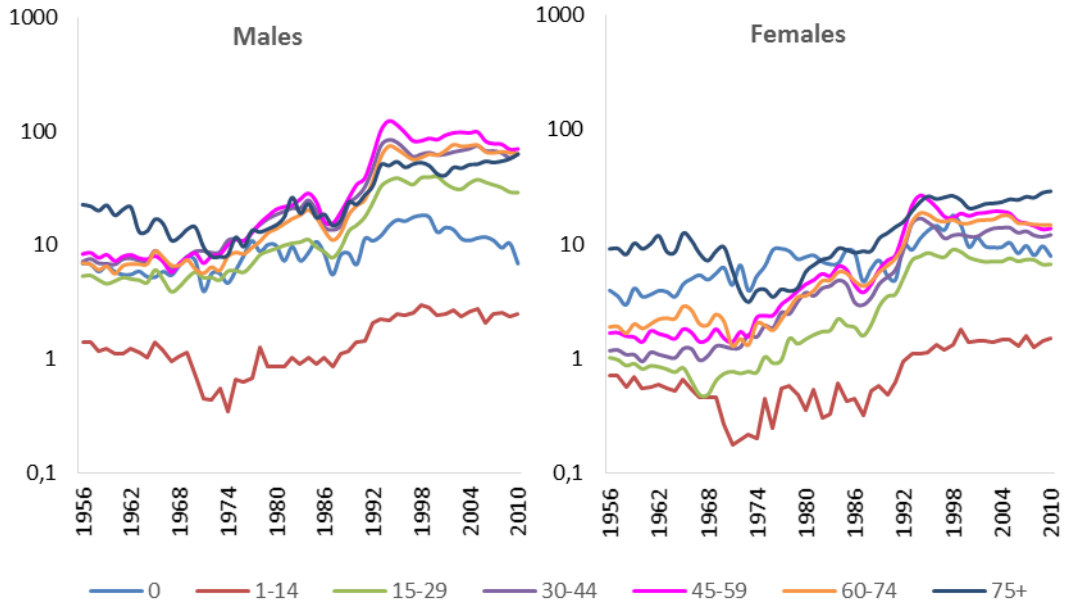

Figure 2. Standardised death rates from EUI in seven age groups, Russia, 1956-2012, per 100,000, logarithmic scale

In 1995, a new phase began in Russia: there was a hesitant and much interrupted reduction in mortality from EUI. By 2012, its level had moved away from its peak in 1994, but was still many times higher than in most other countries shown in Figure 1, and higher than the 1992 level. Moreover, mortality from EUI did not decrease in two age groups: in 2012 it approached (for ages 1-14) and exceeded (for ages 75 and older) the maximum values for the previous years (Figure 2). However, the main feature of this phase was the steady decline, begun in 2003 and unprecedentedly long for Russia, in mortality from other external causes, the level of which returned to the values of the mid-1960s. The main problem is that mortality from EUI is now 6-7 times higher than it was half a century ago, and its proportion of all other external causes has been growing since 2003 (Figure 3).

3.2. The proportion of EUI to mortality from other external causes in Russia and in 15 other countries

The ratio of mortality from EUI to mortality from other external causes (per 100), which for convenience is named here the "proportion of EUI", characterises the quality of statistics of external causes or "proportion garbage", using the metaphor introduced by WHO experts [WHO 2014: 4]. The deterioration of the quality of statistics has lasted, with interruptions, since the first half of the 1970s. Since then, the indicator has increased ten-fold, and even more in most age groups. Decisive and roughly equal contributions to the growth of the indicator occurred during two periods: 1988-1994 and 2003-2012. The latter period is of particular interest.

The mirror increase (with respect to mortality from other external causes) in the proportion of EUI since 2003 is a new phenomenon: in the past, a decrease in mortality from external causes did not mean an increase in the proportion of EUI (1985-1987 and 1995-1997). On the contrary, an increase in the proportion of EUI coincided with an increase in violent deaths. The mirror growth of the proportion of EUI since 2003 indicates that the concentration of violent deaths in

the "trash" block is a very stable trend, which progresses both when mortality from other external causes increases and when it decreases.

Naturally, questions arise. What lies behind such persistent growth in this "technical" indicator? How usual are its current values? Are similar trends encountered in other countries?

Among the 15 other countries under study, only in Portugal has this indicator been higher than in Russia. But the trend in Portugal, as well as in Poland in the 1970s, was characterised by sharp fluctuations (Figure 4), the causes of which require separate consideration, although the amplitude of huge jumps prompts doubts about this data from the very beginning.

In other countries, the maximum proportion of EUI did not exceed 19 for men and 18 for women, and the average value is 5. For them, a proportion of EUI above 10 can be considered high. These values have been observed for a fairly long time in Sweden and the United Kingdom (UK) – countries with reliable data on the causes of death. Values of the proportion of EUI higher than 15 can be considered very high. Russia reached the mark of 10 in the last year of the Soviet period (1991) and 15 two years later. By the end of the 2000s Russia had surpassed the maximum values for the UK, and in 2012 the values of the Russian indicator came close to those for Portugal.

As for trends, growth in the proportion of EUI lasting one or two decades in various periods is found in many countries. A precise assessment of the duration of the trends is hindered by their instability, but cases of a longer rise in the indicator among the countries under consideration are rare, and such long rises are found nowhere but in Russia. Moreover, in countries where the upward trend of the indicator lasted two or three decades, its level tended to remain quite moderate (except in the UK).

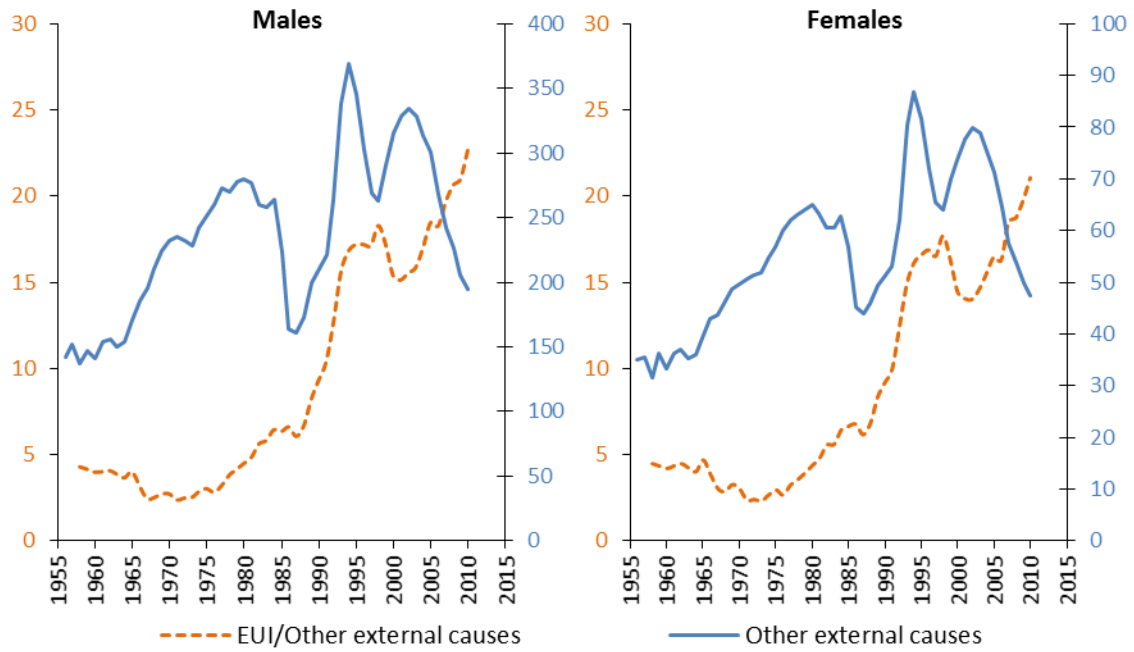

Figure 3. Proportion of EUI (left axis, per 100 deaths) and standardised death rate from "other external causes", (right axis, per 100,000)

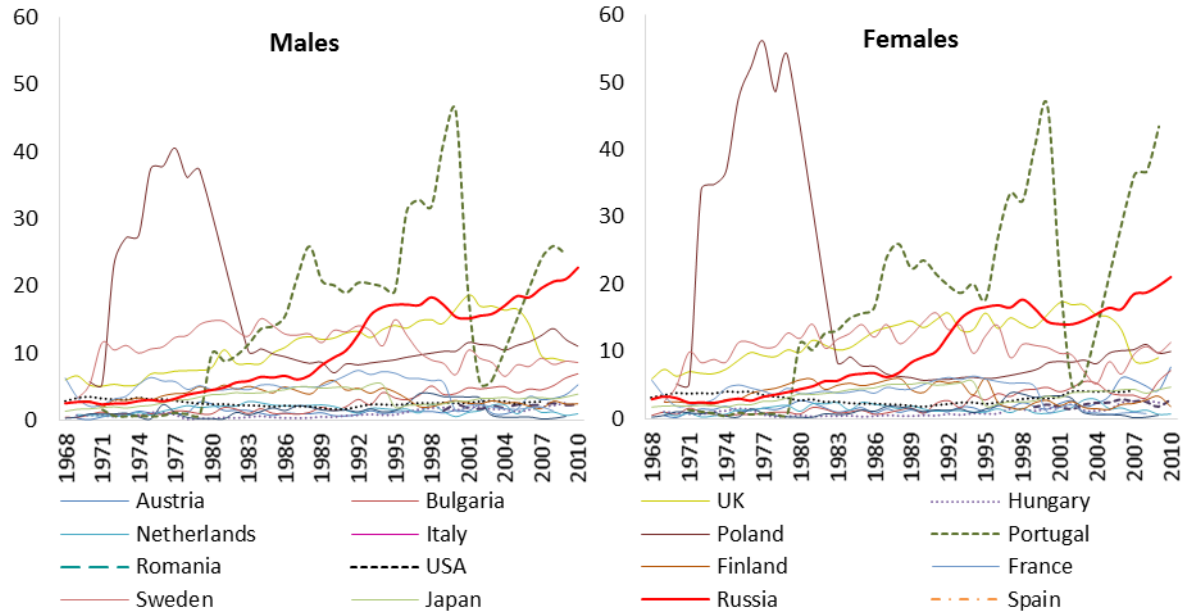

Figure 4. Proportion of EUI in Russia and 15 countries, per 100 deaths from "other external causes"

Thus, compared to other countries, Russia stands out not so much for its increasing trend of the proportion of EUI itself (it is rising everywhere) as for its duration and extremely high level.

The proportion of EUI is a measure of uncertainty in the level of mortality from external causes of all blocks, but studies in other countries suggest that the most likely candidates for falling into the category of deaths of undetermined intent are suicides; they therefore apply the indicator of the proportion of EUI to suicides.

In Russia in the late 1960s and early 1970s, mortality from suicide was 10 times higher than the then-low level of mortality from EUI (Figure 5). The dynamics of the index are almost identical to the dynamics of the proportion of EUI relative to mortality from other external causes just considered: since the early 1990s the ratio has changed rapidly in favour of EUI, and Russia emerged to take second place after Portugal. How far Russia's current ratio is from other countries can be seen in that it is 10-11 times higher than the median, and 5-6 times higher than the upper quartile of the distribution for 15 countries. Only among men and women in Russia (and among women in Portugal) is mortality from EUI higher than mortality from suicide.

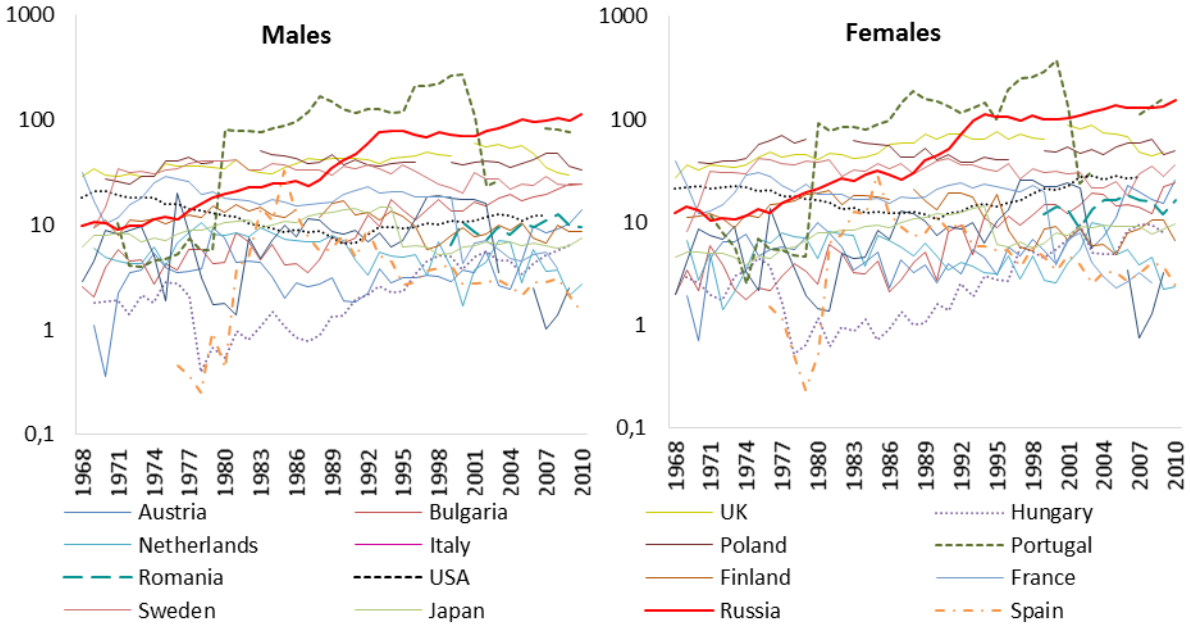

Figure 5. Rate ratios of EUIs to suicides in Russia and in 15 countries, per 100, logarithmic scale

The level of suicide mortality in Portugal has been in doubt for a long time in terms of its dynamics and in comparison with mortality from EUI. It has been demonstrated that in Portugal in the 1980s a considerable number of suicides were coded as EUI [De Castro, Pimenta, Martins 1989], and the situation has not changed since then. Given that in Russia the ratio is the same as in Portugal, in our country, too, the completeness of suicide recording is suspicious, especially for women.

A high EUI/suicide ratio is also observed in the UK, Sweden and Poland. In the UK and Sweden, the problem of underreporting suicide deaths has been discussed by the scientific community for several decades, though only in recent years in Poland [Hofer et al. 2012]. Not long ago, an effort was made to develop a criterion to characterise the quality of suicide statistics [Värnik et al. 2012]. For the 15 members of the European Union the average level of the mortality rate from EUI and the rate ratio of EUI to suicides were combined into a "2-20 benchmark", in which the first indicator is 2.0 EUI cases per 100,000 persons, and the second – the proportion of EUI to suicides – is 20%. All three above-mentioned countries, not to mention Russia and Portugal, do not meet the criteria of the quality of data on mortality from suicide.

However, one must admit that the comparison of ratios of mortality from EUI and from self-harm, while relevant for western countries, is less relevant for countries such as Russia, where most of the deaths of undetermined intent are murders, not suicides. The irrelevance of such an approach for Russia did not arise immediately, but increased together with the increase in mortality from assaults and EUI, especially in the period of 1987-1994.

It is even less relevant to analyse Russia's position among other countries by its EUI/homicide rate ratio, which does not look extraordinary, as in the case of suicides, since mortality from homicide is low in other countries. For example, in the six countries located in Table 1 below Russia, the mortality rate from homicide is not just 3-10 times lower than from EUI,

it is itself very low: 10-50 times lower than in Russia. So the uncertainty of estimates of mortality from homicide in these countries is a problem of a different order of magnitude.

Table 1. Standardised death rates (SDR) from homicide and rate ratios of EUIs to homicides in Russia and 15 other countries

Country, year	EUI per 100 homicides				SDR from homicide per 100,000			
	Ratio		Rank		Rate		Rank	
	Males	Females	Males	Females	Males	Females	Males	Females
Spain, 2010	17	12	1	1	0.8	0.5	13	12
Italy, 2009	19	17	2	2	1.2	0.5	10	13
United States, 2007	23	52	3	6	9.5	2.5	2	2
The Netherlands, 2010	31	18	4	3	1.1	0.6	11	7
Romania, 2010	64	45	5	5	3.1	1.3	3	3
Finland, 2010	76	64	6	7	2.9	0.8	4	5
France, 2008	93	44	7	4	0.9	0.4	12	14
Hungary, 2009	139	71	8	8	1.7	1.0	6	4
Bulgaria, 2010	183	140	9	9	2.0	0.7	5	6
Russia, 2010	224	177	10	10	19.8	5.6	1	1
Sweden, 2010	293	380	11	13	1.4	0.6	7	8
Japan, 2010	632	381	12	14	0.4	0.3	16	15
Austria, 2010	667	277	13	11	0.4	0.5	14	9
Poland, 2010	740	374	14	12	1.3	0.5	9	11
United Kingdom, 2009	760	701	15	15	0.4	0.2	15	16
Portugal, 2009	765	978	16	16	1.3	0.5	8	10

Note: Countries are ranked by the value of the male indicator (column 1) in ascending order.

Among the 15 countries, perhaps only the US somewhat resembles Russia. Firstly, the US comes immediately after Russia by the level of mortality from homicide, with a relatively small gap between the two and a fairly large gap between the US and other countries. Secondly, in the US, too, there is a fairly large group of people with a high risk of dying from external causes. But the US differs from Russia in that the proportion of EUI to homicides is lower than in Russia, by a factor of 10 for men and 3.5 for women. This difference gives an idea of how questionable the levels of mortality from homicide in modern Russia are.

To shed light on the differences between Russia and the US, as well as other countries, we compare the structure of the EUI block by its items (Table 2). Since mortality from EUI is quite low and can be subject to random fluctuations, for each country other than the US, the standardised coefficients were calculated for the period 2007-2010. Five countries, in which the indicator's values for women were lower than 0.5 per 100,000, were omitted. The structure of the EUI block in Portugal differs from that of all other countries by its simplicity: 80% of deaths fall in the vaguest categories (specified and unspecified events), which once again points to the extremely poor quality of data on deaths from external causes in this country. In the US, the greatest difficulties in determining intent arise with drugs and drug poisoning. A similar pattern is seen in Sweden and among women in the UK. In general, the proportion of drug poisonings and all poisonings taken together is much higher among women, as reflected in the average value for eight countries. However, the average profile in this case is a rather artificial construction because of the significant variety of approaches to coding the causes of death in this block. In Japan, almost 30% of EUI are drownings, in Bulgaria there is an unusually large number of hangings, and in Hungary – with its traditionally high mortality rate from suicide – the structure is the most complex. Furthermore, the categories of specified and unspecified events are used to varying degrees in different countries.

In Sweden, Austria, the UK and the US they are used rarely, but in Poland, Finland and Bulgaria they are used often (33-36%).

Compared to other countries, Russia has fewer poisonings, with completely different kinds of substances predominating, and somewhat more hangings. Both means of death, together with drownings and falls, are much more likely to occur in suicides than in murders. It is considered [Ivanova et al 2013] that deaths categorised as EUI which are caused by contact with a sharp or blunt object are a latent part of murders, and precisely these predominate in Russia. On the other hand, in 15 countries, despite considerable variation in the structure of the EUI, all of them are characterised by a very modest share of deaths from contact with a sharp or blunt object (ICD codes Y28-Y29). The maximum value is observed in Italy (7% in men and 11% in women), but in Italy mortality from EUI is negligible: 0.13 and 0.03 per 100,000 for men and women, respectively.

Table 2. Structure of the EUI block in Russia (2012), the US (2007) and in a group of eight countries (2007-2010*), percent

ICD codes	Cause of death	Males			Females		
		Russia	8 states	US	Russia	8 states	US
Y10-Y11, Y13-Y14	Poisoning by drugs	1	13	30	3	27	48
Y12	Poisoning by narcotics	2	8	31	1	7	27
Y15	Poisoning by alcohol	5	3	3	5	3	1
Y16-Y19	Other poisonings	10	5	3	14	4	1
Y20	Hanging , strangulation	15	10	3	12	7	2
Y21	Drowning	3	14	5	3	13	4
Y22-Y24	Firearm discharge	2	3	7	0	1	3
Y26	Exposure to smoke, fire and flames	3	4	2	3	4	2
Y28-Y29	Contact with sharp and blunt object	31	3	1	28	3	0
Y30	Falls from a height	5	9	1	9	8	1
Y33-Y34	Other specified and unspecified events	20	22	14	19	20	11
Y25, Y27, Y31, Y32	Residuals	1	6	1	2	4	1
Y10-Y34	Total	100	100	100	100	100	100

**Unweighted average of mortality rates in eight countries (Austria, Bulgaria, Great Britain, Hungary, Poland, Finland, Sweden, Japan), excluding the maximum value in each category. Portugal (see text) and five countries with the lowest mortality from EUI – Italy, Spain, the Netherlands, Romania and France – have been excluded from the analysis.*

According to Ivanova et al., in Russia a part of deaths from specified and unspecified events (Y33-Y34), when combined with injuries (codes: S00-T14, T90-T98), should also be classified as homicides. The proportion of such cases in 2012 was very high: 95% for unspecified events and about 80% for specified events. If we follow the classification of EUI categories proposed in the article by A.E. Ivanova et al. [Ivanova et al. 2013], then the cumulative proportion of homicides in this block (Y22-Y24, Y28-Y29 and Y33-Y34 in combination with S00-T14, T90-T98) in 2012 was 51% for men and 45% for women.

It is difficult to check whether this conclusion applies to the countries considered herein. If it did, however, this problem would not have gone unnoticed in Portugal, where in 2007-2010 mortality from specified and unspecified EUI was 6-7 times higher than mortality from homicides. In Portugal, however, only underreporting of suicides is discussed. In addition, the structure of the EUI block is largely determined by the structure of other external causes. In 12 countries, including

Portugal, mortality from suicide is higher than from homicide by a factor of 7 for women and 11 for men, whereas in Russia these factors are, respectively, only 1.2 and 2 times (only among American men is this ratio close to Russia's).

Thus, there is good reason to believe that the contribution of homicides to mortality from the block of categories Y10-Y34 in these countries is low and, in comparison with Russia, outright insignificant. Moreover, at the same time, the share of EUI among other external causes in Russia is much higher and continues to grow.

With the exception of specified and unspecified events, all categories contributed to the increase in the proportion of EUI in 2003-2012 in Russia. The largest contribution to the indicator's growth came from the following: contact with sharp or blunt objects (36% for men and 33% for women), hanging (27% and 21%), other poisonings (14% and 17%) and falls among women (14%). Overall, mortality from latent homicides decreased by 1.5 times, and mortality from latent suicides (hangings and poisonings by drugs coded as EUI) increased by the same factor.

Accordingly, the proportion of latent murders in the structure of EUI decreased by 15 percentage points, while suicides increased by 10 percentage points. This resulted mainly from two things: an almost two-fold increase in deaths from hangings, and a 2.3-fold decrease in mortality from specified and unspecified events. The latter testifies to an improvement in the quality of data within the EUI block, because categories Y33 and Y34 – the vaguest unspecified injuries – are in fact unknown external causes, for which neither the intention nor the mechanism of death have been determined.

3.3. Mortality from EUI and from ill-defined causes of death

The EUI block is not the only "collector" of external causes of death. Some of them, including deaths from EUI, may fall into class XVIII, "Symptoms, signs, abnormal clinical and laboratory findings, not elsewhere classified" (columns R00-R99 in ICD-10), which was also called "garbage", but for natural causes of death [WHO 2014: 4]. Twelve blocks of this class describe a vague somatic pathology, including "Senility" (R54), and the last – that is, the 13th – block (R95-R99), which encompasses "ill-defined and unknown causes of death" and in accordance with its name includes incidents for which the cause of death is most difficult to determine (Table 3). For brevity, we will refer to this unit as "ill-defined and unknown causes" of death (IUC).

Table 3. Deaths by causes of class XVIII of the ICD-10 and age groups, Russia, both sexes, 2012, percent

Cause of death	ICD codes	Age groups, years				Total
		0	1-19	20-59	60+	
Sudden infant death syndrome	R95	65.6	0.0	0.0	0.0	0.9
Ill-defined and unknown causes of death	R96-R99	32.4	99.5	99.3	98.2	98.0
Other symptoms and ill-defined conditions	R00-R53, R55-R94	2.0	0.5	0.7	1.8	1.1
All causes for class XVIII, except for R54 (Senility)	R00-R53, R55-R99	100.0	100.0	100.0	100.0	100.0

Although this class should include cases of natural death, some deaths fall into the 13th block because their inexplicable or sudden nature can also be the result of unnatural causes.

As has been found in a number of studies [Värnik et al. 2010; Rockett, Kapusta, Bhandari in 2011; Gjertsen, Johansson 2011], some deaths from external causes do indeed fall into this block. For the analysis of mortality from external causes, the important question is whether it happens accidentally, that is, whether it creates a systematic shift in the variation of mortality from external causes in time and space. Studies analysing the reliability of suicide mortality statistics convey, with rare exceptions [Bjorkenstam et al. 2014], the idea that the underreporting of suicides is accidental, hence there is a fairly high probability of assigning them to categories R96-R99. Therefore, some authors have suggested using in international comparisons the ratios of mortality from suicide to mortality from EUI and to mortality from causes within block R96-R99 as indicators of the uncertainty of measurement of the level of mortality from suicide [Rockett, Kapusta, Bhandari 2011].

In Russia, the assumption that a part of violent deaths are registered as ill-defined was made in the 2000s [Semenova, Antonova 2007]. At present, the hypothesis is considered confirmed, and some researchers believe that, similarly to over-reporting of mortality from EUI, this case of purposeful manipulation is to disguise the acute problem of high mortality from external causes [Ivanova et al. 2013].

For example, this is how the abrupt change in mortality from EUI and ill-defined conditions (they switched ranks) in 1999-2001 in Moscow (Figure 6) was interpreted [Arhangelsky et al. 2006; Antonova 2007; Semenova, Antonova 2007; Ivanova et al. 2013.; Gavrilova et al. 2008]. It is clear that such a practice could affect the dynamics of recorded violent mortality, particularly the proportion of EUI among "other external causes".

Of course, not all deaths that fall into the categories of unknown causes, especially in the older age groups, should be considered violent, and violent deaths falling into this category should represent all groups of external causes, not just EUI. However, there is no reason to doubt that in Russia deaths which should be coded in the Y10-Y34 block (EUI) are put into the XVIIIth class of the ICD-10.

First, of the 13 blocks of class XVIII, only the 13th (R96-R99, which accounted for over 98% of deaths in 2012 [see Table 3]) is actually used, and more often than not, only one of its categories is applied. In the regions of Russia, in 2005 [Antonova 2007] and 2010 the choice fell on R99, the least precise category that was often accompanied by the entry "cause of death unknown" [Ivanova et al 2013].

Second, according to currently established practice, the authorities who determine the cause of a violent death give a verdict of "undetermined intent of death", but forensic experts encode it as R99 instead of Y10-Y34 [Ivanova et al. 2013]. It is no coincidence that the blocks of class XVIII are so unevenly filled in. The somatic categories are empty, since they are filled in by doctors who follow the requirements not to overuse them [Rukovodstvo (Guide) … 2008: 10; KZ SPb (St. Petersburg): 1997], while the 13th block is filled by forensic experts. Finally, the absence of a break in the dynamics of mortality from other external causes in 2000 (Figure 6) indirectly

confirms that, at least in Moscow and since 2000, it is precisely deaths from EUI that have begun to be encoded as IUC.

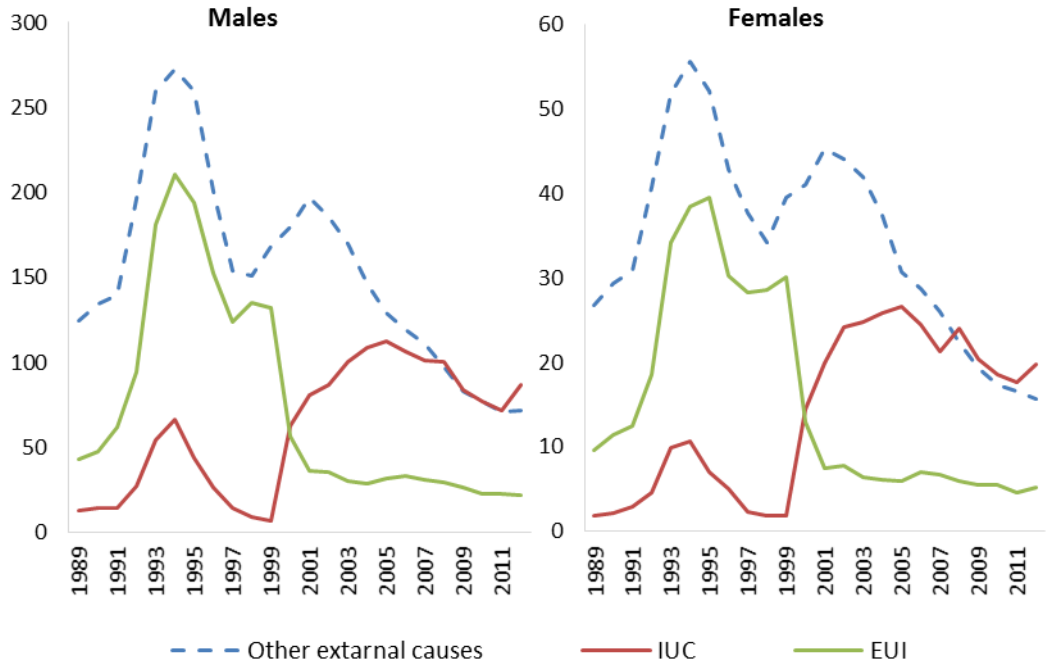

Figure 6. Standardised death rates from IUC, EUI and other external causes in the age group 15-59 Moscow, 1989-2012, per 100,000

Note: The structure of the IUC group has changed over time. Prior to 1999, it totaled all categories of the ICD-9 class "symptoms, signs and ill-defined conditions" (in the brief Soviet nomenclature), except for the rubric "Senility". In 1999-2010, it included all rubrics of the ICD-10 class XVIII (R00-R53, R55-R94, R96-R99), with the exception of "Senility" (R54) and R95 "Sudden infant death syndrome" (R95). In 2011-2012, IUC included only the rubrics R96-R99.

In Russia as a whole (Figure 7), the increase in mortality from IUC and the reduction in mortality from EUI were milder than in Moscow (Figure 6) and began one year earlier. The one-year difference may be due to the fact that it was precisely in 1999 that Russia moved from the ICD-9 to the ICD-10, while Moscow moved later [Danilova, Meslé, Vallin 2014]. In other words, accidentally or not, the change in coding of these causes coincided with the transition to the ICD-10.

Converting part of the deaths from EUI to IUC could explain the "abnormal" decrease in the proportion of EUI against the backdrop of an increase in mortality from other external causes in 1999-2002, but does not account for the period since 2003. In 2003, mortality from other external causes began to decline, while that from EUI continued to rise for another three years, and in general there was a mirror growth in the proportion of EUI in 2003-2012. Within the framework of the hypothesis of a "conversion" of violent deaths into IUC, this could have occurred if, starting in 2003, the transferred diagnoses had come mainly from other external causes.

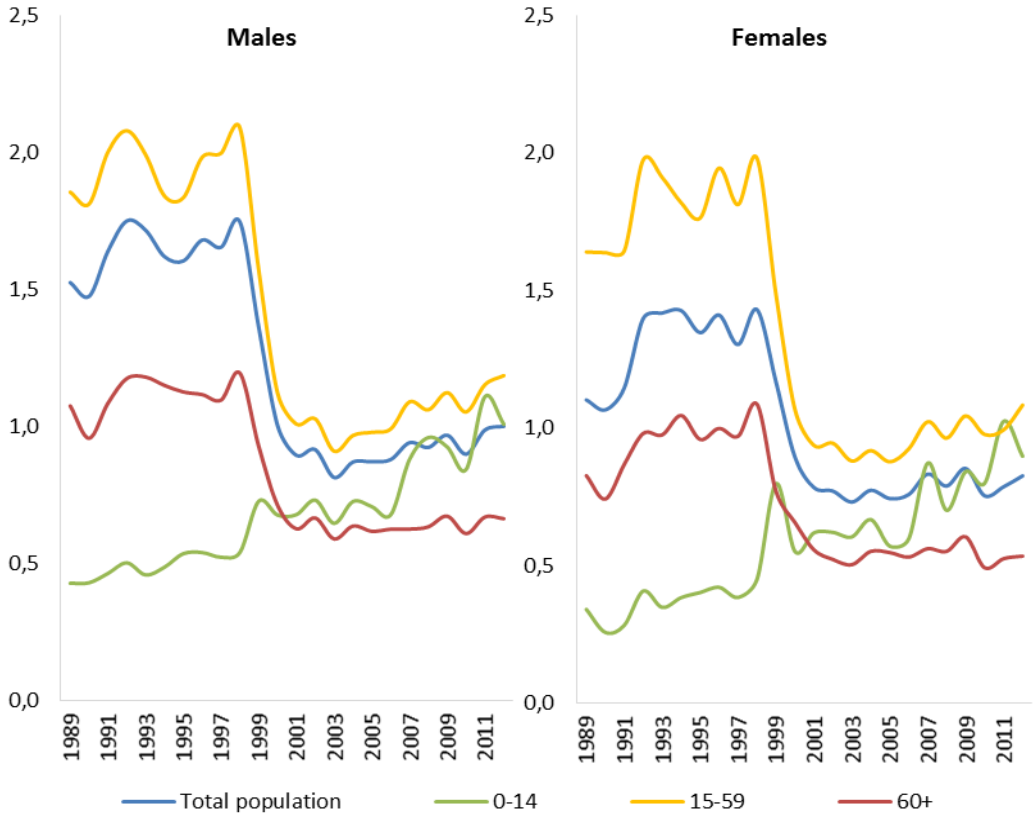

Figure 7. Rate ratios of EUI to IUC (EUI/IUC) in 1989-2012 by age groups and for total population, by sex

Notes: see the note to Figure 6.

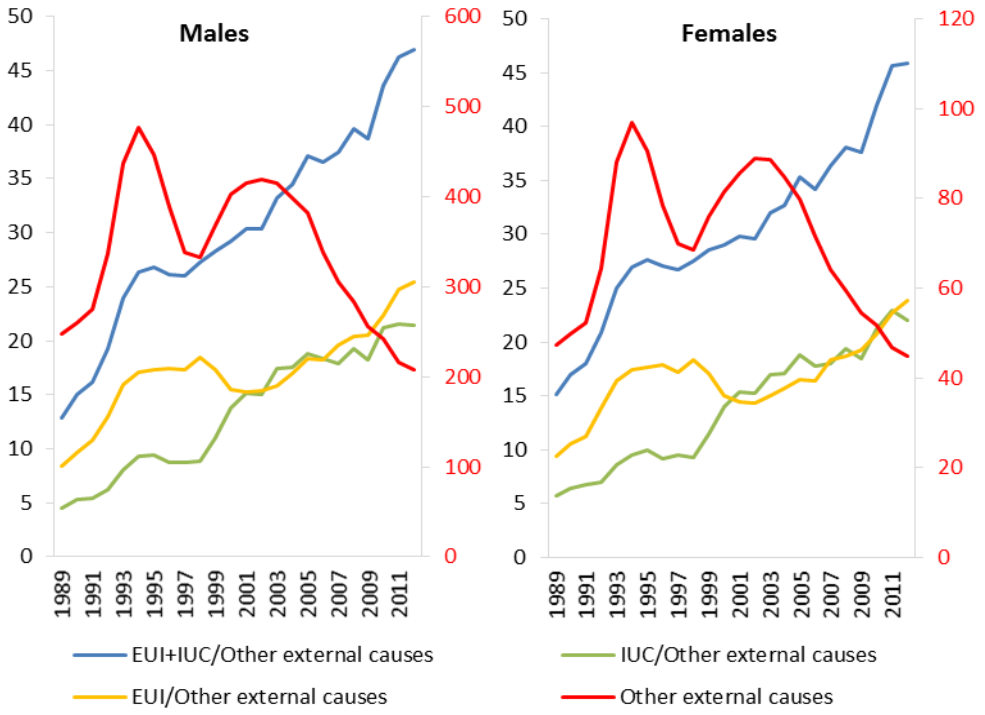

Figure 8. Standardised death rates from external causes other than EUI (per 100,000, right axis) and three rate ratios: EUI, IUC and EUI+IUC to external causes other than EUI (per 100, left axis), at age 15-59, by sex

Be that as it may, the change in the encoding of causes in 1999-2001 affected the level of mortality from EUI and IUC, but not total mortality from these groups of causes, which grew faster in these years than mortality from other external causes. The steady increase in the ratio of mortality from both categories of uncertain causes to the rest of external causes continued thereafter. As a result, as shown in Figure 8, the reduction in mortality from accidental injuries, homicides and suicides in the last decade was accompanied by an increase in the proportion of both EUI and IUC – that is, by an even greater uncertainty about the true level of mortality from external causes. It is also worth noting that more or less coordinated changes in mortality from causes in EUI and IUC since 2000 may point to common factors behind these changes.

4. The increased concentration of violent deaths in EUI categories and its factors: Discussion

The increased concentration of violent deaths in EUI categories deserves a separate discussion. As shown above, the problem of high mortality from EUI in Russia has existed for a long time, but it became particularly acute in the post-Soviet period, when its level exceeded the level of mortality from homicides and suicides, and its ratio to other external causes became disproportionately large compared to other countries.

What is more, the ratio is probably underestimated: firstly, because some causes of death which should be coded in categories Y10-Y34 are classified as ill-defined (R96-R99); and secondly, because of categories from the block of sequelae of injuries that in some countries supplement codes Y10-Y34. In the US National Violent Death Reporting System (NVDS), codes Y89.9 "sequelae of unspecified external causes" and Y87.2 "sequelae of events of undetermined intent" are included in EUIs. In Sweden and in the WHO "Global Health Estimates" project [WHO 2014: 4], only code Y87.2 is added. In Russia, these causes are not treated separately. By 2011, they had become part of a group of "all other events, accidental and of unspecified intent, sequelae of external causes of mortality", along with sequelae of intentional self-harm (Y87.0) and assaults (Y87.1). Since 2011, together with "accidental exposure to other and unspecified factors" (X58-X59), they form the group "impact of factors other than those listed elsewhere". According to available data, in 2000-2002 the share of deaths coded as Y87.2 and Y89.9 in block Y10-Y34 was only 1.4%, but in 2003 it began to grow, reaching 5% in 2010-2012, which is not negligible, especially when it comes to estimating the share of EUI in mortality from "other external causes".

The high level of violent deaths of undetermined intent and its trends require explanation. One of the main questions is the following: to what degree do the statistics of mortality from EUI reflect reality? There is practically no research that would not call this into doubt, and the prevailing view is that the errors in estimating mortality from EUI are mainly due to homicide.

In one of the first papers examining simultaneous, abrupt increases in mortality from violence of undetermined nature and mortality from homicides in 1987-1993, it was hypothesised that some of the murders were recorded under this heading [Meslé et al 1996: §4.5]. This hypothesis was later reapplied to a longer trend [Chervyakov et al. 2002]. In the same vein, D. Bogoyavleskiy interpreted a strong correlation of the temporal and spatial distribution of mortality from homicide and EUI [Bogoyavlensky 2000: 88, 2006: 352]. Likewise, referring to the regional differentiation of mortality, other researchers have spoken out: "Starting in 1985, the growth rate

of mortality from unspecified injuries has outpaced the growth in mortality from homicide; in Russia, maximum levels of mortality from [unspecified] injuries are often recorded in the areas with minimal levels of mortality from homicide" [Semenova et al 2004: 13].

The assumption expressed by D. Wasserman and A. Värnik is that the increase in the concentration of violent deaths in the EUI block at the beginning of the 1990s was at least partly true. It was based on Varnik's experience as a forensic expert who led the psychiatric forensic service in Estonia, as well as on 12 interviews with experts in the field of diagnosis and coding of violent deaths. According to [Wasserman, Värnik 1998], in Soviet times mortality from EUI was overseen by the state, and the failure of a pathologist to attribute a true death from EUI to other causes was criticised; in cases where it was necessary to cover up "surplus" murders, the homicides were coded as suicides [Andreev, Zhdanov, Shkolnikov 2007]. But during Gorbachev's *perestroika* there was an increased degree of freedom of decision-making in the professional field, and after the collapse of the Soviet Union control and pressure on experts eased, and the "art" of coding deaths as EUI was no longer in demand. A similar view is held by E.M. Andreev et al. [2007], who consider the weakening in the early 1990s of the pressure on doctors by the statistical authorities, which sought to minimise unspecified diagnoses, as one of the growth factors of mortality from undetermined injuries, whether accidental or purposely inflicted.

Note that, due to the increased control over mortality from EUI during the Soviet period, its level at the time must be recognised as true or even understated, but not inflated. Therefore, neither its growth (including murder) nor the high – compared to other countries – values achieved by the mid-1980s should cause any doubts.

The hypothesis of weakening control over recording of external causes of death does not contradict the assumption that the rise of violent mortality of an unspecified type in the post-Soviet period is associated with an increase in mortality from homicide. One of the factors of this process was the explosion of crime and a sharp increase in the number of deaths from external causes. The increased burden on the police, investigative agencies, pathologists and forensic experts, together with their low pay and general scarcity of material and human resources [Chervyakov et al. 2002; Pridemore 2003; Wasserman, Värnik 1998], meant that when resources were lacking to conduct the investigation or expertise, external causes of death of a specified type were coded as EUI [Wasserman, Värnik 1998]. In this context, the hypothesis of a deliberate distortion of the statistics of mortality, especially murders, under pressure from the local police or authorities [Wasserman, Värnik 1998; Pridemore 2003; Värnik et al. 2010] looks logical. But both forced and intentional manipulations are possible when there is weak control over the actions of doctors and procedural persons combined with gaps in the organisation of the registration of violent deaths and in its regulatory framework. Imperfect legislation boosted the number of undetermined events [Andreev, Zhdanov, Shkolnikov 2007: 118]. Moreover, within the system of registering violent deaths current in the 1990s, estimates of the number of murders and suicides produced by statistical offices were higher than those compiled by the law enforcement agencies, but lower than forensic data [Porodenko 1999]. In other words, even if forensic experts, deliberately or involuntarily, abused EUI codes, some of the cases in which the manner of death was determined were not reflected by statistical authorities.

Thus, in contrast to the previous period, the rapid growth of mortality of an unspecified manner in the 1990s was partly falsified, that is, it included erroneous deaths from EUI – mostly homicides, as most researchers believe.

Because all of these studies dealt with aggregated data, the degree of falsification is not clear, and therefore it is not clear whether the concentration of violent mortality in the EUI block would have increased without "special tricks". Theoretically, based on the idea that the marginalisation of the population is accompanied by an increase in mortality of undetermined intent [Meslé et al. 1996: §4.5], it is quite possible that the concentration of mortality of the EUI block could have grown "all by itself". Indirectly, this idea is supported by the fact that whenever life expectancy was increasing in Russia, the rate of increase was higher in regions where life expectancy was lower [Andreev, Vishnevsky 2000: 93-94; Andreev, Kvasha, Kharkova 2013: 398-399].

Published explanations of the dynamics of mortality from EUI or its proportions after 1994 do not exist, or in any case we have not found them. However, based on the hypothesis of the "natural" origin of the accelerated growth of mortality from EUI in 1987-1994, one would expect that in the years of declining mortality from external causes, the proportion of EUI would not grow. Indeed, in 1995-1998 that was the case. But a significant drop in 2003 in the number of deaths from other external causes, which should have led both to a reduction in the proportion of "marginal" deaths and to a reduction in the overall workload of pathologists, forensic experts and other procedural persons, was – contrary to expectations – accompanied by an increase in the proportion of EUI.

The lack of an explanation of the dynamics of mortality from EUI after 1994 is probably not accidental. This may have been helped by the fact that, in this period, a trend towards reduced mortality from external causes became dominant. In addition, the focus of research has shifted to the study of the nature of the categories of block Y10-Y34 based on an analysis of medical death certificates. In the works of the last decade, almost all major aspects of the practice of coding external causes associated with EUI have been examined. Perhaps their main achievement has been the results of testing the hypothesis about a part of the EUI categories belonging to other blocks of external causes. An analysis of the regional differentiation of external causes and ill-defined conditions revealed the extreme diversity in the practices of coding and their chaotic variation (volatility) over time. In addition, shortcomings were identified in the regulatory framework which had facilitated the over-concentration of violent mortality from undetermined manner.

This work has resulted in an assessment of the latent cases of murder, self-harm and accidents hidden in the Y10-Y34 categories which confirmed the assumptions made previously about the predominance of latent murders in mortality from EUI. However, the question about the factors behind the dynamics of mortality from EUI in recent years has not been raised. Meanwhile, the explanation of the mirror growth of the proportion of EUI since 2003 is of special interest, particularly because it is at odds with the hypotheses allowing us to explain the tendency of growth of this indicator in previous years by "natural" factors, without resorting to a concept of "manipulation" of the data. Thus, according to the "resource hypothesis", the drop in the number of violent deaths in 2003-2012 should have led to a decrease in the workload of forensic experts

and other procedural persons and an improvement in the quality of the statistics of mortality from external causes. However, it follows from the same research that one of the main factors to be considered consists of organisational problems in collecting and processing data on external causes of death.

The way mortality statistics are organised and any changes therein can play a significant role in determining the levels and trends of mortality from "unknown" causes, including EUI. As examples, one can refer to the aforementioned rapid decline in mortality from "ill-defined conditions" in the 1960s and to the sharp shift in rate ratios of IUC and EUI to other external causes in 1999-2001. In addition, it is known that one of the decisions made by the Board of the USSR Ministry of Health in the spring of 1989 to improve the provision of medical care to those suffering from cardiovascular diseases led to increased mortality from unknown causes in 1989-1990 [Meslé et al. 1996: Chapter 3] and in the following years [Antonova 2007; Gavrilova et al. 2008].

The organisational changes of the post-Soviet period began with the decentralisation of encoding of the causes of death. Before, coding had been carried out in regional statistical offices. Order #398 of the Ministry of Health of the Russian Federation[1] imposed a duty on physicians from medical institutions and hospitals to implement coding as of 1 January 1997.

The transfer of this function from one department to another, and from regional administrations to medical personnel, has created "significant challenges due to the lack of appropriate technical instructions".[2] Alongside the function of coding the causes of death, statistical departments also lost the function of verifying completeness, correctness and coding of medical death certificates by the main cause of death.

This reorganisation could potentially have led to breaches of time series of data on the causes of death and to the deterioration of their quality. However, the effect of innovations should have had a lesser impact on the recording of deaths from external causes because the procedural persons were involved. But since at that time the legislation entrusted physicians with the task of determining, or in any case recording on the medical certificate, an external cause of death from injury or poisoning [Bogoyavlensky 2000: 88; Andreev, Zhdanov, Shkolnikov 2007: 118], such a reorganisation could have had implications for the recording of mortality from external causes, including mortality from EUI. In particular, it could have had an effect during the transition to the 10th revision of the ICD in 1999-2001, generating the notorious conversion of a part of EUI to categories of ill-defined conditions.

As evidenced by international experience, the transition to the ICD-10 could itself have affected the dynamics of the percentage of mortality from EUI. A study in Italy found that the transition to the ICD-10 strongly affected 8 of the 15 categories of external causes, even though there was no interchange between the large blocks (accidents, homicides and suicides) [Gjertsen et al. 2013]. On the other hand, abrupt changes in the level of EUI mortality often coincide with the year of the transition to a new revision of the ICD. For example, in Japan the share of EUI in

[1] The Ministry of Health of the Russian Federation. Order dated December 4, 1996 № 398 "On coding (encryption) of causes of death in the medical records."
[2] Healthcare Committee of St. Petersburg. Order dated March 18, 1997 №98 "On the introduction of instructional and methodological materials for coding causes of death in the medical records."

mortality from other external causes had been increasing for many years, but in 1995 it dropped almost three-fold, and since 1996 it has resumed growth: from 1995 to 2010, its value increased two-fold among men and 2.5 times among women. A fall in the indicator was observed in nine of 14 countries (not counting Romania, for which the time series begins with the introduction of the ICD-10), with the steepest declines occurring in Portugal, Japan, France and Italy.

In Russia, the introduction of the ICD-10 in 1999 did not cause sharp fluctuations in the level of mortality from EUI, but it was precisely in that year that it unexpectedly began to decline against a backdrop of increased mortality from other external causes, which, as mentioned above, may be due to the attribution of deaths from EUI to unknown causes of death. This coincidence was noticed by O.I. Antonova [2007: 105] and, with regard to children, by I. Shurygina [2013]. Although this is an open question, it still appears that the coincidence was not accidental, and that it resulted, in addition to the transition to the ICD-10 itself, from the way in which this transition was carried out.

During the transition to the ICD-10, alongside the introduction of a new form of medical certificate of death,[3] the instructions for filling it out and issuing it, which had been in force since 1984, were canceled, with no subsequent approvals of new ones. The instructions, or rather, recommendations, appeared ten years later, in January 2009.[4] They regulate the procedure for issuing preliminary and final death certificates, as well as the submission of the final verdict for statistical processing. According to S. Nikitina and G. Kozeeva [2006], due to the absence of such instructions there was a drop in the quality of filling out medical certificates and coding causes of death, the definitive medical certificates took longer to complete and, most importantly, the definitive certificates not only no longer reached the statistical agencies, but were no longer issued at all, which had a serious impact on the statistics of external causes of death. Thus, the data on deaths from alcohol poisoning in 2000-2005 processed by Mosgorstat (The Statistical Department of Moscow city) and the data on the same topic compiled by the Moscow Bureau of Forensic Medicine differ by 4-6 times, with the difference steadily increasing during that period [Nikitina, Kozeeva 2006: Table 2].

However, the return of instructions and the publication in 2008 of guidelines for coding the causes of death in compliance with the ICD-10 did not affect the dynamics of either mortality from EUI and other external causes or their ratio. In addition, analysing medical certificates of death for 2010 for the age group 15-59 for Russia as a whole, A.E. Ivanova et al [2013] found a similar problem: the true causes of death established during the examination were not submitted for statistical processing. A further investigation in 2011 showed that it was not so much that a final (instead of a preliminary) medical certificate was not issued, as that not even a preliminary one was issued. The study's authors see the source of this neglect in the country's prevailing legal framework, namely, in order 161 of the Ministry of Health of the Russian Federation from 24.04.2003 "On approval of the instructions on organising and conducting of expert studies in the Bureau of Forensic Medicine". Paragraph 2.2.7.2 is particularly ambiguous:

[3] The Ministry of Health of the Russian Federation. Order dated August 7, 1998 №241 "On improving the medical records certifying births and deaths in connection with the transition to ICD-10."
[4] The Ministry of Health and Social Development of the Russian Federation. Letter dated 19 January 2009 №14-6 / 10 / 2-178 "On the procedure for issuing and filling in medical certificates of birth and death."

- On the one hand, if laboratory tests are needed to establish or clarify the cause of death, a preliminary death certificate is to be issued, and immediately after the tests are conducted, the final certificate is to be issued in lieu of the preliminary certificate;
- On the other hand, the impossibility of establishing the manner of death or the circumstances and place of the injury at the time of issuance of the death certificate does not constitute the reason for the issuance of a preliminary certificate; in this case, "manner of death not determined" is underlined in the form.

This second possible interpretation is the main factor due to which the intent of death determined in the course of the investigation is not submitted for statistical processing, which in turn explains the high proportion of the Y10-Y34 block in mortality from external causes. It should be emphasised that the ambiguity of interpretation is supplemented by the ambiguity of the situation after the cancellation in 2010 of order 161.[5] This order would seem to have lost its power, but another order,[6] promulgated a little earlier, approved, in place of *instructions*, a *procedure* for organising and conducting forensic examinations, and perhaps therefore does not regulate the issuance of either type of death certificate. Thus, the practice of issuing not a preliminary, but immediately a final death certificate with an open verdict continues to this day.

The release of this instruction coincided with the beginning of the current phase of the "mirror-growth" of the proportion of EUI relative to other external causes. It is possible that it is precisely the release of the instruction that contributed to the reduction in recorded mortality from external causes (which began in 2003) and to the continuation of the growth of mortality from EUI until 2005. It is also reasonable that the instruction itself is one of the factors maintaining this relationship.

Immediate issuance of a final medical death certificate in cases where a preliminary one would be warranted, and the failure to submit a final (instead of preliminary) certificate for statistical processing constitute a fundamental flaw in the organisation of recording of mortality from external causes. Little is known about the other flaw – using mortality indicators from specific categories of external causes as criteria for evaluating the work of certain institutions or territorial administrative authorities. Usually it is implicit in arguments about the social significance of the statistics of mortality from homicide, suicide, poisoning, alcohol and drugs. Its role is more obvious for monitoring the implementation of programmes aimed at combating mortality from specific classes and causes of death, including external ones such as traffic accidents and alcohol poisoning. Many such programmes were developed after the approval in 2007 of the Demographic Policy Concept of the Russian Federation, and sometimes this led "to suspiciously strong declines in the coefficients of mortality" [Kvasha, Kharkova 2011].

In and of itself, the use of an indicator of mortality from this or that cause as a criterion is natural, but when there is a lack of control it creates a motive for data manipulation. This

[5] The Ministry of Health and Social Development of the Russian Federation. Order dated 4 June 2010 №423n "On invalidating the Order of the Russian Federation Ministry of Health on April 24, 2003 №161 'On approval of the Instruction concerning the organisation and conducting of forensic examinations in the Bureau of Forensic Medical Expertise.'"

[6] The Ministry of Health and Social Development of the Russian Federation. Order dated 12 May 2010 №346n "On approval of the organisation and conducting of forensic examinations in state forensic research in the Bureau of Forensic Medical Expertise."

hypothesis is well entrenched in Russian demographic literature, which in particular explains the extremely high percentage of deaths of undetermined intent. One of the clearest examples of such manipulations is cited by Ivanova et al. [2013]: mortality from accidental alcohol poisoning (H45) in Russia is a socially important indicator that is monitored by both regional and federal authorities, and the conversion of these losses into a latent form (in particular, to EUI, Y15) makes it possible to significantly improve the indicators of mortality from alcohol poisoning, without making any effort to actually improve the situation.

Overall, we can conclude from the above analysis of the organisation and normative regulation of the collection and processing of statistics of external causes of death that these factors provide the basis for intentional and unintentional distortion of the statistics of mortality from external causes. This, in turn, is likely to support the recent trend towards an increase in the already high degree of uncertainty about the true level of mortality from homicide and self-injury. But are these factors the only possible explanation? Could it be that the mirror growth of the proportion of EUI in 2003-2012 is a natural phenomenon?

To some extent this can be clarified by reformulating the question: were similar periods typical for countries where, contrary to Russia, there are no problems with statistics of external causes?

We have already mentioned that among countries selected for comparison in this paper, an increasing concentration of deaths from external causes in the EUI block over two decades is not uncommon. In most of them, the prevailing trend is towards reduction in mortality from external causes. Therefore, periods of mirror growth of the proportion of EUI are observed in a number of countries: Austria, Bulgaria, Hungary, the UK, Poland, the US, Sweden and Japan. Taking into account the high prevalence of this phenomenon in countries where the problem of abuse of categories of the EUI block is not as acute as in Russia, it can be assumed that the increase in the proportion of those causes is natural. But what accounts for this trend? Let's start from the fact that the risk of mortality from external causes (primarily from suicide, homicide and EUI) is concentrated in socially vulnerable population groups, which is consistent with research on social differentiation of mortality. It follows that the increase in the proportion of causes of undetermined manner in these countries may mean that the reduction of mortality from external causes affects these groups less that the others.

In Russia, where income inequality is more pronounced, mortality from EUI is concentrated in the marginal segments of the population [Ivanova et al. 2004], and the problem of marginalisation is bigger and aggravated by excessive consumption of alcohol. Therefore, if our hypothesis is correct, the growth of the proportion of EUI in Russia in the presence of the reduction in mortality from other external causes may have the same roots, and the proportion itself should be higher than in compared countries. However, a direct analogy with the situation in the eight developed countries cannot be fully justified: in Russia, in the structure of the Y10-Y34 block, an important role is played by categories relating to murder and not, as in these countries, to suicide and accidents. Therefore, although the experience of many developed countries shows that the mirror growth in the proportion of EUI is not the result of manipulation of statistics, the question of its nature in Russia requires further analysis.

5. CONCLUSION

Analysis of long-term trends in mortality from EUI in Russia shows that the distinguishing feature of the periods of increased mortality from external causes was the rapid growth of mortality from EUI and, accordingly, its share in violent deaths. In turn, the unusually high proportion of EUI led to an increase in "uncertainty" as to the true level of mortality from intentional and unintentional events. Since 2003, the ongoing reduction in mortality from external causes has not stopped this trend. Moreover, the reduction strengthened the trend: in 2010, the standardised mortality rate from EUI exceeded mortality from suicide. Now the problem is not that mortality from EUI continues to push mortality away from other external causes, as is observed in other countries, but that this is occurring when the proportion of mortality of undetermined manner has already reached extremely high values.

The proportion of deaths of an unknown manner has increased not only due to injuries of undetermined intent, but also due to "other ill-defined and unspecified causes of death" (R00-R99 in block 13 of class XVIII) According to abundant indirect evidence, deaths belonging to external causes, mainly EUI, are classified as such in some regions [Ivanova et al. 2013]. Thus, a peculiar system of regulation of statistics of mortality from external causes is apparent: deaths from socially significant external causes of death are recorded as events of undetermined intent, some of which (one might say, true deaths of an unknown manner) are displaced from the class of external causes. This phenomenon, called "the conversion of socially significant causes into a latent (Y10-Y34, R96-R99) form" [Ivanova et al. 2013], has important implications for the implementation of programmes aimed at combating high mortality from external causes in Russia, and should be taken into account in their design and implementation.

However, similar problems in the statistics of external causes of death are found in other countries. Sometimes they are objective (difficulties in determining the intention of drowning, poisoning, falls, etc.) and in other instances they result from national peculiarities of coding. In particular, we can point to disproportionately high mortality rates from ill-defined conditions in some European countries [Rockett, Kapusta, Bhandari 2011] and a high proportion of deaths from EUI in external causes in some countries of the European Union. Identification of violent causes of death in infants and one-year-olds is a separate problem. A very high (higher than in Russia) proportion of EUI (in Estonia in 2001-2005 it reached 26%) is due to negligence in the investigation, that is, with no regard to details of the circumstances of the case, sometimes even with no examination of the place of death [Väli et al. 2007]. There is good reason to believe that there is a significant percentage of latent murders among such incidents. For example, over 40% of deaths from EUI among infants and young children in the US (California 1961-1991) resembled murders [Sorenson, Shen, Kraus 1997a], which largely stems from the difficulty of investigating deaths resulting from improper care of young children. Just as in Russia, there are states in the US where the practice of coding external causes varies substantially and changes unpredictably over time, which make the situation even more like Russia's [Breiding, Wiersema 2006]. In the US, too, there exist organisational flaws in the coordination between different departments, which can lead to different recoding of the very same death in different departments; for example, a coroner/forensic expert records a murder, a police report states an accident, and a medical certificate of death classifies it as EUI [Parks et al. 2014]. There are even precedents of pressure from the authorities which lead to a sharp reduction in mortality from suicide and a sharp rise from

accidental poisoning, as occurred in the 1980s in New York City [Whitt 2006]. Finally, according to the analysis of long-term trends in the 14 countries, sudden changes in the level of mortality from EUI in the transition to a new revision of the ICD are not all that rare.

At the same time, similarities are not as important as differences. In most developed countries, statistics on the causes of death are more detailed and more accessible to researchers than in Russia. Working with multiple causes of death, especially in combination with socio-demographic characteristics and – in countries with a population register – with other data, greatly expands the possibilities of monitoring and correcting data on death causes. Studies are being conducted in which information from the medical certificate of death is compared with forensic data. Further measures are being introduced to improve the identification of violent causes, such as psychological autopsy and autopsy narrative (in the UK), and – most importantly for Russia – systems are being created for monitoring external causes of death. For example, systems for reporting mortality from violence in the US (NVDRS), Australia and New Zealand (National Coronial Information System, NCIS) are being combined and systematised in a single database of information from police homicide departments, crime labs, coroners' reports, forensic experts, and death certificates.

In Russia, statistics on causes of death have been moving in the same direction in recent years. But what mainly distinguishes Russia are the scale and the historical roots of the problem. William Pridemore, having found that in the 1990s the number of murders reported by the Ministry of Internal Affairs was lower than that in the Ministry of Health data, formulated the hypothesis that the Ministry of Internal Affairs could not cope with the high level of violence, and in many cases simply did not act. According to him, "Given the history of falsification of crime data within the country, together with … the pressure to reduce crime rates, this is not difficult to believe" [Pridemore 2003: 1350]. There is reason to extend this observation to the statistics of mortality from external causes.

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AN UNNOTICED CONTRIBUTION TO DEMOGRAPHIC TRANSITION THEORY*

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Alexander Kulischer [Alexandre Koulicher] (1890-1942), a former professor at the University of Petrograd (St. Petersburg, Russia) who emigrated to France after the Russian Revolution of October 1917, may be considered one of the pioneers of the theory of demographic transition. However, his contribution to the development of this theory has gone almost unnoticed and underrated. This article presents an intellectual biography of Alexander Kulischer and analyses his views on the demographic transition (demographic revolution), as he expressed them in his publications in German and in French in the first half of the 1930s. Two of these forgotten publications written in French are republished in the appendix to the article.

Key words: *history of demography, demographic transition, demographic revolution, fertility, mortality, migration, Alexander Kulischer [Alexandre Koulicher].*

1

As noted by the British historian and demographer Simon Szreter, the demographic transition theory was born twice [Szreter 1993: 661]: in the first decades of the 20th century and in the 1940s. If this observation is true, then our article covers the first birth of the theory, because the protagonist of this article, unfortunately, did not survive the 1940s.

There is a canonical story of the early life period of the demographic transition theory, which links its origin above all to two names: Adolphe Landry and Warren S. Thompson. In fact, already in a 1909 article [Landry 1909] Landry drew attention to the emergence of a "new demographic regime" requiring a new theory of population, but, as he wrote at the time, "this new theory of population is not, in truth, yet fully developed, it is still in the making" [Landry 1982: 183]. The theory of demographic transition became this "new theory", which then could be only vaguely seen in mentioning a "new demographic regime", but subsequently was significantly developed in Landry's book "The Demographic Revolution", published in 1934 [Landry 1934], and in a more concise form in a paper of the same name a year before [Landry 1933].

As for Thompson, his first brick in the building of the future theory was laid down in a 1929 article [Thompson 1929] in which he identified three groups of countries differing in their birth and death rates and, consequently, in the natural increase of the population. Like Landry, he suggested that as they industrialise, all countries will drift in the direction of the group with low levels of mortality and fertility.

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AUTHORS ARE LISTED ACCORDING TO THE CYRILLIC ALPHABETICAL ORDER AS THEY APPEAR IN THE BELOW-MENTIONED ORIGINAL RUSSIAN ARTICLE.

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There are sometimes proposals to expand the circle of the theory's pioneers. For example, Szreter proposes to include in their number Lujo Brentano, Alexander Morris Carr-Saunders, Thomas Henry Craig Stevenson and Leon Rabinowicz [Szreter 1993: 694]. Our task, however, is not to discuss the whole range of issues relating to the early history of the demographic transition theory. We will just dwell briefly on the last of these authors, because he is the only one who is widely known to Russian demographers and precisely as one of the earliest developers of the theory.

As pointed out by Szreter, he learned about the contribution of Leon Rabinowicz, the author of the book published in 1929 in Paris, "Le problème de la population en France précèdé d'une histoire générale de la population. Étude de sociologie de la population" [Rabinowicz 1929], from an article by the Czechoslovak researcher Alena Subrtova [Subrtova 1984], to which his attention was drawn by Jean Bourgeois-Pichat [Szreter 1993: 694]. However, a much earlier article by Subrtova came to the attention of the Russian demographer Vladimir A. Borisov, who published a paper based on it titled "One more date of the origin of the demographic revolution theory" [Borisov 1986].

In fact, one of the sections of Rabinowicz's book is called "La révolution démographique", and since this book appeared earlier than the publications of Landry, which used this expression, Subrtova and Borisov saw in this a reason (in our opinion, insufficient) for considering its author as one of the pioneers of the theory of demographic transition.

Judging by the publications of Subrtova, Borisov and Szreter, they knew little about Rabinowicz when they referred to his book. They knew no more than that he was born in Poland and had published his book in Paris at the age of 28. In late 1986, after the publication of Borisov's paper, one of the authors of the present article met at a conference in Berlin with Eugene Grebenik, editor of the British journal "Population Studies", and asked him whether he had heard anything about Leon Rabinowicz. The answer was unexpected: Grebenik not only had heard of him, but knew him personally. Leon Rabinowicz was still alive: he had just changed his name. Now his name was Leon Radzinowicz – since 1970, *Sir* Leon Radzinowicz. He had had a distinguished academic career and gained an international name in the field of criminology, and he had become the founder and first director of the Institute of Criminology of the University of Cambridge. After his book was published in 1929, he never again turned to demography.

When this information reached Borisov, he wrote a letter to Leon Radzinowicz and received a reply from him. In turn, Subrtova, in response to a letter from Borisov, said that she, too, knew of the existence of Leon Radzinowicz. He was, she declared, still alive in 1985 [Correspondence 2007]. (Leon Radzinowicz died in 1999 at the age of 93).

In his reply to Borisov, Leon Radzinowicz wrote in particular: "I continue to be surprised that I was the first to use this expression (demographic revolution). It seems to me quite natural to use it" [Correspondence 2007]. In this he was probably right.

Borisov wrote Leon Radzinowicz another letter in which he asked if he knew Adolphe Landry's book. He received no reply to the letter. However, it seems to us unlikely that Landry did not know about a book published in Paris and dedicated to the problems of France's population. It is possible that this book prompted him to use "demographic revolution" as the title of his 1933

article, and then of his 1934 book. Nevertheless, the use of a felicitous expression and the formulation of a fruitful scientific idea are not the same thing.

Leon Rabinowicz (Radzinowicz) was also not the first author to use the expression "demographic revolution". The earliest use known to us is by the Soviet (Ukrainian) demographer Arseniy Khomenko in a pamphlet published in 1925 in Ukrainian [Khomenko 1925], where, referring to the change in birth and death rates in Ukraine during the war and revolutionary upheaval, he writes: "As a result of all this, an entire demographic revolution is taking place" [Khomenko 1980: 104]. In this case, by the word "revolution", then in the air, the author just wanted to emphasise the large scale of the changes taking place, but he did not pretend to suggest any theoretical generalisation. Approximately the same was the case with Leon Rabinowicz.

It is difficult to agree with Subrtova when she writes that he was "the first to use the term 'demographic revolution' in the conceptual sense now used by most demographers" [Subrtova 1984]. Most demographers use it in the context of the demographic revolution theory or the demographic transition – depending on who prefers which – but it always concerns, as Subrtova herself notes, citing Zdenek Pavlik, the upheaval which changed the "quantitative and qualitative nature" of reproduction, "which is most pronounced in the changes in fertility and mortality levels, in the age structure of the population" [Pavlik 1981: 21]. Leon Rabinowicz writes about fertility and mortality and their changes, but sees no "revolution" in this. "We can, without fear of exaggeration," he wrote, "say that the industrial revolution caused a demographic revolution. We will look at it from three perspectives: 1) the overall growth of the population of England; 2) the movement of population centres; 3) the urbanisation of the country" [Rabinowicz 1929: 139]. Here the word "revolution" is used to indicate the importance and magnitude of what was happening with the population. This usage is quite justified, but it does not contain the generalisation which spurred the development of the theory.

2

Now we want to extend the list of pioneers of the demographic transition theory with another great name, which, although not entirely unknown to demographers, is never mentioned in connection with this theory. And yet we are talking about a man who not only literally in just a few words outlined the meaning of what is now called the "demographic transition", but also astutely pointed to the future global sense of this theory, something which none of his contemporaries did.

The historian and economist Joseph Kulischer is well known in the scholarly world as the author of the classic work "History of economic life in Western Europe", which was republished in Russia many times[1] and translated into many languages (e.g. German, Italian, Japanese, etc.). Also widely known in the West is the book by his brother, Eugene Kulischer, "Europe on the move: war and population changes, 1917-1947" [Kulischer E. 1948], who, incidentally, introduced the term "displaced persons" [Tolts 2015a].

[1] The latest edition in Russian is [Kulischer J. 2012].

Less well known, however, is that Joseph and Eugene Kulischer had a younger brother, Alexander, who was also a distinguished scholar. A. Kulischer was born in St. Petersburg on February 9 (21), 1890.[2] In 1907 he graduated there with honours from the St. Anne Gymnasium (Annenschule) [Delo ... 1907]. Alexander, like his brothers, was tremendously influenced by their father, Mikhail Ignatyevich Kulisher (better known in world scholarly literature as Michael Kulischer), who was a prime example of a polymath [Tolts 2015b]. He was well known in Russia as an ethnographer, historian and sociologist, and not only among specialists; Michael Kulischer published frequently in popular journals. Many of his articles were also published in German academic journals, which made their author famous outside Russia.

Alexander was the youngest in the Kulischer family. Like all his brothers, and before them his father, he was educated in the Law Department of St. Petersburg University, from which he graduated in 1911 [Delo ... 1907]. Later, when describing the scholarly path of each of the Kulischer brothers, contemporaries always called them disciples of the famous Russian sociologist Maxim Kovalevsky,[3] who taught at the university where they studied. While at the university, Alexander, like his brother Eugene, was an active participant in the student circle of the prominent lawyer and sociologist Leon Petrazycki (Petrazhytski) [Shul'govskiy 1910]. Out of this group emerged the most prominent Russian social scholars well-known in the West: Pitirim Sorokin, Georges Gurvitch, Nicholas Timasheff, Nikolai Kondratiev [Golosenko, Serbenko 1999].

After graduating from university, Alexander trained for two years at Oxford under the scientific guidance of the Russian-British historian and jurist Paul Vinogradoff. Subsequently, "he returned to Russia with a well-deserved reputation as the best expert in English constitutional law" [Gurvitch 1942: 374]. Alexander's collaboration with his Oxford mentor continued after his departure from England. So, upon publication in 1915 of one of his books, the scholar mentioned Alexander Kulischer among those who helped him "with the reworking of the English edition into the Russian text" [Vinogradoff 2014: 4]. When Vinogradoff died, Alexander published an extensive obituary [Kulisher A. 1925].

In those years, the political system of England and the problems of Ireland's self-determination were at the center of Alexander Kulischer's scholarly interests. He devoted two articles to these problems: "The national unity of England and Home Rule" and "Irish Home Rule and English federalism", which were then published together under the title "The autonomy of Ireland" [Kulisher A. 1915].

Alexander Kulischer's knowledge in constitutional law turned out to be in demand after the February Revolution of 1917, when he took an active part in the formation of a new concept of the country's higher authorities [Vremennoye Pravitel'stvo i Uchreditel'noye Sobraniye 1928]. In addition, Alexander Kulischer was a member of the Commission on the reform of local self-government [Bayguzina 2006: 404]. It was his finest hour as a scholar of law. It is clear, however,

[2] Made clear from the student records of Alexander Kulischer [Delo ... 1907]. The authors are grateful to Anatoly I. Chayesh for providing data from this source.

[3] In the library of this scholar, there is a reprint of an article by Alexander Kulischer with these words: "To my dear Maxim Maximovich Kovalevsky, from his student, the author" [Matiyeva, 2008: 56].

that all this work was in vain, as by the end of the year power in Russia had been seized by supporters of a completely different concept of the State.

Alexander, like other members of his family, was extremely critical of the 1917 October upheaval. All the Kulischers belonged to the Constitutional-Democratic Party, which was outlawed after the Bolsheviks came to power. Soon his brother Eugene was forced into hiding in Finland, then in 1918 he moved to Kiev [The Gazette 1942]. In December 1919, Joseph, the eldest of the Kulischer brothers, was arrested by the Cheka (State Security under the Bolsheviks); soon, however, he was released per the request of the university where he worked [Vinogradov 2003: 228]. Three months before that, in September 1919, Alexander was arrested alongside a large group of Petrograd (St. Petersburg) opposition intelligentsia, but was released [Sorokina 2003: 357].

The following year, Alexander could escape arrest only by fleeing Petrograd, where a Cheka ambush was already waiting for him in his apartment [Kulisher A. 1927a]. Thus ended his work at the University of Petrograd (St. Petersburg), where he was a professor. In July, Alexander, as he later wrote, made his way with great difficulty to Kharkov and then to Kiev [Kulischer A. 1921: 36], where he was reunited with his brother Eugene. From there began a hazardous journey to the West. They left their homeland, now in the hands of the Bolsheviks, at the end of 1920.

Once abroad, Alexander Kulischer vigorously resumed his research activity. In 1921, shortly after his arrival in Berlin, he published in German his book "The Essence of the Soviet State" [Kulischer A. 1921].[4] This book received rave reviews even from someone as far from his political views as Eduard Bernstein, a prominent figure in German Social Democracy [Bernstein 1922]. Two years later, a book by Alexander Kulischer about young Benjamin Disraeli [Kulisher A. 1923] was published in the same city in two translations.

In 1923, the Russian Scientific Institute opened in Berlin. Its academic council included, along with other well-known scholars in exile, Alexander Kulischer [Russkiy Berlin 2003: 287]. However, this institution would not become his place of work. Alexander Kulischer made persistent attempts to find a teaching position at any university, even across the ocean, but they all failed. Edward A. Ross, a well-known American sociologist, actively engaged in the fate of Russian scholars in exile (it is he, in particular, who paved the way to the United States for Pitirim Sorokin), recommended Alexander Kulischer to eighteen American universities [Doykov 2009: 124]. Unfortunately, all his efforts ended in vain; not even his good knowledge of English helped. Most likely, it was a question of his origin: "Jews ... were excluded from many faculty positions in American universities throughout the 1920s and beyond" [Rabkin 2015: 68].[5]

In the very same year, 1923, Alexander Kulischer moved to Paris and started working in the most authoritative newspaper of Russian emigration – "Posledniye novosti" [The Latest News], run by the well-known historian and former Minister of the Russian Provisional

[4] In the publications of Alexander Kulischer in different languages, the spelling of his surname varies: Kulischer in German, Koulicher in French and Koulisher in English.

[5] Not long before his death, Alexander Kulischer was awarded a position in The New School for Social Research, though it happened too late to change his destiny (Gurvitch 1942).

Government, Pavel N. Milyukov. Until its closure in 1940, Alexander was one of the leading columnists (some of the materials he signed under the pseudonyms Junius and M. Alexandrov, and still others he published as unsigned editorials). The role of Alexander Kulischer in the newspaper was so noticeable that opponents called it the "Milyukov – Kulischer organ" (e.g. [Vozrozhdeniye 1936]). Thus, the abilities he inherited from his father proved auspicious: in 1880-1886, Michael Kulischer directed the publication in Kiev of one of the best Russian provincial newspapers [Tolts 2015b].

In Paris, Alexander Kulischer lectured in the Russian department of the law faculty of the Sorbonne and in the Franco-Russian Institute of Social and Political Science, as well as in several other educational institutions and community organisations. However, in his publications in foreign languages, he always pointed out his former affiliation with the University of Petrograd. Alexander Kulischer was an elected board member of the Russian Academic Union in Paris [Serkov 2001: 443-444]. At the same time, he enthusiastically participated in various political endeavours of both all-Russian emigration and its Jewish part.

Alexander Kulischer's father had worked for more than forty years on the problems of migration and left an unfinished manuscript in German titled "Wars and resettlements" [Tolts 2015b]. Once in exile, his youngest son did not forget the legacy of his late father. In 1924, an article titled "The theory of movement of peoples and the civil war in Russia" by Alexander Kulischer appeared in a French academic journal [Koulicher A. 1924]. In this article, Michael Kulischer's migration concept was presented in the form in which it was formulated in his unfinished manuscript, and based on this concept the author gave a novel interpretation of post-revolutionary events in Russia.

Gradually, Alexander Kulischer began to give more and more attention to research on migration topics and population issues, and to lectures on these topics. At the first World Population Conference (Geneva, 1927), where he was listed as a representative of Russia (and once as a representative of the USSR), Alexander Kulischer delivered a report, "Some aspects of the migration problem" [Koulisher A. 1927c], and participated actively in a debate on migration issues. It is interesting that his statements in 1927 have not lost their relevance today and, not without reason, continue to attract the attention of experts (e.g. [Bashford 2007]).

Apparently, around this time began the close collaboration in the field of migration studies between Alexander and Eugene Kulischer. The first evidence of this collaboration was their joint participation in the 6th International Congress of Historical Sciences (Oslo, 1928), where, due to objections from the Soviet delegation, Alexander Kulischer and other Russian émigré scholars were no longer allowed to represent their country – something what they had wanted [Bocharova 1998: 97]. Each of the brothers gave a report there in a personal capacity [Koulicher A.1928; Kulischer E. 1928].

In 1932, the brothers published in German the book "War and migration. World history as peoples' movements" [Kulischer A., Kulischer E. 1932]. The Kulischers' theory of migration was for the first time presented in full, and the examination of the history of mass population movements in Eurasia spans from the 7th to the early 20th centuries. This book provoked numerous responses of contemporaries (e.g. [Milyukov 2015]). Its materials would later be widely used by many researchers, including Fernand Braudel in his classic work "Civilization and

Capitalism, 15th-18th Century", in which he characterized the brothers as "two distinguished historians" [Braudel 1992: 97].

For our topic, it is important that it is precisely in this book a concept that can be called nothing but an exhaustive, yet concise statement of the idea of demographic transition is first formulated. We will return to this issue, but let us first finish our brief biographical sketch.

Alexander Kulischer did not lose interest in his original profession (jurisprudence), and in the first half of 1930 he published in prestigious law journals three French-language articles: "Les quatre constitutions de l'Angleterre" [Koulicher A. 1932], "La multiplicité des sources en droit constitutionnel" [Koulicher A. 1934a] and "La démocratie anglaise et le droit de dissolution" [Koulicher A. 1935]. Contemporaries evaluated the works in this cycle quite highly as "a remarkable study" [Hessen 2011: 96], "a sketch of absolutely exceptional brilliance" [Gurvitch 1942: 374] and "a brilliant study" [Dahl 1936: 166].

Yet these publications, which drew the attention of legal scholars, were rather a tribute to the past. His longtime friend Georges Gurvitch, who knew Alexander Kulischer well, said: "Over the years he became more fascinated by sociology. The problems of demography and migration of peoples especially fascinated him" [Gurvitch 1942: 374].

In 1937, the brothers began working on a new book on migration in Europe during the First World War and in the 1920s and 1930s. This book was supposed to be a continuation, the second volume of their joint work published in German in 1932. Authors of a survey of the refugee situation in Europe were familiar with one of the early versions of the manuscript, and they used its materials in their fundamental report [Simpson 1939: 64]. As a well-informed and authoritative witness wrote, the brothers managed to finish this book: "The second volume in French, which predicted the war, had been prepared for publication. The occupation of Paris prevented its appearance" [Gurvitch 1942: 375].[6]

The brothers decided to flee occupied France. However, in the fall of 1941 Alexander Kulischer was arrested by the Vichy authorities when crossing into the "Free Zone". He died in February 1942[7] in the Vichy internment camp of Noé in circumstances that have still not been determined [Tolts 2014].

3

Returning to the book by Alexander and Eugene Kulischer, let us cite the place of interest to us.

> "The process of 'modernization' of the population, which is observed in different countries at different times, can proceed at different paces, but still in its general outline is always the same, and it seems, is necessarily associated with the

[6] As already mentioned, Eugene Kulisher published in the United States the book "Europe on the move: war and population changes, 1917-1947" [Kulischer E. 1948]. Its first part, the biggest in size, describes in detail the migration process in this part of the world before the Second World War. There is no doubt that the basis for it was an unpublished manuscript by the brothers in French. Alexander Kulischer's contribution to this part of the book becomes even clearer if we take into account the testimony of a well-informed expert that many of the materials used in it concerning Russia and the Soviet Union were simply absent in the United States [Gordon 1949]. Therefore, the younger brother's role in the creation of the book is apparently still underestimated by specialists.

[7] Two close dates are given in the available sources: February 6 and 13, 1942.

> penetration of modern culture in any given country. It includes a *reduction of both mortality and fertility, with, however, the first for some time decreasing by more than the second*, resulting in a period of an excessive increase of births, a rapid accumulation of the population mass and an obvious 'overpopulation' visible to all. The latest experience of the most culturally developed Western countries seems to indicate that an increasing decline in fertility will eventually catch up with a reduction in mortality, and that all this development will end in a stationary state with low values of both coefficients. This process can be explained by attributing the reduction in both mortality and fertility to the same cause, whether it is an increase in wealth or the enlightenment, which affects both health care and hygiene on the one hand, and the new 'sexual morality' on the other. We can also assume the existence of a causal relationship between a fall in mortality and a decrease in fertility, given that a decrease in mortality leads to a strongly progressive development of the population, in which either opportunities to feed itself must expand rapidly, or a tendency to maintain its standard of living by means of keeping families small must arise. In any case, mass migrations act as a corrective tool during a period of excessively high fertility; they reduce overcrowding, thanks to which it becomes possible to preserve the mortality rates already achieved and to make the transition from the old adaptation of the population to the conditions of existence by means of a 'carnage of death' to the new adaptation by means of a 'responsible attitude towards procreation'" [Kulischer A., Kulischer E. 1932: 139-140].[8]

Although the book from which this quote is taken has two authors, the positions formulated therein belong of course to Alexander Kulischer. This is confirmed by two of his other forgotten publications in French, which are presented in the appendix to this article.

One of them is the summary of the report at the 7th International Congress of Historical Sciences held in Warsaw in 1933. In this brief synopsis, there is a very clear description of the stages of the demographic transition, as if it had been borrowed from a modern encyclopedia.

[8] In the original the quotation reads as follows: «Der Prozess der "Modernisierung" einer Bevölkerungsentwicklung, der in verschiedenen Ländern zu verschiedenen Zeiten einsetzt und sich in einem verschiedenen Tempo abspielt, aber dennoch überall in den Hauptzügen derselbe bleibt und mit dem Eindringen der modernen Kultur in ein Land notwendig verbunden zu sein scheint, besteht in einem *Rückgang sowohl der Mortalität als auch der Natalität, wobei aber in der Regel die erstere eine Zeitlang schneller sinkt als die letztere*, wodurch eine Periode steigender Geburtenüberschüsse, eines raschen Anhäufens von Bevölkerungsmassen und einer sichtbaren und allgemein empfundenen "Übervölkerung" entsteht. Die jüngste Erfahrung der kulturell führenden Völker des Abendlandes scheint darauf hinzudeuten, dass am Ende das Sinken der Sterblichkeit doch von einem immer schnelleren Geburtenrückgang eingeholt wird und dass der Abschluss der ganzen Entwicklung in einem stationären Zustand auf der Basis eines niedrigen Niveaus der beiden Faktoren bestehen muss. Man kann diesen Prozess dadurch erklären, dass man den Rückgang sowohl der Mortalität als auch der Natalität auf dieselbe Ursache zurückführt - sei es die Hebung des Wohlstandes, sei es die Aufklärung, die sich dort in Medizin und Hygiene, hier in der "neuen Sexualmoral" auswirkt. Man kann auch einen ursächlichen Zusammenhang zwischen dem Sinken der Sterblichkeit und dem Geburtenrückgang annehmen, wenn man berücksichtigt, dass eine Verminderung der Sterblichkeitsrate eine stark progressive Bevölkerungsentwicklung herbeiführt, bei der entweder der Nahrungsspielraum immer schneller ausgeweitet werden oder eine Tendenz zur Sicherung des *standard of life* durch Kleinhaltung der Familien einsetzen muss**.** Jedenfalls sind es aber die Großen Wanderbewegungen, die in der Periode der steigenden Geburtenüberschüsse als ein Korrektiv wirken, die Übervölkerung lindern, wodurch erst die Beibehaltung der erreichten Besserung in der Sterblichkeitsrate ermöglicht und der Übergang *von der alten Anpassung der Bevölkerung an den Nahrungsspielraum durch "Schlachthaussterblichkeit"* zur neuen Anpassung durch *"verantwortungsbewusste Zeugung" überbrückt wird».*

> "In the first phase, the population grows faster and faster, thanks to a long-term reduction in mortality. Fertility also starts to decline, but with some lag, and its decline begins to slow down such that the excess of births is always increasing and there is a veritable 'overflow' of the country. Over time, the growth [of people] is more and more inhibited as a result of the drop in fertility catching up with that in mortality, although mortality also continues to decline. The relative increase is reduced, although the absolute number continues to grow. In the end, there is a stunning decline in fertility, which tends to suppress any excess of births and even portends a population decline" [Kulischer A. 1933].[9]

To this we must add the author's clear understanding of the universality of the process and of the vector of its diffusion through Europe – from west to east. The interpretation of the French version of demographic development in the 19th century as a special case that nonetheless fits into the overall scheme of development is now widely recognized, but in the early 1930s, this was not nearly as obvious.

However, the most interesting is another publication of Alexander Kulischer – his review of "La révolution démographique" by Adolphe Landry [Landry 1934], which appeared in the same year that the book was published [Koulicher A. 1934b]. This very positive and benevolent review contains at the same time some criticisms that indicate that the reviewer has his own well-developed position that allows him to speak with the author of the book on equal footing.

Noting that the scholarly level of Landry's book "is far superior to most of what has been written by representatives of the natalist school", Alexander Kulischer immediately distanced himself from "natalism" as from a "prejudice". However, his positive assessment of the book is based on the fact that the author, *in spite of* his prejudice, presents facts that could destroy this prejudice.

Although Landry was concerned about the decrease in fertility, which, it seemed to him, leads to depopulation, he, remarks Alexander Kulischer, "without a backward glance describes the former, 'primitive' mode, in which 'balancing of the size of the population with its economic resources is provided by mortality – including mortality as a result of universal famine and pestilence'". There is no turning back, and further arguments of the review's author anticipate the extant debate among demographers about the ability of the demographic revolution (demographic transition) to lead to sustainable reproduction of the population and to avoid depopulation in conditions of unrestricted freedom of procreative choice.

What matters is not the way he responds to this question (to which there is now no generally accepted answer), but the way he formulates his response. Alexander Kulischer considered the demographic revolution as a self-completing process as a result of which the equilibrium between fertility and mortality, upset by the "revolution", is restored to a "steady state". He too, of course, has no convincing arguments in favour of the fact that fertility cannot fall below the equilibrium point, but he is not worried by this question. Alexander Kulischer draws attention to the fact that while demographers worry about the future of fertility, the world takes advantage of the reduction

[9] Unfortunately, this publication of Alexander Kulischer went almost unnoticed. We know only of one reference to it in the context of the history of the study of demographic cycles [Kula 1950: 479].

in mortality, which overtakes the decline in fertility, as a result of which the number of people on Earth greatly increased over the 19th century (though apparently did not actually double, as he believed in accordance with the notions of his day).

Alexander Kulischer considers the demographic revolution described by Landry universal – with the same certainty as expressed by Dudley Kirk ten years later with respect to the demographic transition [Kirk 1944: 29]. Alexander Kulischer's understanding of the demographic changes as universal processes was likely inherited from his father. Michael Kulischer, in his book "Essays on comparative ethnography and culture", already stressed that "the general scheme of motion is the same for all peoples" [Kulisher M. 1887: X]. This view, which he first expressed in the Russian press in the late 1870s, was met, per the testimony of a contemporary, with quite fierce objections from the adherents of national "uniqueness" [Vengerov 1919: 120].

It is curious and somewhat surprising that, when comparing the French and English trajectories of development (the latter was followed by other European countries), Alexander Kulischer not only emphasises that this is the issue of two different versions rather than two different patterns of the transition (il ne s'agit pas de deux stages, mais de deux variantes), but also prefers the French version. He sees the advantage of this version in the synchrony of the reduction in mortality and fertility, and sees great danger in the lagging of the decline in fertility behind that in mortality, which did not exist in France.[10] It is truly amazing that in the intellectual climate of Europe of that time, permeated by the fear of depopulation, he could argue with such penetrating clarity that the "danger of uncontrolled growth of surplus population is now more substantial than the distant prospect of the shrinking of the human race as a result of fertility decline" [Kulischer A. 1934b: 258].

In a careful reading of the review, whose intent is purely scholarly, it is also impossible not to see an attempt to understand not only the new demographic realities, but also the political confusion and political speculations engendered by them – attempts to reconcile the incompatible, that is, the fear of depopulation and the fear of overpopulation. "To such an extent," he writes, "that we see today, as in some European countries, the authorities, intellectuals and 'national' democrats shouldered a double task: to convince people of the absolute need to find an exit for the population, 'suffocating' more and more within its borders, to prepare to conquer these exits at the expense of the aged or of 'inferior' races ... and at the same time to preach and conduct a policy of unfettered 'natalism', ruled by an insane fear that the 'ravages' of the 'demographic revolution' would soon <…> eliminate both the means and the motives for expansionist undertakings" [Kulischer A. 1934b: 259]. Recall that the idea of solving the problems of a rapidly growing population through the expansion of "living space" was clearly articulated in "Mein Kampf", and that Hitler was already in power by this time. At the same time, in "Mein Kampf" a negative attitude to birth control was clearly expressed. All of this was of course well known to Alexander Kulischer, as he headed the political section of "Posledniye novosti" [The Latest News].

The relevance of the context of the 1930s has long ceased to exist, but the relevance of the warning about the "danger of uncontrolled growth of surplus population" turning into a global

[10] The French demographic tradition has always seen the same distinctions in the opposite way, interpreting the comparison of the French and English versions not in favor of France (e.g. [Sauvy 1963: 78-79]).

population explosion has not only lingered, but has grown much more acute decades after the death of Alexander Kulischer.

Worthy of special mention is another feature of Alexander Kulischer's examination of all the problems of demographic transition. We have already cited words, somewhat unusual for reflections focused on the demographic transition, from the 1932 book, that "mass migrations act as a corrective tool during a period of excessively high fertility". The poorly understood fertility decline in the twentieth century made a terrifying impression on the entire European society associated with demography's increased interest in fertility problems; migration as a subject of scholarly interest faded into the background. As David Coleman rightly wrote, "Until recently, migration has typically been regarded as the 'weak sister' of modern demography" [Coleman 2006b: 19]. Content analysis of the four leading European demographic journals for 1997-1999 showed that migration as a subject of study was dealt with significantly less often than fertility and mortality, and "migration as a factor (a variable) contributing to population size was treated only marginally, which is not the case with regard to fertility and mortality" [Hoffmann-Nowotny 2000: 77-78]. However, then the situation began to change rapidly, as migration began to attract more and more attention. Coleman, with his concept of "the third demographic transition" [Coleman 2006a], contributed to the relatively recent inclusion of migration issues into the set of central issues of the theory of demographic transition; unfortunately, he did it somewhat one-sidedly because he sees "the third demographic transition" only from the perspective of countries accepting migrants.

Meanwhile, Alexander Kulischer, in contrast, originally viewed the demographic transition through the eyes of a scholar of migration, heavily influenced by his father, who had developed the theory of migration as a part of general population dynamics theory [Koulicher A. 1924].

In his review of Landry's book, Alexander Kulischer recalls the role played by emigration in the 19th century. In all European countries except France, "birth control affected initially only cities that had been inundated by people from the countryside, who still lived by the 'laws of nature' and had avoided the effects of this 'primitive regime' only thanks to this migration, as well as to emigration overseas" [Kulischer A. 1934b: 258].

However, he had touched on this topic earlier and in greater detail. In his intervention at the World Population Conference of 1927, Alexander Kulischer said: "One considers an isolated country and says such and such is its birth rate, such its growth, such its natural and artificial resources. If one reflects for a minute, however, one sees all at once that this problem of an isolated population does not exist. In reality, the whole area within which migration is possible is a unit" [Koulisher A. 1927b: 102].

In his main presentation at the Congress in 1927, Alexander Kulischer begins with the assertion (similar to D. Coleman's statements at the beginning of the 21st century) that the importance of migration was underestimated in demographic theory [Koulisher A. 1927c: 305]. Pointing to a number of historical examples of the extremely important role of migration as a component of population dynamics (and stressing every time the hardly peaceful nature of large migrations – another point in common with Coleman [2006a: 419]), he comes to a conclusion which seems to have been formulated today:

"As the period of the exceptionally rapid increase of food resources and of the 'open door' for migrations seems to be closed, birth control might be perhaps an alternative to the return to the ancient conditions if it prevailed universally. But we must wait a long time before this solution is universally adopted. In the meantime, the richer nations, which are also those with a sharply declining birth rate, if they refuse to admit the surplus population of the poorer countries, will be forced to help the potential emigrant populations in finding a living at home" [Koulisher A. 1927c: 309].

Summarizing, we can say that Alexander Kulischer, already in the late 1920s and early 1930s, had – and repeatedly expressed – a clear conception, in many respects ahead of its time, of an array of demographic changes grouped today under the concept of a "demographic revolution" or "demographic transition". As he understood them, these universal changes, inevitable for all countries, concerned all three main demographic processes (mortality, fertility and migration), and determined the nature of their interaction: a fall in fertility is a consequence of a fall in mortality, and the lagging of the first behind the second leads to excessive population growth, which to some extent can be controlled through migration.

It is also important that Alexander Kulischer not only developed the general scheme of demographic changes, but also expressed awareness of related problems. For example, one cannot but marvel at his insight into the impossibility of decreasing fertility rapidly everywhere and at the same time the concomitant impossibility of countering the excess of population in poor countries with emigration.

At the same time, his view of the demographic revolution is more optimistic than that of Landry. Alexander Kulischer does not share Landry's concerns about the devastating threats allegedly posed by the demographic revolution; with a touch of irony, he mentions Landry's reflection that the Roman Empire collapsed because of declining fertility, and he calls to "reject the solidarity of interests of the 'populationists' of all countries and take a humanistic point of view…which ardently yearns…for the soonest possible triumph of the 'demographic revolution'". [Kulischer A. 1934b: 259].

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APPENDIX

Below are the original French texts of the summary of Alexander Kulischer's report at the VII International Congress of Historical Sciences (Warsaw, 1933) and his review of Adolphe Landry's book, *La révolution démographique,* discovered by Mark Tolts.

LE CYCLE DE POPULATION DANS LES PAYS MODERNES

Alexandre M. Koulicher

VII^e^ Congrès international des sciences historiques. Résumés des communications présentées au Congrès. Vol. II. Varsovie 1933 : 354-355.

La plupart des peuples modernes traversent à différentes époques, suivant le moment où le peuple en question est entré dans la voie du «progrès moderne», un cycle typique au point de vue du développement de la population. En parlant de l'Angleterre, où ce cycle a commencé dès la seconde moitié du XVIIIe siècle, il se répète avec une régularité étonnante des stages dont il consiste, chez les autres peuples européens, généralement parlant, de l'ouest à l'est.

Ce cycle, qui, aujourd'hui, s'achève chez les peuples les plus avancés à ce point de vue, tandis qu'il est encore en plein développement chez les autres, consiste des stages suivants. En une première période, la population augmente de plus en plus rapidement grâce à une baisse prolongée de la mortalité. Une baisse de la natalité commence aussi, mais à une certaine distance et elle va, d'abord, plus lentement de sorte que l'excédent des naissances est toujours accru et il y a une véritable «inondation" du pays. Plus tard, l'augmentation est de plus en plus enrayée, par la baisse de la natalité rattrapant celle de la mortalité, bien que celle-ci continue, elle aussi, de diminuer. La proportion de l'augmentation est réduite bien que ses chiffres absolus continuent de croître. A la fin, il y a une baisse foudroyante de la natalité, qui tend à supprimer tout excédent des naissances et fait même prévoir une diminution de la population.

De ce développement normal il y a pourtant quelques exceptions. Ainsi, d'un côté, en Hollande, la baisse de la natalité n'a pas pu jusqu'ici rattraper celle de la mortalité et le développement de la population demeure progressif sans arrêt. D'autre part, en France, la baisse de la natalité a rapidement gagné sur celle de la mortalité de sorte qu'il n'y a pas eu de période d'excédents de naissances augmentés, rien qu'une diminution suivie de cet excédent, jusqu'à l'état stationnaire de la population, qui s'est établi en France avant les autres pays, mais auquel d'autres peuples arrivent également après des secousses et des tribulations beaucoup plus grandes.

Les causes de ce cycle se trouvent dans certaines relations entre le mouvement démographique et l'évolution économique des pays modernes, – en particulier, dans le processus également typique de l'exode rural et de l'urbanisation des populations.

La conclusion générale qui se dégage de l'étude de ce sujet, consiste en ceci, que les changements de la natalité, loin d'être le facteur déterminant de l'évolution, n'en sont que des conséquences, étant déterminés, d'une part, par les conditions économiques qui limitent, à tout moment donné, le nombre de la population additionnelle, susceptible d'être élevée sur le produit du travail de la population existante, et d'autre part, dans ces limites par la mortalité, qui subit,

beaucoup plus directement l'influence de l'évolution économique et intellectuelle, la restriction des naissances ne faisant que permettre le maintien d'une mortalité réduite.

REVIEW OF THE BOOK BY ADOLPH LANDRY *LA RÉVOLUTION DÉMOGRAPHIQUE*

A. Koulicher (Kulischer)

Archives de philosophie du droit et de sociologie juridique. 1934. 4(1-2) : 257-259

A. Landry. - La Révolution démographique (Etudes et essais sur les problèmes de la population). Libr. du Recueil Sirey, 1934, 230 pp.

L'ouvrage de M. Landry est un recueil de plusieurs études. Le thème principal en est le fait mondial de la diminution des naissances et l'examen des moyens destinés à combattre cette révolution, tenue pour néfaste par notre auteur qui est «un populationniste».

Ouvrage d'une valeur scientifique très supérieure à la plupart des écrits de l'école nataliste. M. Landry cède bien au parti-pris, traditionnel en France depuis l'époque où la stagnation numérique de la population française par suite de la diminution des naissances était considérée comme un fait exceptionnel de décadence d'une race vieillissante condamnée à la submersion par les peuples plus jeunes et plus vigoureux. Mais ce parti-pris n'empêche pas l'auteur d'exposer avec beaucoup de vigueur les faits nouveaux qui sont venus démolir cette ancienne conception. Non seulement, en effet, la «révolution démographique» se présente aujourd'hui comme un phénomène universel, bien qu'elle fasse son apparition chez les différents peuples à des moments différents, mais il semble en outre qu'elle marche d'autant plus vite, qu'elle a commencé plus tard dans un pays donné. Aussi la situation démographique de plusieurs pays européens est-elle dès maintenant «pire» que celle de la France. Et M. Landry ne cache pas sa crainte que le monde entier puisse succomber au même destin. C'est sans ménagement pourtant qu'il décrit le «régime démographique» du bon vieux temps auquel met fin la «révolution» tant redoutée : «Là, aucune préoccupation des conséquences que peut avoir pour le bien-être des individus, des familles, la multiplication sans frein des membres de celles-ci.» L'adaptation du chiffre de la population à ses ressources économiques se fait sous ce régime par la mortalité, - y compris les grandes famines et épidémies, - lesquelles rattrapent la natalité, et «enrayent l'accroissement».

On conviendra qu'il est malaisé de préconiser le retour à ce «régime démographique primitif». C'est sans doute le motif pour lequel l'auteur cherche à définir un «régime intermédiaire». Là un certain souci de maintenir le niveau du bien-être conduirait au retardement des mariages ou au célibat de quelques-uns. Ce régime serait à distinguer du «régime contemporain», résultat du triomphe d'une conception «rationnaliste» de la vie, qui conduit à la prévention directe des naissances. Une baisse de la mortalité produit, sous le régime «intermédiaire», un accroissement de la population; ce n'est plus le cas sous le régime «contemporain».

Un exemple du «régime intermédiaire» serait fourni par l'Angleterre au XIX^{e} siècle à une époque où le «régime contemporain» s'était déjà établi en France. En réalité, il ne s'agit pas de

deux stages, mais de deux variantes de la «révolution démographique», la variante anglaise s'étant reproduite plus tard dans les autres pays, où la «révolution» s'est accomplie. En France seulement, la restriction des naissances est apparue, dès le début, dans les villes et les campagnes à la fois. Embrassant tout le pays, la baisse des naissances a diminué progressivement le taux d'accroissement, malgré la baisse de la mortalité, jusqu'à aboutir sans secousses à l'état de population stationnaire. De là aussi la conservation des petits patrimoines et un moindre degré de prolétarisation. Partout ailleurs, la restriction des naissances n'était, d'abord, qu'un phénomène de la ville inondée par la marée, qui venait de la campagne, qui, elle, suivait encore la «loi naturelle», et n'échappait aux conséquences du «régime primitif» que par cette migration et, aussi, par l'émigration transocéanique. Dans ces conditions, la baisse de la mortalité commençait par augmenter l'excédent des naissances, celle de la natalité ne suivant qu'à distance. Puis, le déplacement rapide du centre de la population vers les villes infécondes a fait pencher brusquement la balance. De là, finalement, une baisse foudroyante de la natalité générale, d'où attente de diminution de la population à une époque prochaine.

M. Landry présente une bonne explication des méthodes employées pour calculer les tendances futures du développement d'une population. Les taux «bruts» de natalité et de mortalité sont trompeurs parce qu'ils dépendent de la distribution de la population entre les âges, cette distribution étant, elle-même, appelée à changer par suite de variations des éléments démographiques. Force est donc de remplacer le taux de la natalité par un calcul compliqué de la «reproduction» d'une génération par les femmes de la génération précédente, la mortalité entrant dans ce calcul, en tant qu'elle empêche une partie des femmes d'achever pleinement leur carrière «reproductrice». Quant à la mortalité générale (dont on «rectifie» le taux par un calcul de la durée moyenne de la vie), elle «n'est pas sans intérêt», mais les changements n'en conduisent qu'à des variations du nombre de la population, «une fois acquises». Il y a là des expressions qui prêtent à un malentendu. Ce que l'auteur veut dire, c'est que, lorsque la mortalité, après avoir subi un changement, redevient stable, la variation du nombre de la population, résultant de ce changement étant une fois accomplie, la tendance ultérieure de la population à augmenter ou à diminuer ne dépendra plus que de sa «reproductivité». Oui, mais la croissance sera plus rapide ou la diminution plus lente si la vie de chaque génération est plus longue. «L'intérêt» véritable de la mortalité réside en ceci, que *tous* les accroissements considérables de la population sur lesquels nous possédons des renseignements tant soit peu sûrs, ont été le résultat de la baisse de la mortalité qui ont fait doubler le genre humain au XIXe siècle, malgré tous les affaiblissements de la «reproductivité». A l'inverse, dans *tous* les cas, où nous connaissons avec certitude les causes de «dépopulations et de décadences», elles ont été produites par des vagues de mortalité exorbitante, sinon par la fuite des habitants; ces pertes devenaient définitives si elles coïncidaient avec la ruine des ressources économiques, double résultat caractéristique de tant de dévastations guerrières. Il y a des faits bien mieux prouvés que l'hypothèse d'une crise de naissances pour expliquer la décadence romaine.

Voilà pourquoi il y a plus d'urgence dans le danger des tentatives d'expansion violente de la part de populations surabondantes et qui continuent d'augmenter (par le fait des taux «bruts» d'excédents de naissances, lesquels en fin de compte, déterminent la situation *actuelle* à la différence de ces calculs «rectifiés» qui ne servent qu'à des pronostics douteux), – même au point de vue d'un idéal «quantitatif» de civilisation, - que dans la perspective lointaine d'une diminution du genre humain par la baisse des naissances. Reste, il est vrai, cette considération, que «du point

de vue national, on sera très généralement populationniste». À un tel degré, ajoutons-nous, que l'on voit, à l'heure actuelle, dans quelques pays d'Europe les dirigeants, les intellectuels et démographes «nationaux» attelés à une double besogne: convaincre le peuple de la nécessité absolue de chercher des issues pour une population qui «étouffe» de plus en plus en ses limites (ce qui est démontré par les chiffres «bruts» de la population et de son accroissement), se préparer à la conquête de ces issues aux dépens des peuples vieillis» ou des races «inférieures»..., et, en même temps, mener une politique et une prédication «nataliste» à outrance, sous l'empire de la crainte folle que les «ravages» de la «révolution démographique» ne suppriment bientôt (comme il est à prévoir d'après les calculs de «reproductivité») et les moyens et les motifs des entreprises expansionnistes. Dans ces conditions, ne faut-il pas rejeter l'intérêt solidaire des «populationnistes» de tous les pays, se placer à ce point de vue humain, - identique, dans l'espèce, avec l'intérêt national de la France et de tous les peuples pacifiques, - qui fait ardemment souhaiter, dans ces cas, le triomphe de la «révolution démographique» aussi rapide que possible?

SOCIAL DIFFERENCES IN HOUSEHOLD STRUCTURES IN THE 19TH CENTURY: MOSCOW AND ITS OUTSKIRTS*

ALEXANDRE AVDEEV, IRINA TROITSKAYA, GALINA ULIANOVA

During the last few decades, ideas about household structures in the territories lying east of the Hajnal line have changed considerably. Not only has the line itself been transformed into a fairly wide 'transitional' zone and its location on the European map been changed, but the variety of family forms found behind the generalised characteristics of the "Eastern" territories has made scholars re-examine certain theoretical concepts and findings.

The new concepts are based on the growing number of micro-studies covering the territories of Central and Eastern Europe and provide very detailed information on family size and structures. For Russia, which has always been considered a model of the Eastern type of household organisation, new data have appeared as well, making it possible to re-examine the theories concerning Russian households.

However, scholars more often pay attention to geographic rather than social stratification of household types. The majority of studies are devoted to the social group of peasants, especially of peasant serfs, while household structures in other social groups are less explored.

In this article, we seek to fill this gap by providing a comparison of household structures in two social groups, namely of Moscow merchants and of serfs who lived near Moscow in the middle of the 19th century. The household structures in the two groups were entirely different: one in two merchant families was a nuclear one consisting of a couple with or without children, or a single parent with children, while in the peasant population multiple households, including several nuclear families, predominated (60% of the total number of households). The most likely explanation for this is the two groups' different obligations to the state.

***Key words**: Hajnal line, household classification, revisions, merchants, peasants.*

"West is West, East is East,
and never the twain shall meet ..."

Rudyard Kipling,
"The Ballad of East and West" (1889)

Where is the border between East and West? We can assume that for Kipling, this conclusion, based on his life in Britain and the British colonies, was not in any doubt, but a resident of continental Europe would have a hard time giving a clear answer to the question. And yet, one possible answer is provided by the results of a project studying fertility in Europe (The European Fertility Project), better known in scientific circles as the Princeton Project.

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THE STUDY WAS CONDUCTED WITH THE SUPPORT OF THE RUSSIAN FOUNDATION FOR THE HUMANITIES, PROJECT 15-01-00362 «A DEMOGRAPHIC HISTORY OF THE MOSCOW MERCHANT CLASS ACCORDING TO THE LISTS OF THE 3RD-10TH REVISIONS (1762-1858): MARRIAGE AND FAMILY, FERTILITY AND MORTALITY, SOCIAL AND SPATIAL MOBILITY».

The project was initiated by A. Coale in the late 1950s, a time when the model of demographic transition – still relatively new and widely discussed – needed data to support it. Therefore, one of the main goals of the project was to study the characteristics of the demographic transition in certain European countries. An international team of then young demographers, today world-famous scientists (B. Anderson, J. Knodel, R. Lesthaeghe, M. Livi Bacci, E. Van de Walle, et al.), participated in the project and, using project data, described in detail how and when the demographic transition took place in Europe [Coale 1969; Coale, Anderson, Harm 1979; Coale, Watkins 1986; Knodel 1974; Lesthaeghe 1977; Livi Bacci 1971, 1977; Van de Walle 1974].

But in addition to answers to important questions about the patterns of the demographic transition and, above all, the drop in fertility in Europe, the project gave several interesting results of a more general nature, including those which led to the conclusion that temporal and geographic differences in nuptiality played a very important role in the reduction of fertility [Tilly 1986: 324] – a conclusion that confirmed the European marriage patterns , already well known by that time, of J. Hajnal and of his famous, albeit not exactly straight line connecting St. Petersburg and Trieste [Smith 1990: 172].

According to the Hajnal model, the decline in fertility to the west of this line was due not only to voluntary birth control after reaching the desired number of children in the family and to lengthening the intervals between births [Knodel 1974], but also to the postponement of marriage for quite a considerable period of time [Hajnal 1965] – a conclusion that seems obvious today but in the mid-1960s was an important scientific discovery and determined for many years to come a whole area of research in demography.

Once the Hajnal line had divided Europe into “East” and “West” by a purely demographic criterion, many could not resist the temptation to use it not only to separate, but also to contrast Eastern and Western Europe, for example, by the degree of democratisation, IQ parameters, level of corruption, civic consciousness, etc.[1]

In the early 1970s, P. Laslett, noticing differences in the types of family structures in Western and Eastern Europe, used the Hajnal line to divide Europe on this basis [Laslett 1972]. Note, however, that over time, as new data appear – especially for countries that do not belong to Northern or Western Europe – the border becomes more and more blurred and less obvious, and behind the differences in household types profound differences in family systems integrated into the wider socio-economic context can be seen [Todd 1983]. Nevertheless, it can be stated that, until the end of the 1980s, the Hajnal line represented a border to the west of which knowledge regarding the structure of households was more or less documented.

Recent decades have significantly changed our understanding of the types of households in the territories lying to the east of the Hajnal line. Not only has the line itself turned into a fairly extensive “transition” zone, and not only has its position on the map of Europe changed [Kaser 2001; Mitterauer 2003], but also the variety of types of marriage and family found behind the generalised characteristics of Eastern and Central European territories has led researchers to reconsider some of the theoretical concepts and results of earlier studies [Szołtysek 2007].

[1] See for example: https://hbdchick.wordpress.com/2014/03/10/big-summary-post-on-the-hajnal-line/.

This expansion of the boundaries of the phenomenon under study was made possible by a growing number of micro-studies providing detailed information about the size and composition of households in Central and Eastern Europe. New data have appeared also for Russia, which has always been considered a classic example of an "Eastern" type of family formation and household organisation, and they too provide a basis for the revision of existing ideas about the Russian family. Studying the forms of Russian families and households based on individual data allows us to apply standard classifications of types of households to Russian sources and to obtain results that are comparable with European ones.

Existing studies more often take into account the geographical rather than the social stratification of types of households; researchers critical of the Hajnal model point to its excessively "demographic approach to the study of family history, ignoring the significant differences between classes" [Kaiser 1992: 39]. The object of the overwhelming majority of studies of Russian household types is the social group of peasants, a fact largely due to the quantitative predominance of this class in the population of the Russian Empire in the 19th century; it is precisely their demographic behaviour which determined rates of fertility, mortality and natural increase during this period. In addition, the formation and functioning of serf households explored in this article are fairly well documented. Official sources, such as revision or confession lists, are supplemented by orders from the landlord or his administrators, correspondence between them concerning affairs on their estates, inventories of local households, instructions of clerks concerning estate management, records of punishments and lists of passports issued.

Other social classes, relatively few and less susceptible to external control requiring documentation, have been studied in much less detail. We have tried to bridge this gap by presenting in this article a comparative analysis of the structures of households in two estates (suburban Moscow merchants and serfs) in the middle of the 19th century. The results of an analysis of household structures in the Vykhino *votchina*[2] have already been presented in earlier works of the authors [Blum, Troitskaya, Avdeev 2000]; data on the size and structure of the households of Moscow merchants in the middle of the 19th century, estimated from a 10% sample and presented in a form comparable with the results of similar studies, are now published for the first time.

SUBJECT OF THE STUDY AND DATA SOURCES

The sample, on which our comparative study of class differences in the structures of households in the middle of the 19th century is based, includes about 3,000 persons: more than 1,500 representatives of the merchant class living in two large Moscow *slobodi*,[3] and about 1,400 serfs

[2] A patrimonial estate.

[3] Sloboda (settlement): Until the 18th century this was a small, autonomous part of a city. In the 18th century, during the first revision, Moscow was divided into sections, which were called hundreds, fifties and slobodas; later, hundreds and fifties were renamed slobodas. For the merchants and petty-bourgeois of Moscow, this division remained until the end of the 19th century (at least until the publication of "Materials for the history of Moscow merchants"). Historically, a sloboda was a place of settlement of a corporative community, which had certain freedoms. Thus, in the Sadovnicheskaya sloboda lived horticulturists, and in the Kadashevskaya sloboda were coopers. At the beginning of the 18th century, the corporate and professional nature of the sloboda was forever lost.

from one of the suburban Moscow estates of the Counts Sheremetev.

The Kadashevskaya and Sadovaya Naberezhnaya slobodas were located on both banks of the Vodootvodny Canal (Figure 1); this is reflected in the toponymy of modern Moscow (Kadashevskaya and Sadovnicheskaya Embankments, Kadashevsky lanes, etc.).

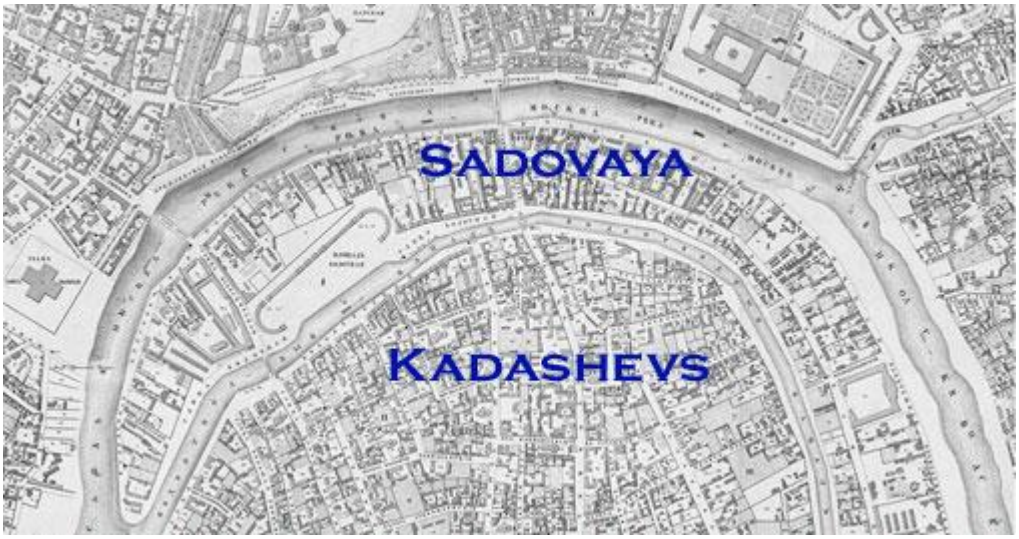


Figure 1. Kadashevskaya and Sadovaya Naberezhnaya slobodas (map of Moscow in 1851)

The Vykhino *votchina*, consisting of the *selo* (the village of Veshnyaky) and three *derevni*[4] (the villages of Vykhino, Zhulebino and Vyazovka) located close to one another, was situated 10-12 km from Moscow on Bolshaya Kolomeskaya Road (Figure 2).

Records were used from the revisions[5] of 1834 and 1850-51 as sources of data on the size and composition of households. The revision household lists of the Vykhino *votchina* are kept in fund 51, "The Moscow Treasury Chamber", of the Central Historical Archive of Moscow (CHAM). The source of data on merchants' households consists of the revision lists from "Materials for the history of Moscow merchants", a multi-volume work published in 1883-1889 on the proposal of the elected representative of the Moscow merchant class, N.A. Naydenov, seconded at a meeting of representatives on April 8, 1883.

[4] Both the *selo* and the *derevnya* were populated rural areas, but until 1917 there was a distinct difference: the *selo* always had a church, that is, it was the centre of a parish uniting several nearby *derevnyas*.
[5] Poll tax registers introduced by Peter the Great after the basis of taxation in Russia had changed from households to individuals.

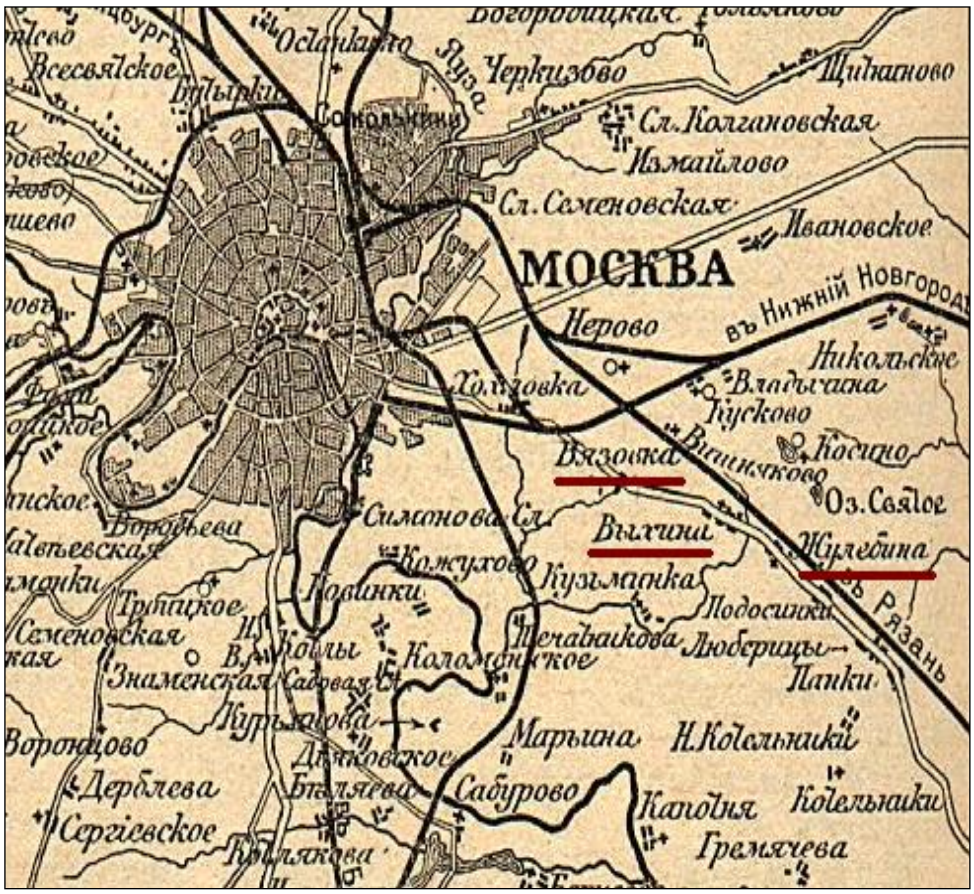
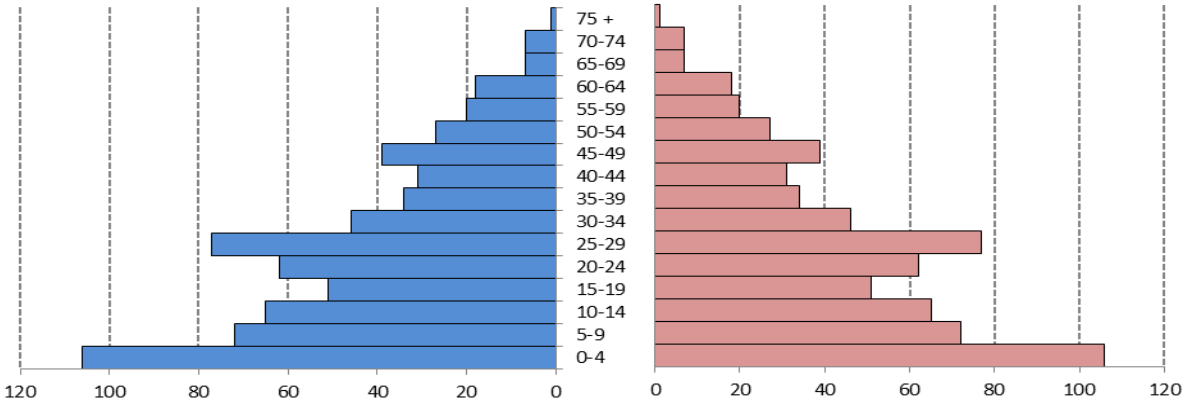


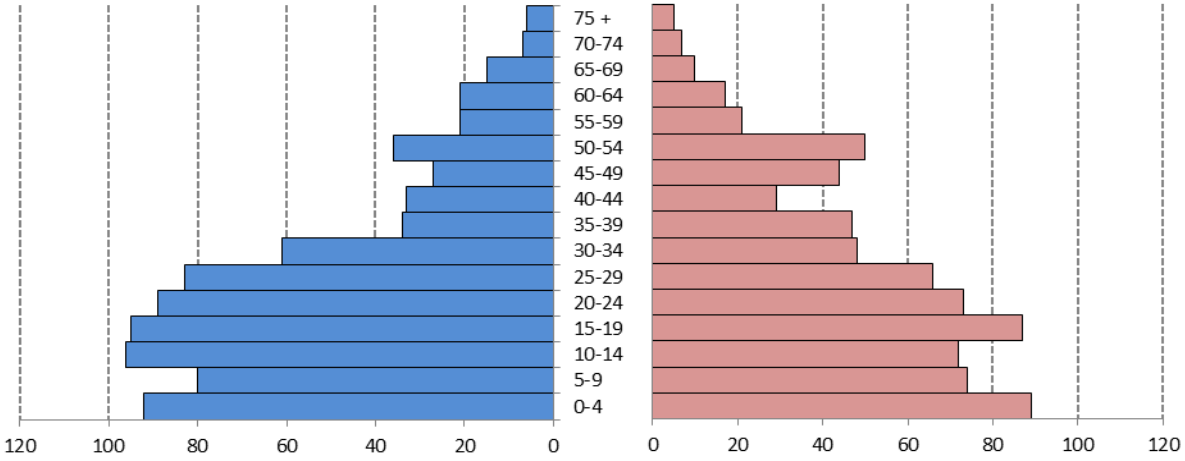
Figure 2. Map of the Moscow region (second half of the 19th century)

Revision lists are a unique source of demographic information containing information about the size and structure of households, kinship ties within the household, the sex and age structure of the population, an age breakdown of deaths, etc.[6] According to records of the 9th revision, for our sample both social classes being studied had a sex and age structure typical of historical populations: in both groups, a third were children under the age of 15 and the average age was 26 (Figure 3).

[6] For more about the revisions as a source of demographic information, see: [Troitskaia 1995].



Peasant population, men *Peasant population, women*



Merchant population, men *Merchant population, women*

Figure 3. Age and sex pyramids of the studied population according to the 9th revision (1850)

STRUCTURES OF HOUSEHOLDS: SOCIAL CLASS DISTINCTIONS

To assess household structures, we used the classification of P. Laslett, although it is often criticised, including in the case of its application to Russian data. However, unsatisfied with the alternative classifications proposed by Soviet or Russian historians, and in order to be able to compare our results with the results of similar studies, we use the above classification. Laslett proposed it in the early 1970s, a time when family history studies, which began in the late 1950s in Western Europe, required generalisation and a basis for comparison of results obtained in different countries.

According to this classification, there are five types of households, ranging from simple ones consisting of a single person to multiple, multigenerational ones involving several couples with or without children. Within each type there are several subtypes, depending on the kinship relations between the members of the household and the head of the household [Laslett 1979].

Table 1. Structures of merchant and peasant households according to the 8th revision (1834)

Category of household according to the classification of P. Laslett	Merchant Households, Moscow		Peasant Households, Vykhino	
	share, %	average size	share, %	average size
Solitaries	12.0		6.9	
No family	2.4	#)	1.7	#)
Simple family households	58.1	5.07 (±2.40)	14.7	4.59 (±1.80)
Extended family households	3.3	4.64 (±1.12)	12.1	6.14 (±1.56)
Multiple family households	24.3	9.70 (±4.15)	64.7	15.87 (±9.71)
Number of households / Total population / Average household size (all types)		334 / 1887 / 5.65		116 / 1367 / 11.78

Note: #) – estimates for category "No family" are not presented due to the small number of such households.

As can be seen from Table 1, at the time of the 8th revision, the merchant class was dominated by the nuclear (simple family) household: a married couple with or without children or a widow/widower with children. These account for about 60% of the total number of households, whereas in the Vykhino *votchina*, the share of such households does not exceed 15%. It is interesting that the average size of the merchant nuclear household is 0.5 persons larger than that of the peasant nuclear household. Hypotheses that could explain this difference (e.g. higher fertility, lower infant mortality, later marriage and a smaller proportion of single-parent families in the merchant population) require additional verification. In the peasant population we see the opposite trend: multiple households account for almost 65% of the total versus 25% in the merchant population.

Also worth note is the relatively high proportion of single households (solitaries) in the total number of merchant households (12% versus 6.9% for peasants) and the very low proportion of extended households consisting of couples with or without children and other unmarried relatives (3.3% among merchants versus 12.1% among peasants). The explanation of this is found in the Russian legislation of that period; we will discuss this below.

In the period between the revisions, quite noticeable changes took place in both of the studied populations (Table 2). We note above all a decline in the proportion of multiple peasant households and, very importantly, a decrease in their average size. In addition, during the same period the proportion of nuclear peasant households doubled, while the share of single households fell more than two-fold.

In the merchant population, there was a significant decrease in the proportion of nuclear households, and almost a doubling in the share of singles. To illustrate the nature of the changes in household structures, we have presented the data from Tables 1 and 2 in graphical form in Figure 4.

Our results show a simplification of the structures of peasant households between the 8th and 9th revisions, primarily a reduction in the proportion of medium-sized and multiple households. Whatever the reason for these changes, they give cause to consider the limitations of using P. Laslett's classification to analyse Russian household types.

Table 2. The structure of households according to the 9th revision (1850-1851), with an evaluation of the differences with the data of the 8th revision (1834)

Category of household according to the classification of P. Laslett	Merchant Households, Moscow		Peasant Households, Vykhino	
	share, %	average size	share, %	average size
Solitaries	21.7***		2.9*	
No family	2.9 n.s	#)	2.4 n.s.	#)
Simple family households	47.9***	4.78 (±2.53)	27.1***	3.93 (±1.72)
Extended family households	4.5 n.s.	7.57 (±2.59)	15.2 n.s.	5.19 (±1.79)
Multiple family households	23.0 n.s	8.89 (±4.13)	52.4*	8.89 (±2.85)
Number of households / Total population / Average household size (all types)		309 / 1536 / 4.97		210 / 1386 / 6.60

*Notes: *** $p \leq 0.01$; ** $p \leq 0.05$; * $p \leq 0.1$; n.s. – the differences are non-significant;*
#) estimates for the "No family" category are not presented due to the small number of such households.

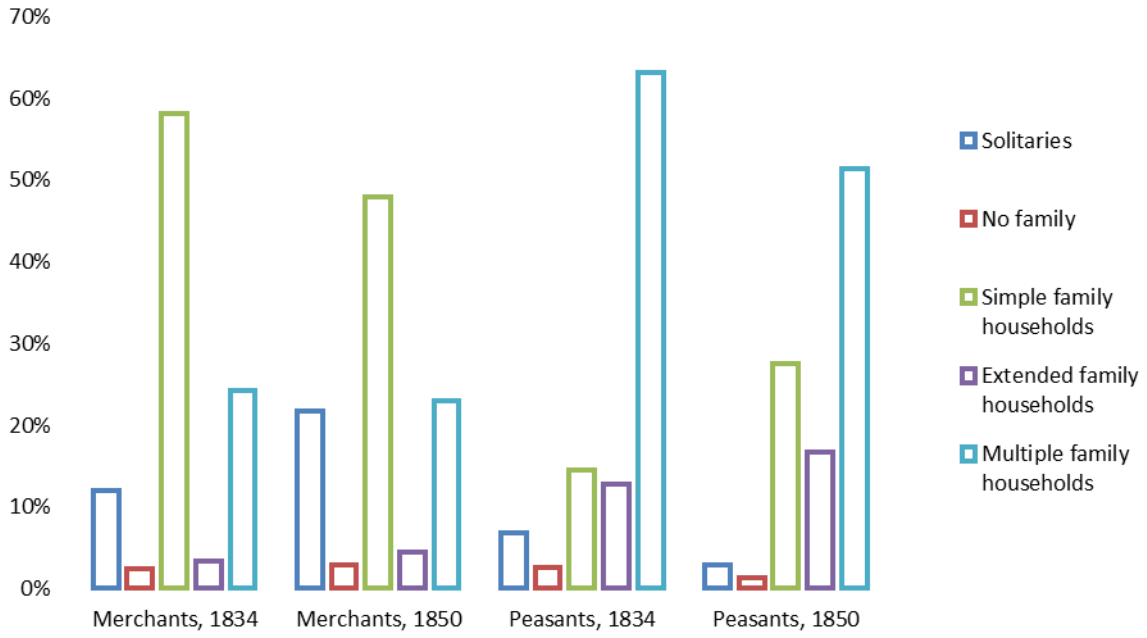


Figure 4. Changes in the structure of merchant and peasant households in the period between the revisions, %

When discussing multiple households in relation to the historical populations of Europe, in the overwhelming majority of cases we are talking about the "*stem family*", consisting of a married couple and a married son, either the parents' only son or their potential heir. But in Russia, a multiple family household often includes, in addition to one or more married sons of the household head, indirect relatives (e.g. nephews, cousins, uncles, etc.) with their families. Often the kin relationships between members of the same household were quite distant, and in order to find the common ancestor, thanks to whom they all ended up being recorded in the same household, you had to go back three or four generations. If in such multiple family households there appeared a possibility of division, it generally involved "side branches" splitting off to form their own households. But this process, revolutionary for the Russian multiple family household, is hidden

by Laslett's classification, as most of the newly formed households were also multiple and therefore remained in the same category. Thus, the proportion of multiple households changed very little, and quantitative changes in structures were expressed only in a significant reduction in the average size of multiple households. If in the classification of Laslett there were a sixth family type (for example, "nested multiple" families, which could include households with, among others, families of indirect relatives of its head), the evolution of family types in Russia would be more obvious (Table 3).

Table 3. Distribution of multiple family households in the Vykhino *votchina* by family relationship with the household head

	8th revision (1834)	9th revision (1850)
The proportion of multiple family households in the Vykhino *votchina* (per Laslett's classification), %	64.7	52.4
Of them :		
Consisting only of direct relatives of the household head , %#)	42.3	47.2
Including indirect relatives, %	22.4	5.2
Average size of households consisting only of direct relatives	12.53 (±7.46)	8.85 (±2.94)
Average household size, including indirect relatives	22.60 (±10.41)	9.27 (±2.33)

Note: #) – This category includes, in addition to "stem" households, so-called "frérèches" consisting of several families of married brothers.

DISCUSSION

The differences in the structures of merchant and peasant households in the middle of the 19th century can hardly be explained by random variations; the two classes had become too different by that time.

To better understand the factors shaping households in both classes and their representation in the sources, it is necessary above all to recall the purpose of introducing the revision at the beginning of the 18th century. It was meant to record the taxable classes – those inhabitants of the Russian Empire obliged to pay the poll tax – as well as to provide a basis for regular recruiting for military service; in other words, it was meant for calling up a certain percentage, determined by law for each recruitment separately, depending on the domestic and international situation, of the male tax-paying population. Over time, the revisions moved closer to the classical censuses, as they included more and more exempt classes, including that of the merchants, "just for the record".

The duties of peasants and merchants in relation to these basic public service obligations (the poll tax and conscription) were significantly different, a fact which could affect, among other things, the formation of households in each of the classes.

Among the peasant population, responsibility for performing these duties was collective, communal; thus, a large family with a large number of able-bodied men and women, and therefore with a significant land allotment, was a kind of guarantee of their fulfillment. The merchants, on the other hand, bore a personal or family responsibility for payment of the tax, the amount of which did not depend on the household's size and structure, but on the capital declared by its head. As

for military duty, the merchants were exempt, at first partially, then completely. Thus, there was no particular need to unite several merchant families into one multiple household. Moreover, such unifications had to be carried out according to special rules established by law.

Principles of taxation

The poll tax was introduced by Peter I in 1718, at the same time as the revision, mainly to maintain the regular Russian army created in that period [Polnoye sobraniye…1830: V. 5:3245]. The average size of the tax was to be calculated by dividing the costs of maintaining the army by the number of taxable persons available, as determined by the revision. The calculated tax replaced all monetary and natural/labour duties formerly imposed on the population.

At the beginning of the introduction of the new tax system, in the merchant class a tax of 40 *altyns* was levied on each person registered by the revision; in 1775, the poll tax for them was replaced by a so-called "guild tax":

> *"To divide, as now, merchants possessing a capital of 500 roubles or more into three guilds, and to take from them each one percent per year of their truthfully declared capital, and the poll tax not to take" [Polnoye sobraniye…1830: V.21: 14327].*

The sizes of the guild tax grew constantly. For example, after the reform of 1824 it reached 3-5% of the stated capital, depending on the guild [Polnoye sobraniye…1830: V.39:30115]; afterwards, right up to 1863, it remained practically unchanged. But in any case, the head of household (the owner of the merchant's capital) was personally responsible for the payment of the fee, which had nothing to do with the size and structure of the household. In the peasant population, including in the Vykhino *votchina*, the system of collection and payment of taxes was fundamentally different. On the one hand, the existence of a large household, and therefore of a large number of registered males, increased the formal amount of the poll tax which the household had to pay. But in the peasant community there existed a principle of redistribution of taxes, according to which the total amount designated for payment was divided up among households in accordance with their economic possibilities. The "internal", communal unit of taxation was the *tyaglo*; more often than not, this was a married couple, as well as single men of working age, capable of paying a partial *tyaglo*. In any case, each *tyaglo* was entitled to a plot of land or a part thereof, making it possible to fulfill financial obligations to the state and the landowner. Thus, a greater number of *tyaglos* in a household meant, on the one hand, a greater tax burden, but on the other hand, more economic prosperity due to the concentration of a significant amount of land held by the household. Therefore, a large and multiple peasant household was in the interests of the landowner, the community and the head of the household, since it served as a kind of guarantee of the fulfillment of their financial obligations to the state.

Obligation to military service

The peasant population was the main provider of recruits in the Russian army. Regular, almost annual recruitment meant that, in the Vykhino *votchina*, 2-4% of the male population of prime working age – 20-35 years – each year left their families, never to return or to return disabled. It was only after the Crimean War that the term of military service became more or less "humane", amounting to 15 years, during a part of which a soldier was in the reserve. By the time of the

introduction of universal conscription in 1874, the lengths of stay in the active army and in the reserve had become virtually identical – 7 and 8 years, respectively. In the peasant population, the system of choosing a family for providing recruits was multiple. There was a recruiting order, which depended largely on the number of adult males in the household – that is, ultimately, on its size and structure – and the just execution of the conscription requirement was seen to by the whole peasant community. The main rule guiding the community was this: conscription was not to weaken the economic opportunities of the household, so that the first recruits were selected from families in which there were three or more men of working age (15-65 years). When all such families had taken their recruiting turn, the next recruits were taken from families with two male workers. Therefore, to ensure the supply of recruits and facilitate their choice, both the peasants' master and the community had an interest in maintaining relatively large and multiple households. Difficulties in selecting recruits were one of the main reasons for prohibiting the breaking up of peasant households:

> *"Many cases have shown that large peasant families will use all possible means to divide up their families for the sole purpose of getting on the list of small families and single persons, and thus to avoid army recruitment, as well as to be freed from other public duties" [Rossiyskiy gosudarstvennyy…U.321: 39-39]*.

Documents from the Vykhino *votchina* contain extensive correspondence with the Board of Housing over the dividing up of peasant families. In 1846, in the village of Vyazovka, the Gusev brothers – Basil, Ilya and Alexei – asked the Moscow Board of Housing for authorisation to divide *"by voluntary and amicable agreement, a large but oppressed family, especially when there is a military billeting (when we most definitely have no space in our home)". Despite the approval of this division by a communal assembly of the Vykhino* votchina*, the Housing Board considered that "The dividing up of the Gusevs is unacceptable, because in their family there are 3 persons in line for recruitment and in their separate houses there will not be two workers each; and for this reason both the request of the Gusevs and the decision of the communal assembly shall not be respected" [Rossiyskiy gosudarstvennyy…U.321: 39-39]*.

As for the merchant class, it provided a very important privilege: the replacement of military service by payment of a fee for recruits throughout the 18th century. Since the very beginning of conscription, introduced by Peter I, merchants were allowed to "give money for recruits" [Polnoye sobraniye…1830: V.6:3983], though the exact amount was not specified, because it was tied to the size of the annual Zemsky tax. Later, in the Manifesto of the next conscription on September 19, 1776, the amount of payment for a recruit was fixed:

> *"As Russian merchants, being exempted from the poll tax, pay one percent of their capital, the All-Merciful, discharging them from providing recruits in kind, commands until future regulation that a payment of 360 rubles be exacted from them for each recruit" [Polnoye sobraniye…1830: V.20:14509]*.

A few years later the amount had risen to 500 rubles on the pretext of "*the rise of prices on all things in general*" [Polnoye sobraniye…1830: V.21:15721], but in 1807 an imperial manifesto giving the merchants new benefits, distinctions and advantages was announced:

> *"As a sign of Our benevolence towards the dignity of the merchant class, the All-Merciful releases from payment of the conscription tax all three guilds in perpetuity" [Polnoye sobraniye…1830: V.29 22418].*

Thus, if the merchant families were sometimes large and multiple, the reason for that was not the obligation to provide recruits.

External control of household structures

Formation of household structures among the merchants was indirectly regulated by law, while the serfs were in this respect in complete subjection to their master.

As noted above, for the master of peasants a large and multiple household with a sufficient number of workers was a kind of guarantee of the performance of their duties. The opinion of an owner of the Vykhino *votchina* regarding the dividing up of families, although it would evolve over time, in principle supported the existence of large households. The instructions to the managers of the Sheremetev *votchinas* included several points devoted to such divisions, which essentially boiled down to this: division of a large household must not reduce the economic potential of each of the newly formed households and should not violate the recruiting order. But even fulfillment of these criteria did not give an unconditional right to divide up a household; each case had to be considered separately:

> *"No one shall be allowed to divide without permission from the Board of Housing, which can allow this only when, in the family requiring division, there are no fewer than two adult workers and the recruiting order is properly maintained. Only then can division of belongings and duties into two houses be allowed with the approbation of the Board of Housing, so that in each house two male souls shall remain; otherwise, fragmentation of families shall not be allowed and shall be strictly monitored" [Rossiyskiy gosudarstvennyy…U.321: 39-39 about].*

For unauthorised divisions severe penalties were stipulated, not only for those who divided, but also for their neighbours, who could be fined for failure to report them. This can be considered as yet another example of collective responsibility in the peasant community:

> *"On September 29, 1841, we, the undersigned peasants of the Vykhino* votchina *of His Excellency Count Dmitri Nikolaevich, assembled in a full village meeting in the* votchina *Board, heard Moscow Housing Board order N2521m of the 26th of this September confirming the prohibition on dividing into different families without permission, for which the penalty will be 100 roubles. We pledge to watch out for others and, if anyone should perpetrate an unauthorised family division, to inform the Board, otherwise we give it the full right to collect from the neighbours a penalty of 100 roubles at 10 roubles each; and to this we hereby sign" [Rossiyskiy gosudarstvennyy…U.142: 3].*

Since the beginning of the 19th century, the formation of merchant households was controlled, albeit indirectly, by law. According to a Senate Decree of February 28, 1809, the heads of merchant families were allowed to register in their capital only close relatives – their wives, sons, unmarried daughters and, under certain conditions, siblings and grandchildren. This law was passed shortly after the complete exemption of the merchant class from conscription. Its purpose

was to fight abuses, particularly the attempt of young men to avoid military service who, by registering in the households of their merchant relatives, came under the 1807 Act mentioned above.

The formation of households was affected by other factors (e.g. the relation to land, inheritance principles, particularities of marital behaviour, etc.) which could also determine the differences in the structures of the peasant and merchant households. A detailed study of these factors is beyond the scope of this article.

THE DEMOGRAPHY OF RUSSIAN CLASSES: PROSPECTS FOR FURTHER RESEARCH

The study of the demographic history of Russian classes seems very promising for several reasons. As mentioned above, the vast majority of historical and demographic research into the times of the Russian Empire focuses on the peasant class. This imposes certain limitations on the analysis of the factors of demographic behaviour of this group due to its homogeneity and negligible territorial and social mobility, especially up to the middle of the 19th century. The merchant class, at least in Moscow, gives many more opportunities for historical and demographic research. First of all, it is a highly mobile population. Passage from one class to another is relatively frequent. Representatives of other classes (petty bourgeoisie, peasants and even nobles) who were able to pay the guild tax and had sufficient capital, joined the merchant class, while merchants unable to pay the guild tax were "demoted" to the class of the petty bourgeoisie. In addition, the class of Moscow merchants was constantly being replenished by new arrivals from other districts of the Moscow province and other provinces.

Another striking feature of merchant households, a feature virtually non-existent in the peasant population, is the role of female household heads. After the death of the head of a peasant household, his role passed, as a rule, to the eldest son or to the eldest man in the family. If a household consisted of a widow with underage children nominally managing the household, she did not have the formal rights of the head; for example, she could not participate in assemblies of the *mir*. In a merchant household, the role of the head, at least formally, was inherited by a widow, as it was she who acquired the capital and guild status of the deceased husband. Archival documents give us quite a number of examples confirming the important role of widows in managing the business and the home. The same applies to girls who inherited their deceased father's capital [Ulianova 2009: 10-15, 49-54].

A more diverse confessional and ethnic composition also enhances the possibilities for studying the demographics of the merchants. A significant proportion of Old Believers (their share in the Moscow merchants reached 20%) and a growing number of Catholics and Protestants among Moscow merchants allow us to study the impact of this factor on demographic behaviour, though unfortunately only in the middle of the 19th century. The religious confession of Moscow merchants was indicated only in the last two published revisions, in 1850 and 1858.

A problem with the study of classes other than the peasants is the insufficient number of observations. According to the 1897 census, there were 19,000 merchants, or 2% of the population

of Moscow; in the middle of the 19th century, the number of merchants and their families was still 19,000, a figure which barely exceeded 5%. Consequently, certain demographic indicators should be evaluated with caution.

CONCLUSION

Over the course of the research presented herein, the authors have become convinced once again that the revisions are a source of detailed and high-quality information on the population of the Russian empire in the 18th and 19th centuries, a source which makes it possible to describe the demographic processes of this period in the most modern demographic terms. In particular, study of the revision records of Moscow merchants gives reason to wonder about the social differentiation of the Hajnal model: the class distinctions in household structures observed in Russia in the 19th century are too significant to be explained by only geographical factors or random deviations.

What does this differentiation mean? Does it imply the spread of a new type of demographic behaviour which began with the more developed and affluent classes? Does it point to local features that disappear as the distance from the center increases? What happens in other classes, for example, among the "petty bourgeois" who, on the one hand, are personally free and, like merchants, live in cities, and yet, on the other hand, must perform all obligations to the state just like the peasants? Will their household structure present a kind of intermediate version? Answers to all these questions need to be found, and the authors hope to provide them in future research.

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THE SEQUENCE OF LIFE EVENTS OF RUSSIAN MEN SERVING AND NOT SERVING IN THE MILITARY*

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Using two representative Russian surveys – "Person, Family, Society" (used for building research models) and "Russian monitoring of the economic condition and health of the population" (for auxiliary, descriptive analysis) – we analysed the differences in the life courses of Russian men who served and did not serve in the army. For these two groups of men, we compared the ages and sequences of the most important first events (separation from the parental home, first job, obtaining an education, first cohabitation, first marriage, and first child). We constructed socio-demographic "portraits" of these men at the age of 15 and at the moment of the survey (2013).

Our results revealed that those men who served in the military have more socio-economic and demographic events than those who did not do military service: men with military experience start adult life earlier and more intensively. The mechanism of selecting men for military service has changed since the 1990s. Men who serve are mainly children of parents without higher education and not occupying senior positions in the period of their children's socialisation. After completing military service, men often work and live separately, while those who did not serve in the army study and live with their parents.

***Key words**: army, conscription, military service, demographic behaviour, job, education, separation from parental home, marriage, cohabitation, Russia, life course, sequence analysis.*

INTRODUCTION

Currently, the topic of military service, or more precisely, its impact on a man's life course, remains poorly understood. Existing research in this area can be divided into two main areas: the first is based on the assumption that military service makes a man out of a boy [Gradoselskaya 2005; Daniel 2005; Michel 2001], while the other shows that military service is a waste of time [Smirnov 2009; Sukhanov in 2014]. These judgments are often the subjective points of view of the authors and are not based on representative empirical data.

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THE ARTICLE WAS CARRIED OUT WITHIN THE FRAMEWORK OF THE BASIC RESEARCH PROGRAM AT THE NATIONAL RESEARCH UNIVERSITY HIGHER SCHOOL OF ECONOMICS (HSE) IN 2016 (GRANT № 16-05-0011 "DEVELOPMENT AND TESTING OF DEMOGRAPHIC SEQUENCE ANALYSIS AND MINING TECHNIQUES") AND SUPPORTED WITHIN THE FRAMEWORK OF A SUBSIDY GRANTED TO THE HSE BY THE GOVERNMENT OF THE RUSSIAN FEDERATION FOR THE IMPLEMENTATION OF THE GLOBAL COMPETITIVENESS PROGRAMME.

The view of military service as an important event in the life of a man is due to the fact that young people go into the army at the age of 18 – an age when, from both a legal and a psychological point of view, they are just beginning to acquire the status of an independent adult. Away from home and their familiar surroundings, they learn within a year or two to be independent in private life, but at the same time to obey orders, to maintain subordination and to stand up for themselves in a very particular kind of group. This complex combination of influences on a young man shapes his outlook and attitude to different aspects of life.

Due to data limitations, our study does not answer the question of causality: does military service affect a man's life, or is it that men who end up in the army are from the start predisposed to certain socio-demographic patterns of behaviour? In order to draw conclusions about causality, it is necessary to have a picture of the normative values and life course events at the start of military service (or at the age of 18 for those who do not serve) and after completion of the transition to adulthood. We have data only about the dates of the onset of the key events of life, the fact of military service and a number of auxiliary variables derived from the survey "Person, family, society" (PFS) in 2013 [Maleva et al 2014; PFS 2013].

Using sequence analysis (SA), we studied the ways in which the life course of men who served differed from those who did not. Without making any conclusions about causality, we recorded the differences themselves, which is an important step in understanding the phenomenon of life in the army in Russia. Such a detailed study of the data on service in the army in the context of the life course has never been carried out.

The main goal of the study is to examine the differences in the onset of sociodemographic events in the life course of Russian men who served and did not serve in the army.

The goal was broken down into the following objectives:

1. To determine the intergenerational differences in the ages of onset of sociodemographic events for men who served and did not serve in the army;
2. To identify the differences in the sequences of onset of sociodemographic events for men who served and did not serve in the army;
3. To construct "portraits" of men who served and did not serve in the army at age 15 and at the time of the survey (2013)

Before turning to the results of our solutions to these tasks, it is necessary to describe the structure of the present work. The first section deals with the features of military service in the world and in Russia, and examines the experience of sociologists and demographers in the study of military service as a stage of the life course. The second section is devoted to the features of the database on which the study is based. The final part of the work presents results of the conducted analysis.

MILITARY SERVICE IN HISTORICAL CONTEXT

There are, throughout the world, several ways of supplying an army with military personnel:

- A mercenary or contract army in which soldiers voluntarily serve by contract and receive a wage;
- A compulsory military service or conscript army, implying a general or selective (concerning only men) service;
- A militia or volunteer army, in peacetime consisting only of a registration system and command structure, with military service consisting of short-term, reservist training.

In different periods of time, one method or another of forming an army becomes most popular. For a long time in Europe and in the world, it was the mercenary army that predominated, but in 1798 in France there appeared a conscript army to protect the new-born republic from attack by neighbouring countries. According to a law passed in that year, all unmarried childless French men 20 years of age or older were called up for military service for 5 years. The clergy, workers at military enterprises, students of certain universities and officials were exempt from service. Wealthy Frenchmen could avoid conscription through the mechanism of drawing lots: with sufficient financial means, one could pay someone to serve in his place [Forrest 1989]. Gradually, compulsory military service began to show greater efficiency compared to the prevailing European practice of maintaining a mercenary army. This was due to the fact that conscription made it possible, in the event of military action, to quickly mobilise a large number of men in reserve, which was important in the period of the First and Second World Wars and at the beginning of the "Cold War" between the countries of the North Atlantic Treaty Organisation and the Warsaw Pact. However, at the start of the 21st century, these major wars having ended, most countries again began to move towards a contract army [Shearer 1998].

In each country, how the army is formed is based on many factors, such as the nation's security priorities, the nature of external threats and economic opportunities, but one of the main factors is the demographic situation. A striking example of the impact of demographic waves on the toughness of legislation governing military enlistment is the experience of Russia.

In 1925, the previously voluntary military service became compulsory for all male workers of the USSR. Service in the armed forces was seen as an honourable duty and was enshrined in the Soviet Constitution of 1936 as every man’s sacred duty to protect the Fatherland [Constitution...1936: Article 132, 133]. Recruits were men between 19 and 40 years of age belonging to the class of workers. The length of service was 2-4 years (depending on the type of troops). In 1939, the USSR adopted a law "On universal military duty", abolishing the ban on the recruitment of children of former officers, the Cossacks, the clergy, dispossessed peasants, merchants, noblemen and factory owners. Deferments appeared for reasons of disease and family. In 1946-1948, there was no conscription, as everyone was engaged in reconstruction work. In 1949, the length of service increased to 3-4 years, and the age of conscription was lowered to 18 years.

Due to the decline in fertility during the war, in the first half of the 1960s the cohort of 18-year-olds was small, which caused problems in recruitment. To neutralise the resulting shortage of recruits, university graduates began to be called up (as officers) for a period of 3 years. In the 1970s, when the generation of recruits had again become numerous, the length of service again increased to 2-3 years, but the list of deferments due to family circumstances was significantly expanded. Also, particularly important ministries and departments received the right to a special military registration, which allowed for specialists needed by these ministries to avoid recruitment for military service [Gradoselskaya 2005]. After the Soviet army's invasion of Afghanistan in 1979, there was a need to increase the number of military personnel, for which the legislation governing military recruitment was amended, extending the categories of persons subject to conscription. In the mid-1980s, when the small cohorts were reaching the age of 18, deferments for men to continue their studies were suspended, and the number of ministries and departments entitled to a special military registration was reduced. But as soon as the draft contingent started to grow again, deferments returned. After the collapse of the USSR and the downsizing of the army, the number of deferments increased significantly and, as of 2007, the length of military service was reduced to 1 year.

SERVICE IN THE ARMY TODAY

Today, the least popular type of army is a militia. It exists only in Switzerland. Universal conscription is no longer in first place, being retained only in a small number of countries[1]. Becoming more and more widespread is the contract army, which has several advantages. Firstly, a contract army consists of people who choose a military career consciously, rather than draftees thinking about how soon they will get out. Secondly, a contract army reduces personnel turnover, making it possible to save valuable man-hours it takes to prepare all the new recruits. Increasing the qualifications of servicemen creates the conditions for providing them with advanced equipment and technology. Thirdly, the professionalization of the army helps to ensure that young people can plan for life's key starting events: education, employment, entry into marriage and partnerships and beginning procreative behaviour per their own preferences [Friedman 1967].

Most countries, including Russia, are transitioning to a mixed form of military recruitment, combining in different proportions both draft and contract service. For example, in the countries of NATO contract soldiers make up about 45% of the total number of military personnel: in Germany 55%, in Greece and Norway around 30% and in Denmark and Belgium 60-65%.

In 1998, Russia passed a law "On Military Duty" (Federal Law №53 from 28.03.1998), in section V of which were listed the conditions for concluding a contract and enlisting in the army. Over the 17 years of the existence of this form of military service, the number of contract soldiers has increased to 50% of the total number of military personnel [RBC 2015]. D.A. Medvedev, during his tenure as president, said: "We have, in fact, made a political decision on how to calmly move forward

[1] Russia, Belarus, Israel, North Korea, Switzerland, Finland, Austria and, Estonia.

in the direction of a professional army. We will keep recruitment from both conscription and contract soldiers simultaneously. The draft will remain, but only those will serve who believe this extremely important and necessary for themselves. Everything else will be done by people hired by contract" [Forbes 2011]. That is, the country's leadership understands the priorities of the time: in an age of rapid technological development and enormous growth in information, a year of absence from one's professional environment represents a significant loss for a person's human capital. Today's young people who do not make a conscious choice in favor of the military service have a chance to invest this time in their own development. Of course, Russia still has universal military service, but there are more and more legal (and illegal) ways to avoid it. All this provides an opportunity to young people who choose and do not choose the military as their main profession to regulate the calendar of the onset of their life's events in greater accordance with their priorities.

SERVICE IN THE ARMY AS A STAGE IN THE LIFE COURSE

The concept of the life course emerged in the 1920s. The first to see a life as not a cycle but a course were psychologists [Bochaver 2008]. Then, starting in 1975 the concept was developed within the framework of the sociological sciences and has since become truly multi-disciplinary and paradigmatic [Yezhov 2005; Christmas 2012: 21].

The main difference between a "course" and a "cycle" is that a life is no longer perceived as a series of predetermined stages tied to a person's age [Cohn 1999]. A life course is the result of the personal choices of the individual in various spheres of life. Here too there are stages, but age is not what gives one a pass to the next level; rather, it is a person's achievements: the status he acquires determines at what stage of life he is. The life course consists of status transitions – significant events that change the person's social position, the way his life is arranged, his social identity and role as a member of society (e.g. employment, completion of education, marriage and birth of a child). Some events have an even stronger effect, influencing the change of an entire trajectory or multiple trajectories of life. Such events are called turning points.

Service in the army can be considered such a turning point, one which can change the direction of a man's life in several areas. At the age of 18, only just beginning the transition to adulthood, obtaining an active capacity in different spheres (legal, labor, civil), young people must fulfill their military service. This is a very long and difficult test, involving separation from loved ones, strict army order, subordination, limitations of everyday conditions, physical work and being in an exclusively male group. Some researchers believe that such tests make him strong, that is, they "make a man out of a boy" [Gradoselskaya 2005; Daniel 2005; Michel 2001], while others believe that a young man could spend these one or two years more usefully "in civilian life" [Smirnov 2009; Sukhanov 2014].

Despite the differences of opinion, there is one point of commonality: the majority of studies on the subject of service in the Russian army have been carried out without sufficient support from

representative empirical data. If, in other areas where there is insufficient Russian research, we can draw on the experience of different countries, then the present subject will receive little attention from our foreign colleagues, due to the fact that the majority of countries have switched to contract service, suggesting that military service is neither a duty to one's country nor an ordeal, but simply a paid job. Therefore, studies that are carried out based on representative empirical material are most often devoted either to servicemen (during a war) rather than conscripts, or to issues related not to demographic behaviour, but to the health and social and psychological characteristics of the soldiers.

In studying the effect of military service on the short-term and long-term health of conscripts [MacLean, Elder 2007; Sampson, Laub 1996], it was found that conscription has a negative impact on future health. Crime too has been studied through the prism of military service [Van Schellen, Apel, Nieuwbeerta 2012]. It was found that for the 1942 cohort, drafted into the army at the beginning of the Vietnam War, military service significantly reduced the likelihood of crime among younger offenders. The results showed that military service contributed to the overall decrease in violent crimes during this period. One study [Britton, Ouimette, Bossarte 2012] established a connection between military service and life satisfaction, depending on a man's propensity to depression: among those men not prone to depression who served in the army, 39% more were satisfied with life than those who did not serve.

One of those who have analysed the impact of military service on the demographic behaviour of soldiers is G. Elder, Jr. The principle he formulated (within the concept of the life course) of a "life stage" implies that the impact of historical events varies depending on the stage of human life. To test this principle, Elder conducted a study on the interaction between military service and age, using data from the Oakland Growth Study [Elder 1987]. He found that for men mobilised at a later age (older than 22), military service can destroy family relationships and careers.

According to Elder, soldiers receive the least personal benefit while participating in wars. He found that the divorce rate among American servicemen is higher than that of the civilian population. At the same time, the period of time in which the marriage took place is important: before, during or after a war. Marriages entered into before the war were hard to maintain, due to the long separation of partners. It is obvious that neither partner remains the same during a war: servicemen experience all the severity of military combat, while their wives, waiting for them at home, experience all the hardships of economic deprivation and complete responsibility for the family. After the end of the Vietnam War, soldiers returning home demonstrated a desire to start families as soon as possible, in contrast to their peers who did not participate in the war.

Thus, the particularities of the impact of fixed-term military service in the army on the life course of men have not been studied in a sufficiently comprehensive and deep way. In this paper, for the first time, biographies of Russian men will be studied in light of the presence or absence of army experience. This will be done on the basis of representative Russian data using one of the most advanced and promising methods – SA.

On the basis of the information we collected on changes in Russian legislation concerning military service, on the impact of external factors (wars and demographic waves) and on the understanding of the transformation vector of demographic behaviour, we have formulated the following hypotheses.

1. Intergenerational differences between those who served and who did not serve in the army will be seen only for those called up after 1991 (born in 1973), because, up to this time, opportunities for avoiding conscription were minimal, and generally only those with health problems did not serve in the army.
2. The long separation from loved ones, the idealisation of life "in the civilian world", can strengthen the desire of men returning from the army to create a family. We assume that the overall intensity of the onset of demographic events will be greater for men who have served.

THE INFORMATIONAL BASE OF RESEARCH

This study used a database of two large Russian population surveys, "Person, family, society" (PFS) and "Russian monitoring of the economic situation and the health of the population" (RLMS). The first wave of PFS was conducted in 2013 by the Institute of Social Analysis and Forecasting of the Russian Academy of National Economy and Public Administration [Maleva et al 2014.; PFS 2013]. In the same year, the HSE held the 22nd wave of RLMS [RLMS 2013]. The main base is the PFS, because it contains complete and accurate information about the different events of the life course, as well as the issue of military service. RLMS is used in the descriptive section.

The PFS survey interviewed 9,500 respondents (45.3% men, 54.7% women) selected by multistage, stratified, regionalised sampling, which made it possible to achieve, with a 5% margin of error, representative data for the Russian population over 18 years of age. In the third stage of sampling, regionalisation was carried out via polling stations, so the sample did not include those doing time in prison or otherwise temporarily deprived of voting rights.

The PFS questionnaire included two questions regarding military service. The first question was direct, formulated as follows: "Have you served in the army?" A positive answer was given by 2,952 men, a negative one by 1,381. The second question (indirect) concerned the army as a reason for relocating. Only 19% of men reported military service as a reason for moving. The amount of data is small, so the analysis was based on the first question, used thereafter as a stratification variable. However, this question has a drawback: the wording is inaccurate and can give a positive answer for those who received the rank of officer, studied in a non-military university, or had a special military registration.

In the 2013 RLMS survey (a full sampling was used) the question of military service was put more correctly: "Have you done military service, that is, have you served in the army by conscription?". If the answer was yes, another question was asked: "From what year to what year did

you serve in the army?". The RLMS database included a total of 3,595 men who had done military service, and 2,476 who had not.

Despite the RLMS's more detailed information regarding service in the army, it was the PFS survey that was chosen as the primary database. The key reason was that it contains questions about the starting dates of events in different spheres of life, which determines the main focus of this research.

The difference in the wording of questions in the PFS and the RLMS, as well as errors in measurements, led to small differences in the distributions of the men who served in the army. Figure 1 shows the proportion of men in their cohort who did military service by year of birth. The sharp swings in the curve are due to the small number of observations in the oldest and youngest age groups.

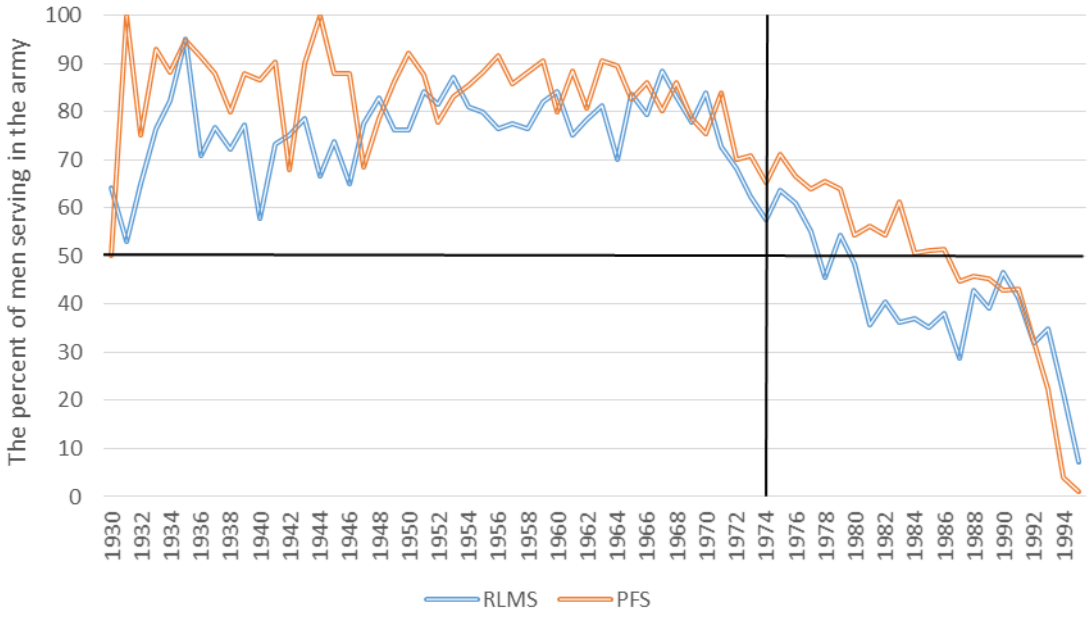

Figure 1. Proportions of men serving in the army (one-year cohorts by year of birth), %

Source: compiled by the authors according to [RLMS 2013; PFS 2013].

In Figure 1, the 50% level is marked by a horizontal line. Above it is the situation in which the number of men who have done military service exceeds the number of those who have not. Below it is the reverse situation. The vertical line represents the year 1973 – the year of birth of the generation that reached the age of 18 in 1991, at the time of the Soviet Union's collapse. Until the birth year of 1987 according to the RLMS and of 1984 according to the PFS, the percentage of those who were called up exceeded the percentage of those who received a "white card" – a certificate of exemption from military service. As can be seen in the graph, the military registration system worked flawlessly during the Soviet period, registering virtually all able-bodied men of military age. In modern Russia, the selection mechanism for the army changed; the proportion of recruits in every cohort was reduced to 30% or less.

Figure 2 shows the distribution of ages at which young men were sent to serve in the army (according to [RLMS 2013]). Most of the young men were called up for military service on reaching the age of 18 years or the next year, if their birth date was later than the fall draft or if they had a deferment until finishing their secondary school or vocational training. For those entering military schools, an exception was made: they could begin military service at the age of 17, but such persons were few, according to the histogram. In total, more than 80% of those who did military service were called up before the age of 20.

In the 2000s, when the youngest generations began to reach the age of military duty, there was an increase in the popularity and accessibility of higher education, as well as in the number of deferments for the period of study. This led to a decrease in the proportion of 18-year-old recruits and smoothed out the age distribution of recruits.

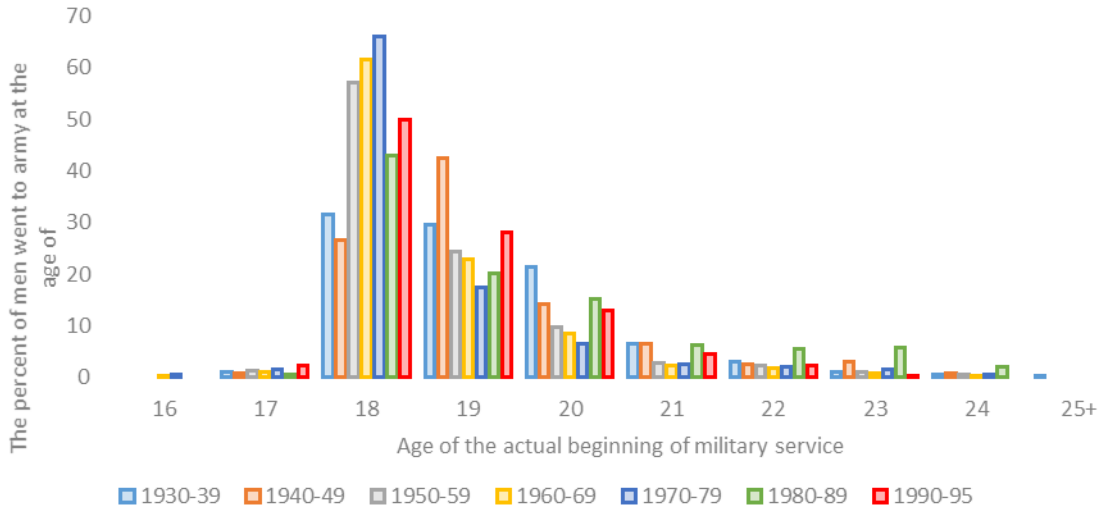

Figure 2. Age of the actual beginning of military service of members of different generations, %

Source: compiled by the authors according to [RLMS 2013].

We believe that the average age of the most intensive formation of a young person's normative values regarding children and marriage is 20 years [Magun 2009]. The experience gained during this period affects the further trajectory of one's life course. For the majority of men over 40-49 years, this period came during military service in the army. Generations born after 1970 were called up after the change in the recruiting policy of the armed forces, as a result of which there was an increase in the percentage of those not serving and receiving deferments and, consequently, not spending the period of intensive formation of normative value consciousness in the barracks. These same generations are linked to the intergenerational breakdown in family values [Popov 2009]. This means that the reduction in the proportion of men having served in the army may have contributed to the move away from traditional family values among men, and have become one of the mechanisms initiating Russia's second demographic transition.

MAIN RESULTS

Socio-demographic "portraits" of men serving and not serving in the army

As shown in Figure 1, the number of men who have been in the army varies depending on the generations. While in Soviet times the number of recruits exceeded the number of "white card-holders", in modern Russia the number of those who do not serve exceeds the number of those who do. The reason may be the fact that, in Soviet times, the main criterion for conscription was the state of health of the recruit, while in modern Russia the selection mechanism has changed: the ones who serve are those unable to dodge, that is, young men from less well-off families, those who could not or did not want to get a higher education, and people from rural areas, for whom the army can become a social elevator. There is also a deferment for men who have two children. In order to examine the reasons for which the ratio of those serving to those not serving has changed, and to test hypothesis 1, we have constructed "portraits" of men in each category, those born before and after 1970.

To draw up "portraits" of men from the PFS questionnaire, we chose integral variables describing the respondent, both as an adolescent and at the time of the survey.

1. At the age of 15:
   - existence of brothers and/or sisters;
   - level of parents' education;
   - occupational category of parents;
   - level of family income;
   - disability obtained as a child.
2. At the time of the survey:
   - level of education;
   - primary occupation;
   - command of foreign languages;
   - living with parents;
   - having a disability.

As predicted in hypothesis 1, for the generations born before 1970 no significant differences were observed between those who had and had not served. The only exception is people with disabilities: there are more of them among those who did not serve in the army, but the proportion of such people in the PFS sample is so small that it would be incorrect to draw any conclusions.

In the case of more recent generations, the situation changes (Figures 3 and 4)[2]. As for statistically significant differences between those who served and did not serve, the first group consists mostly of young men whose parents, at the time of the young man's 15th birthday, had a professional (in the case of the fathers) or high school or less (in the case of the mothers) education, and were

[2] Only results for those variables showing significant differences are shown.

engaged in physical labor (Figure 3). The “portrait" of contemporary young men not having served looks like this at age 15: these are the children of highly educated parents and highly qualified professionals.

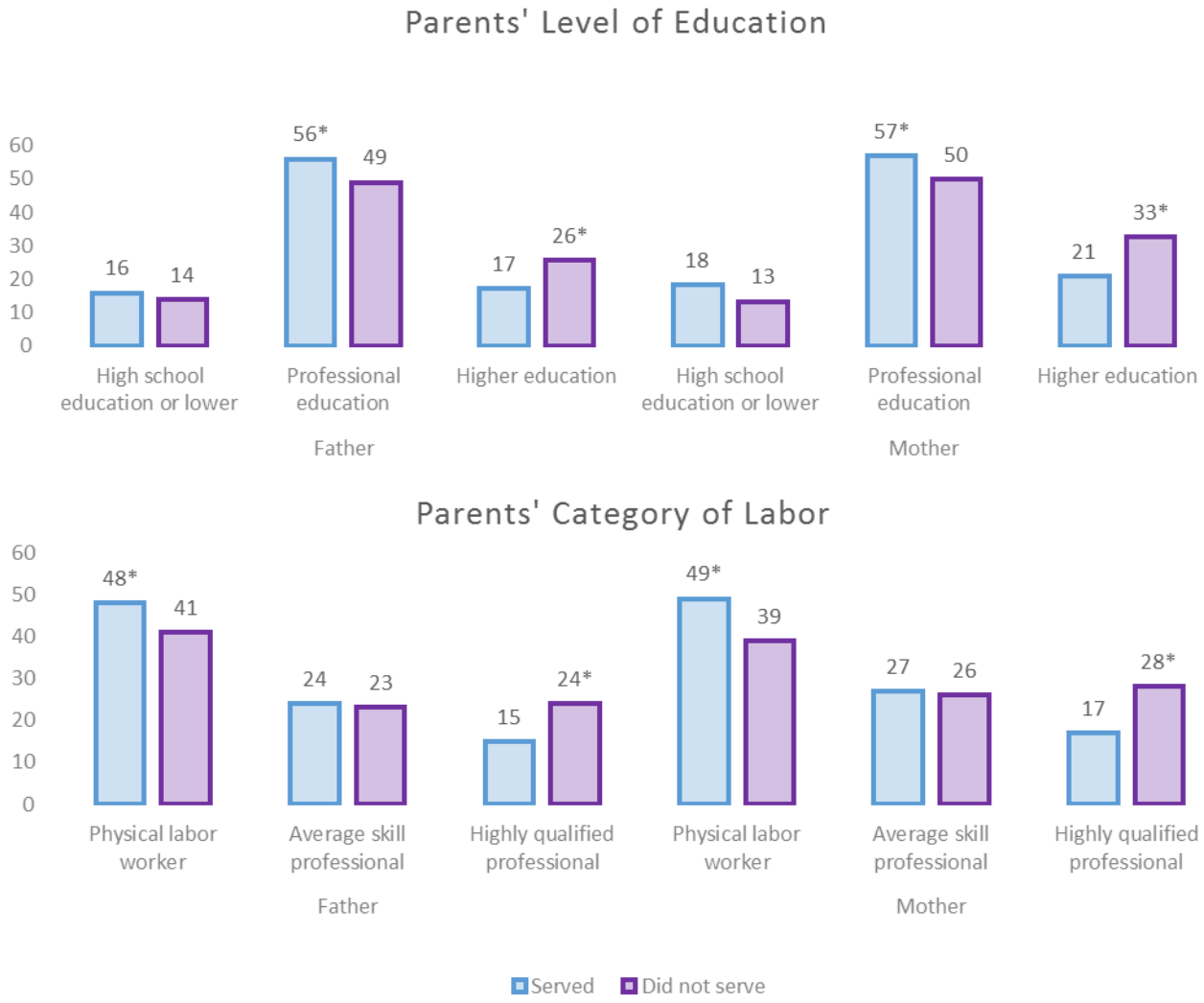

Figure 3. Characteristics of men born after 1970 who served and did not serve, at the age of 15 years, %

*Note: * - The percentage is significantly higher (95%).*

Source: compiled by the authors according to [PFS 2013].

At the time of the survey, men who had served in the army had the following set of characteristics (Figure 4): they lived separately (while those who did not serve lived with both parents or their mothers), worked (those who did not serve either studied or combined work with study), and, unlike those not having served, did not speak foreign languages.

Figure 4. Characteristics of men born after 1970 who served and did not serve, at the time of the survey, %

*Note: * - The percentage is significantly higher (95%).*

Source: compiled by the authors according to [PFS 2013].

The supposition about the change in the selection mechanism was confirmed: before 1970, men who had and had not served in the military were distinguished only by the presence of a disability, while the differences in young cohorts are observed in several indicators. Of the characteristics of the respondent's situation in childhood, only his parents' job and education turned out to be significant.

The income of the family, the presence of siblings and a disability received as a child did not show any differences. These results suggest that it is advantageous social relations manifested in their parents' job and education – not income or state of health – which are the reason that today's young people avoid military service.

Characteristics of respondents after serving in the army differ across a wide range of indicators. Those who served were more likely to live alone, worked (at the time of the survey), and did not speak foreign languages. That is, in general, men who had gone through the "school of life" in the army were more independent, more likely to support themselves and to live separately. Educational attainment turned out to be insignificant, since the barriers to higher education which existed at certain times of the Soviet era do not exist in modern Russia. However, knowledge of foreign languages is indirect evidence that men avoiding military service are oriented towards a better education. The state of health once again is not different for those who did and those who did not do compulsory military service. That is, in the army, where originally the main criterion for selection was the health of conscripts, mechanisms of selection by this characteristic have stopped functioning.

Age characteristics of the onset of events in men

In this section, we will look at the differences in age of the onset of starting sociodemographic events in the life course of those who have done and have not done military service.

According to the theory of the second demographic transition [Jennings, Sullivan, Hacker 2012; van de Kaa 1987; Lesthaeghe 1995; Potârcă, Mills, Lesnard 2013] the category of markers of demographic changes should include the increasing proportion of divorces and second marriages not registered officially, as well as the higher average age of marriage. All these changes give direction to transformations in other areas of life. Therefore, we chose for more detailed examination the following starting events of men who had served and had not served: the first separation from parents, the first employment, educational attainment, sexual debut, first partnership, first marriage and birth of the first child (Table 1).

Henceforth in our work, only part of the PFS array will be used. This is due to the fact that all the questions from the block "marriages, unions, children" representing great interest to us were asked only to respondents of reproductive age. Therefore, we are forced to limit ourselves to a subsample consisting of cohorts born in 1970-1995 (2,062 men, of whom 1,111 served and 951 did not). Respondents with these years of birth were called up for service starting in 1987, which makes it impossible to evaluate the link between military service and demographic events for men falling into periods of a consistently high level of recruitment.

Ages of the onset of socioeconomic and demographic events did not differ significantly between men who had and who had not served in the army, but it is interesting to look at the general trends which are the same for both groups of men. Before doing so, it is worth noting that some members of the younger generation at the time of the survey were not yet 20 years old, which affected

the value of the average ages and made comparison with the indicators calculated for the preceding generations more difficult.

Table 1. The average age of onset of sociodemographic events

Generations	First separation from parents	First job	Highest level of education	Sexual initiation	First cohabitation	First marriage	First child
Served in the army							
1970-1974	22.2	20.8	19.6	20.0	23.2	24.1	25.8
1975-1979	21.6	21.2	19.7	19.3	22.8	24.9	25.9
1980-1984	21.1	20.9	19.4	18.7	21.5	23.8	24.5
1985-1989	19.9	20.4	19.2	18.1	20.7	22.7	23.2
1990-1994	19.1*	19.7	18.2	17.1	18.1	20.3	19.8
Did not serve in the army							
1970-1974	22.5	21.0	20.3	19.4	22.7	25.3	25.5
1975-1979	22.2	21.4	19.8	19.7	22.7	24.7	25.8
1980-1984	21.1	20.7	20.0	19.1	21.2	24.0	24.9
1985-1989	20.4	20.2	19.4	18.3	20.5	22.6	23.0
1990-1994	18.4	19.4	17.8	16.9	17.9	20.2	20.8

*Note: * - significantly higher for members of the same generation not serving in the army.*

Source: Compiled by the authors according to PFS 2013.

There is a strong decrease in the age of separation of young people from their parents, but this is the effect of the youth of the cohorts, as a study carried out on similar data shows young people postponing this event [Dolgova, Mitrofanova 2015]. In the case of the start of a work career, there is no apparent reduction of age: men start working at about age 20-21. The average age of completion of the highest level of education shows that the majority of men (regardless of whether they served in the army and which generation they belong to) have a secondary education, as it is obtained before the age of 20. Slight fluctuations may be caused by changes in the system of education in the country, in particular the number of years of schooling.

The average age of sexual debut has moved down among younger generations. This trend began in the years after the Russian Revolution of 1917 [Denisenko, Dalla Duan 2001] and, as can be seen in the table, continues to this day. The rate of decline of this age is not significantly different for those who have or have not served in the army. The generations born after 1960 more often begin life together with cohabitation rather than marriage [Artamonova, Mitrofanova 2016; Mitrofanova 2010]. Often this union takes the form of a trial marriage which can either crumble or turn into a marriage [Zakharov 2007]. This is indirectly confirmed by the fact that the age at first marriage is greater than the age at first cohabitation. By the early 1990s, the age differences in Russia of sexual debut, first marriage and birth of the first child were minimal. For representatives of the "Soviet" generations, the decline in the age of sexual debut, in the absence of modern means of contraception, often led to an unplanned pregnancy, which was often covered up by marriage [Zakharov 2007], but according to the classification of T.A. Gurko [Gurko 2001], unplanned pregnancy is hardly the only reason for marriage. Marriage, in his opinion, may be caused by the desire to:

- register legally a premarital pregnancy;
- legalise existing love, sexual relations;
- psychologically separate from parents;
- get married so as to get on a waiting list for housing;
- gain a foothold in the city;
- be like everyone else: "I've returned from the army - it's time to get married";
- have a family, children.

The existence of a motivation to get married after returning from the army is confirmed by an increase in cases of marriage at age 22 for men who had served.

As shown by analysis of the average age of sociodemographic events, we faced large drawbacks in the evaluation of indicators for the younger generations, as most of these cohorts have not yet made their choices in different areas of life, and those who have did so deliberately at early ages. To neutralise these drawbacks of standard statistical methods, we examined sequences of the onset of events, which give a more complete and objective picture of the changes taking place.

Sequence analysis of the onset of socio-demographic events of men who have and have not served

Sequence analysis of the onset of events is one of the most advanced methods of analysis of a life's events, giving unique information that cannot be obtained by other methods. SA allows one to work not with separate events, but with a chain of a fairly large number of events [Abbott 1995; Billari 2001; Billari, Piccarreta 2005; Ritschard, Oris 2005]. To present events in a sequence, one must go from using the format of events to using the format of statuses, consisting of a set of letters in which a person's status is encoded in each of the areas of life considered at a particular time. In this work, the unit of time chosen was a month. The starting point was a man's 15th birthday, and the final point his 35th – that is, for each respondent a 240-month-long segment of his life course was built. We limited the period of observation to his 35th birthday in order to equalise the chances of different generations for the onset of events and exclude marginal cases (since first events are most likely to occur in the first half of life).

Each status reflects the respondent's condition in three spheres: reproductive, matrimonial and socioeconomic. While the first two spheres have only a few combinations, as will be shown below, three socioeconomic events yield 26 combinations (including simultaneous onset of events). In order to reduce the total number of statuses, a trial analysis was first carried out, which revealed which events are more common, and which less. For the best possible representation of sequences in pairs of events we focused on the first event, while in trios of events – on the last. The breakdown of each sphere into categories is presented in the list below, and the grouping into statuses – in table 2.

1. The reproductive sphere:
   - no child;
   - there is at least 1 child.
2. Matrimonial sphere:
   - single;
   - has experience of living in at least one partnership;
   - has experience of living in at least one marriage.
3. Socioeconomic sphere:
   - no socioeconomic events or one of these events: separation from parents, work experience or highest level of education;
   - 2 events: separation from parents, then one event;
   - 2 events: hired for first job, then one event;
   - 2 events: the completion of education of the highest level, then one event;
   - 2 events came at the same time;
   - 3 events: 2 events came at the same time or consecutively, then separation from parents;
   - 3 events: 2 events came at the same time or consecutively, then employment;
   - 3 events: 2 events came at the same time or consecutively, and then the completion of education;
   - 3 events came at the same time.

Table 2. Grouping of events in statuses

Socioeconomic events	Demographic events					
	No children			1 child		
	Single	1 partner	1 marriage	Single	1 partner	1 marriage
No events or one event	no events / separation / work / education					
Separation > event						
Work > event						
Education > event						
2 events simultaneously						
2 events > separation						
2 events > work						
2 events > education						
3 events simultaneously						
Censoring						

Table 2 displays not only status variants, but the colour codes for each of them, so as to simplify the graphic perception of the sequences. A table showing abbreviations for each status is available in table A-1 of the appendix. Figure 5 shows the chronograms for men who did (left) and did not do (right) compulsory military service. A chronogram represents the distribution of frequency

of the occurrence of each status with respect to the time intervals in which the given sequences of events were observed.

The sample includes respondents of different ages. The youngest at the time of the survey were only 19 years old, that is, we can construct a biography for only 4 years of their life. The part of their life course about which we know nothing is indicated on the chronogram by a burgundy-coloured gradient. In terms of advanced statistical analysis, such a lack of information about events not occurring within the range of observation is called censoring.

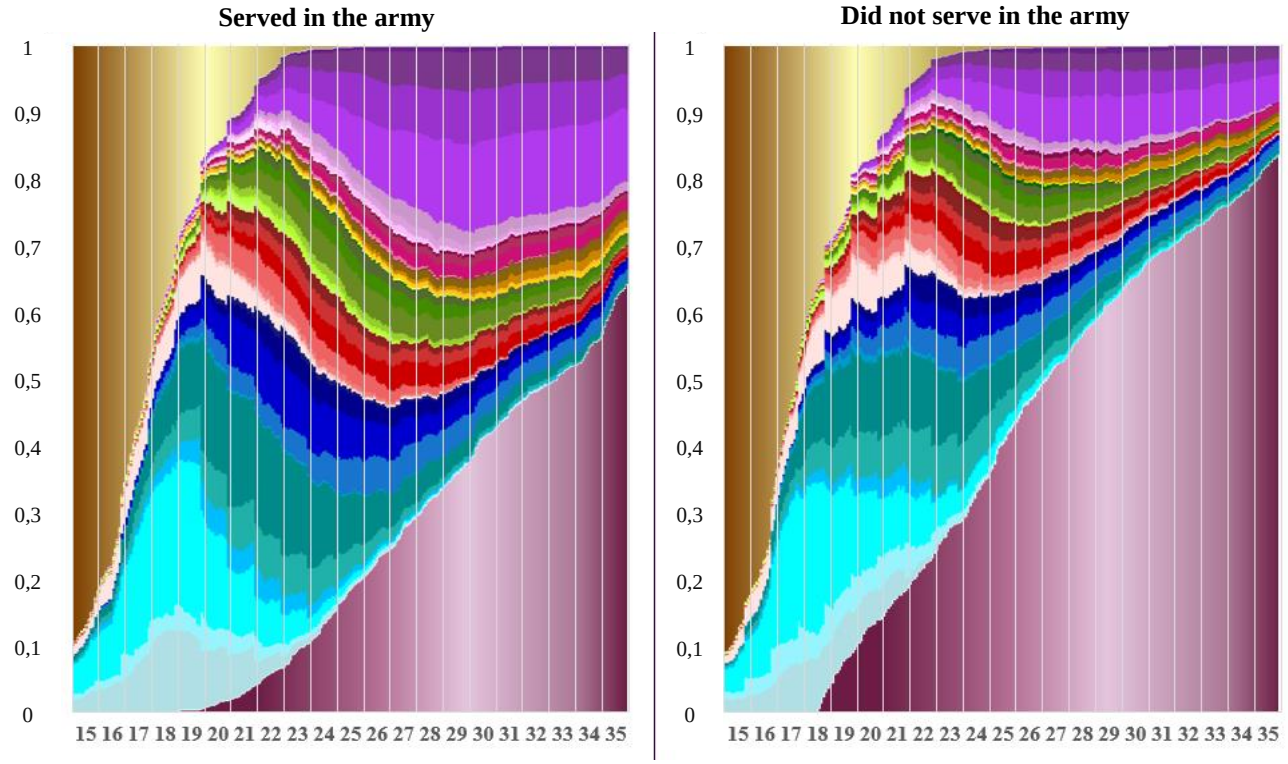

Figure 5. Chronograms of the onset of starting events for men who served and did not serve in the army

Source: Compiled by the authors according to [PFS 2013].

Differences in the chronograms of the onset of events indicate the particular features of a life course in the context of military service. While the number of men not having sociodemographic events at the beginning of the transition to adulthood is almost the same for both categories, the number of censored events is significantly higher in men who did not serve. This points to a smaller number of events in their lives, which may be due to the relative youth of this group of men; this is because among representatives of older generations, the percentage of those avoiding military service is minimal, whereas for young people it is becoming more typical.

At the beginning of the period of observation (age 15), men who served and did not serve have roughly the same set of events: a few events of the socioeconomic block (most often separation from their parents and attainment of their highest level of education) and a very small proportion of

demographic events, namely partnerships. By the age of 19 (when men who served were in the army), the proportion of men separating from their parents increases among those who have not served. This is most likely due to the fact that, among those who served, it is their departure from the army which is the reason for leaving the parental home for at least 3 months. By the end of the observation period (age 35), the differences between men who have and who have not served are particularly noticeable: the proportion of those in a first marriage, having one child and some events from the socioeconomic block (the purple range) is of the order of 23% among men who served, while among those who did not serve it is less than 10%. The remaining combinations of events, including demographic ones (red, pink and green ranges), are also to a far greater extent among men who served than among those who did not.

Table 3 (the full version is in Table A-2 of the appendix) presents statuses in order from the longest (in months) to the shortest for all men, for those who served and who did not serve in the army.

Table 3: Ranking of statuses from the longest to the shortest for all men (i.e. those who served and those who did not serve in the army)

№	All		Men who served in the army		Men who did not serve in the army	
	Status	Average duration, months	Status	Average duration, months	Status	Average duration, months
1	SC00	38.54	SC00	38.07	SC00	39.10
2	SC0E+	14.37	M1C1++L	16.88	SC0E	13.47
3	SC0E	13.43	SC0E+	16.08	SC0E+	12.37
4	M1C1++L	13.32	SC0E	13.40	M1C1++L	9.16
5	M1C1++J	8.05	M1C1++J	10.46	SC0J+	7.57
6	SC0J+	6.87	SC0++J	8.98	SC0++L	5.76
7	SC0++J	6.75	M1C1++E	7.25	M1C1++J	5.23
8	SC0++L	6.39	SC0++L	6.92	P1C01	4.44
9	M1C1++E	5.70	SC0L	6.74	SC0L	4.37
10	SC0L	5.65	SC0J+	6.28	SC0++J	4.14

The status in which men in both categories remain the longest is that of an absence of any type of event (more than three years). Next in terms of duration (16.9 to 18 months) among men who had served in the army comes the status of "in a first marriage, with one child, with three socio-economic events, the last of which is separation from parents", while among men who did not serve in the army it is the status of "no demographic events, presence of the highest level of education" (13.5 months). In third place for men who served (16 months) and who did not serve (12 months) comes the status of "no demographic events, two socio-economic events, the last of which is the presence of the highest level of education". The fourth longest status for men who served (13.4 months) is "no demographic events, the presence of education of the highest level", and for men who did not serve (9 months), it is "in the first marriage, with one child, three events, the last of which is separation from parents".

As seen in these rankings, the men who served in the army stayed in all statuses longer than those who did not serve. This suggests that they open up their trajectories earlier. The longest status

for men who served is also the most intense, the status in which there is a demographic and a socioeconomic component, whereas for men who did not serve, most characteristic is an absence of demographic events and the presence of education. Statuses of higher rank are very similar and differ mainly in their position on the list and in their duration.

Tables 4 and 5 (full versions are in tables A-3 and A-4, respectively, of the appendix show the most frequent subsequences of events for men who did and did not serve, where by "frequent" we mean those subsequences whose level of support (the proportion of men in the population of the respective category) exceeds 9%. Subsequences may consist of one or multiple statuses.

Table 4. Ranking of subsequences by frequency of occurrence among respondents who served in the army

№	The sequence	Proportion of men who served	Persons
1	(SC00)	0.905	1005
2	(SC00)-(SC00>SC0E)	0.436	484
3	(SC00>SC0E)	0.436	484
4	(SC0E>SC0E+)	0.389	432
5	(SC00)-(SC0E>SC0E+)	0.356	395
6	(SC00)-(SC00>SC0E)-(SC0E>SC0E+)	0.350	389
7	(SC00>SC0E)-(SC0E>SC0E+)	0.350	389
8	(SC00>SC0L)	0.194	216
9	(SC00)-(SC00>SC0L)	0.194	215
10	(SC0L>SC0L+)	0.166	184
11	(SC00)-(SC00>SC0J)	0.163	181
12	(SC00>SC0J)	0.163	181
13	**(M1C0++L>M1C1++L)**	0.157	174
14	(SC00)-(SC00>SC0L)-(SC0L>SC0L+)	0.150	167
15	(SC00)-(SC0L>SC0L+)	0.150	167
16	(SC00>SC0L)-(SC0L>SC0L+)	0.150	167
17	**(SC00)-(M1C0++L>M1C1++L)**	0.143	159
18	(SC0J>SC0J+)	0.134	149
19	(SC00)-(SC00>SC0J)-(SC0J>SC0J+)	0.125	139
20	(SC00)-(SC0J>SC0J+)	0.125	139
21	(SC00>SC0J)-(SC0J>SC0J+)	0.125	139
22	**(SC0E+>P1C0E+)**	0.098	109
23	**(SC00>P1C01)**	0.096	107
24	(SC0E+>SC0++L)	0.095	105
25	**(SC00)-(SC00>P1C01)**	0.092	102
26	(SC0E>SC0E+)-(SC0E+>SC0++L)	0.092	102

Note: Subsequences containing demographic events are marked in bold.

The greatest number of men who served are in the "no events" status: 1,005 out of 1,111 men. This suggests that only 10% of men had had any events at the beginning of the observation period (their 15th birthday). A total of 44% of those who served have a subsequence of "*no events*, and then *the presence of complete education*", and 35% of them had one *socioeconomic event* (employment or separation from parents) after education. In 19% of men the first event was *separation from parents*. Some 17% of this number then had one other *socioeconomic event*. For 16% the first event was *employment*, in 13% of cases supplemented by another *socioeconomic event*. Then, among men who

served, we begin to see subsequences with demographic events. A share of 16% of men have the subsequence "*in the first marriage, no children, three socio-economic events, the last of which is separation from parents*, and then the same, but with *one child"*. A share of 10% at first have only *education* and one other *socioeconomic event*, after which they enter their first partnership. The same number of respondents at first had *not a single event*, and then entered into their *first partnership* and had either *one or no socioeconomic events*. All other subsequences in this category of men have a support level of fewer than 100 people. That is, altogether for men who served, 26 subsequences were found among more than 9% of the subsample.

Among men who did not serve, 22 subsequences were found for more than 9% of the subsample (Table 5).

Table 5. Ranking of subsequences by frequency of occurrence among respondents who did not serve in the army

№	The sequence	Proportion of men who did not serve	Persons
1	(SC00)	0.924	879
2	(SC00>SC0E)	0.441	419
3	(SC00)-(SC00>SC0E)	0.440	418
4	(SC0E>SC0E+)	0.306	291
5	(SC00)-(SC0E>SC0E+)	0.284	270
6	(SC00>SC0E)-(SC0E>SC0E+)	0.279	265
7	(SC00)-(SC00>SC0E)-(SC0E>SC0E+)	0.278	264
8	(SC00)-(SC00>SC0J)	0.205	195
9	(SC00>SC0J)	0.205	195
10	(SC0J>SC0J+)	0.182	173
11	(SC00)-(SC0J>SC0J+)	0.171	163
12	(SC00)-(SC00>SC0J)-(SC0J>SC0J+)	0.170	162
13	(SC00>SC0J)-(SC0J>SC0J+)	0.170	162
14	(SC00)-(SC00>SC0L)	0.135	128
15	(SC00>SC0L)	0.135	128
16	**(SC00>P1C01)**	0.129	123
17	**(SC00)-(SC00>P1C01)**	0.127	121
18	(SC0L>SC0L+)	0.111	106
19	(SC00)-(SC0L>SC0L+)	0.102	97
20	(SC00)-(SC00>SC0L)-(SC0L>SC0L+)	0.101	96
21	(SC00>SC0L)-(SC0L>SC0L+)	0.101	96
22	**(M1C0++L>M1C1++L)**	0.094	89

Note: Subsequences containing demographic events are marked in bold.

The most common subsequence also consists of a single status: "no events" (92%, or 879 of 951 men). The next most common subsequence also coincides for those who did and did not serve in the army: "*No events*, then *the presence of education*" (44%), to which in 30% of the cases is added another *socioeconomic event*. Then the situation changes: the third most common subsequence among men who did not serve is "*no events*, then *employment*" (20%); for 18%, after a while another *socioeconomic event* will be added. Fourth in terms of support level comes separation from parents (13%), in 11% of cases supplemented by another *socioeconomic event*. At this stage, among men who did not serve, demographic events begin to appear, but the support level is much less, and in first place

comes not marriage but partnership: located among 13% of men from the subsample is the subsequence "*no events*, then *first partnership without a child* ", and among 9.4% – "*first marriage without children, three socio-economic events, the last of which is separation from parents*, then *the appearance of a baby*".

Thus, every ninth man in the sample (regardless of army service) had no sociodemographic events for some period of time. A share of 44% of the men at some point in time completed their education. A total of 19% of those who served and 13% of those who did not serve separated from their parents; some 16% and 18%, respectively, found employment; shares of 16% and 9%, respectively, got married, had a child and made all three status transitions in the socioeconomic sphere, the last of which was separation from their parents; and 10% and 13% started to live in a partnership. In general, sequences containing different demographic events are more common among men who did military service.

Next we consider chronograms of sequences of events for each cohort in the context of service in the army (see Figure 6).

Above all, attention should be paid to the number of men who did and did not serve in the army. While in the older generation the number of men who served was over twice the number of those who did not, for the generation born in 1990-1994 the situation is diametrically opposite. However, despite the variations in fullness of the categories, censoring was consistently greater among men who did not serve. That is, the army, whatever the percentage of the generation not serving, is conducive to a life course much richer in events.

The chronograms that most differ from each other are those for the oldest and youngest generations. Men born in 1970-1974, who served in the Soviet era, completed their education earlier (stopping at a lower level than men who did not serve) and separated earlier from their parents (which is likely due to service in the army). By the age of 17, men who did not serve were in partnerships without children more often than men who did serve. By the age of 35, among those who did military service there were more married men with children (purple range; more than 60%) than among those who did not (over 50%). In general, men who served had more sequences, including demographic events (all colour ranges except blue).

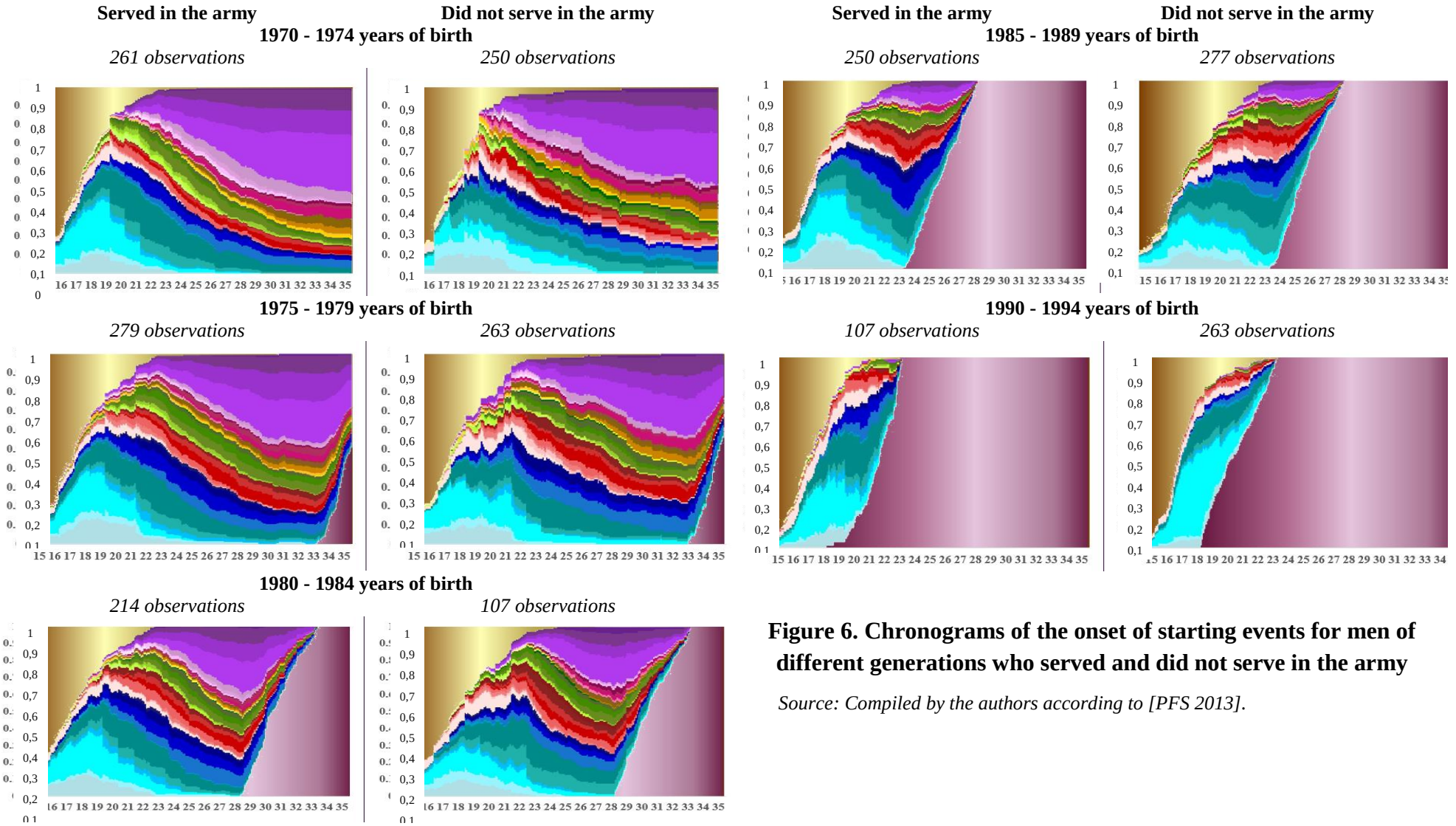

Figure 6. Chronograms of the onset of starting events for men of different generations who served and did not serve in the army

Source: Compiled by the authors according to [PFS 2013].

Among men born after 1990 there is still a lot of censoring, as the youngest respondents at the time of the survey (2013) were only 19 years old, and the eldest respondents of this generation were 23. Nevertheless, the differences between the categories can be seen quite clearly: the men who served in the military had more socioeconomic and demographic events than those who did not serve. They had more separations from their parents, which is connected directly with army service. With greater speed and intensity they completed all socioeconomic events (blue), entered into a partnership (red range), got married (green) and had children (yellow, pink, and purple).

The chronograms presented here confirm both in the context of generations and in general for all cohorts, hypothesis 2 – that demographic events among those who served in the military would begin earlier and more intensively than among those who did not.

CONCLUSION

This study provides empirical evidence of a whole series of differences in the life courses of men who have served and have not served in the military.

In Soviet times, 80-90% of 18-year-old men were called up for military service (Figure 1), while in today's Russia this percentage is below the threshold of 50%. The cause of there being more men with exemptions than without lies in the change in the mechanism of recruiting men for service. Sociodemographic "portraits" show that for men who served in Soviet times there were no differences in characteristics at the time of their 15th birthday and on the date of the survey (2013). The only variable for which there are minor differences is a disability, which confirms that in Soviet times men were exempted only for reasons of health The characteristics of respondents who served in the post-Soviet period suggest that the possibility of avoiding military service is linked to the social connections of their parents. Men who received a similar deferment later than their peers who served become independent, but invest more of themselves in the development of their professional skills.

Sequence analysis has shown that men who have done military service complete socioeconomic and demographic events earlier and more intensively. The greatest differences are in the chronograms for the oldest and youngest generations. Men born in 1970-1974, who served in the Soviet era, completed their education earlier (stopping at a lower level than men who did not serve) and separated earlier from their parents. By the age of 35, among those who did military service there were more married men with children than among those who did not. Men born after 1990 still show a lot of censoring, yet complete all socioeconomic events, enter into partnerships, get married and have children faster and more intensively.

Taking into account that men who have served are most often members of the older generation, and that those who have not served are most often of the younger generation, we do not make firm conclusions about the impact of military service on life events, as we are dealing with intergenerational transformations of sociodemographic behaviour and with different susceptibilities of generations to censoring (young men have fewer events due to their young age). However, one can make the unambiguous conclusion that those who have experienced military service shape their life course somewhat differently than those who have not gone through the "school of life". To what this phenomenon is attributable (e.g. intergenerational transformations,

changes in attitudes to the army, selective recruitment or the effect of service itself, etc.), is an issue that requires further investigation with the assistance of advanced methods not only of analysis, but also of collecting information (cohort, longitudinal studies with a carefully outlined set of indicators).

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APPENDIX

Table A-1. Grouping of events in statuses (with indication of the abbreviations for each status)

	Demographic events					
	No children			No children		
	Single	Single	Single	Single	Single	Single
No events or one event	SC00					
	SC0L					
	SC0J					
	SC0E	P1C01	M1C01	SC11	P1C11	M1C11
Separation > event	SC0L+	P1C0L+	M1C0L+	SC1L+	P1C1L+	M1C1L+
Work > event	SC0J+	P1C0J+	M1C0J+	SC1J+	P1C1J+	M1C1J+
Education > event	SC0E+	P1C0E+	M1C0E+	SC1E+	P1C1E+	M1C1E+
2 events simultaneously	SC02	P1C02	M1C02	SC12	P1C12	M1C12
2 events > separation	SC0++L	P1C0++L	M1C0++L	SC1++L	P1C1++L	M1C1++L
2 events > work	SC0++J	P1C0++J	M1C0++J	SC1++J	P1C1++J	M1C1++J
2 events > education	SC0++E	P1C0++E	M1C0++E	SC1++E	P1C1++E	M1C1++E
3 events simultaneously	SC03	P1C03	M1C03	SC13	P1C13	M1C13
Censoring						

Table A-2. Ranking of statuses from the longest to the shortest for all men (i.e. those who served and for those who did not serve in the army)

№	All		Men who served in the army		Men who did not serve in the army	
	Status	Average duration, months	Status	Average duration, months	Status	Average duration, months
1	SC00	38.54	SC00	38.07	SC00	39.10
2	SC0E+	14.37	M1C1++L	16.88	SC0E	13.47
3	SC0E	13.43	SC0E+	16.08	SC0E+	12.37
4	M1C1++L	13.32	SC0E	13.40	M1C1++L	9.16
5	M1C1++J	8.05	M1C1++J	10.46	SC0J+	7.57
6	SC0J+	6.87	SC0++J	8.98	SC0++L	5.76
7	SC0++J	6.75	M1C1++E	7.25	M1C1++J	5.23
8	SC0++L	6.39	SC0++L	6.92	P1C01	4.44
9	M1C1++E	5.70	SC0L	6.74	SC0L	4.37
10	SC0L	5.65	SC0J+	6.28	SC0++J	4.14
11	P1C0++L	4.31	M1C0++L	5.26	M1C1++E	3.89
12	P1C01	4.26	P1C0++L	4.71	P1C0++L	3.84
13	M1C0++L	4.09	P1C01	4.11	SC0J	3.83
14	SC0++E	3.58	SC0++E	4.01	SC0++E	3.08
15	SC0J	3.20	P1C0++J	3.58	M1C0++L	2.73
16	P1C0++J	3.00	P1C0E+	3.39	P1C0E+	2.40
17	P1C0E+	2.93	SC0L+	3.27	M1C0++J	2.38
18	M1C0++J	2.83	M1C0++J	3.21	P1C0++E	2.33
19	SC0L+	2.58	M1C1E+	3.07	P1C0++J	2.32
20	P1C1++L	2.44	P1C1++L	2.83	P1C1++L	1.98
21	P1C0++E	2.21	SC0J	2.67	P1C0J+	1.92
22	M1C1E+	2.18	M1C0++E	2.18	SC0L+	1.78
23	M1C0++E	1.91	P1C0++E	2.10	M1C0++E	1.60
24	P1C0J+	1.50	P1C1++J	1.92	SC1++L	1.27
25	SC1++L	1.30	SC1++J	1.63	SC02	1.18
26	SC1++J	1.29	M1C0E+	1.59	M1C1E+	1.15
27	P1C1++J	1.24	M1C1J+	1.44	P1C0L+	0.99
28	M1C1J+	1.16	SC1++L	1.33	M1C13	0.90

№	All		Men who served in the army		Men who did not serve in the army	
	Status	Average duration, months	Status	Average duration, months	Status	Average duration, months
29	M1C0E+	1.16	P1C0J+	1.14	SC1++J	0.90
30	M1C13	0.90	SC03	0.98	P1C03	0.89
31	SC02	0.86	M1C1L+	0.96	M1C1J+	0.84
32	SC03	0.76	SC1E+	0.90	P1C1++E	0.79
33	P1C1++E	0.75	M1C13	0.90	M1C0E+	0.66
34	P1C0L+	0.74	M1C01	0.80	SC1++E	0.61
35	SC1++E	0.71	SC1++E	0.80	M1C01	0.56
36	M1C01	0.69	P1C1++E	0.71	M1C03	0.50
37	M1C1L+	0.66	SC02	0.58	SC03	0.49
38	P1C03	0.62	SC1J+	0.57	M1C0L+	0.48
39	SC1E+	0.59	M1C11	0.56	P1C1++J	0.44
40	M1C0L+	0.49	M1C0J+	0.55	P1C1E+	0.37
41	M1C0J+	0.46	P1C0L+	0.53	M1C0J+	0.36
42	SC1J+	0.43	SC11	0.51	M1C1L+	0.32
43	M1C11	0.42	M1C0L+	0.50	SC11	0.29
44	SC11	0.41	P1C03	0.39	SC1J+	0.27
45	P1C1E+	0.35	P1C1E+	0.33	M1C11	0.25
46	M1C03	0.34	P1C11	0.25	SC1E+	0.22
47	P1C11	0.21	M1C03	0.20	P1C1J+	0.21
48	SC13	0.15	SC13	0.19	P1C11	0.16
49	P1C02	0.15	P1C1L+	0.16	P1C02	0.15
50	P1C1J+	0.14	P1C02	0.15	SC1L+	0.14
51	SC1L+	0.13	SC1L+	0.12	SC13	0.10
52	P1C1L+	0.09	P1C1J+	0.07	M1C12	0.04
53	M1C02	0.05	M1C02	0.07	P1C13	0.04
54	M1C12	0.03	M1C12	0.02	M1C02	0.02
55	P1C13	0.02	SC12	0.00	P1C1L+	0.01
56	SC12	0.00	P1C12	0.00	SC12	0.00
57	P1C12	0.00	P1C13	0.00	P1C12	0.00

Table A-3. Ranking of subsequences by frequency of occurrence among respondents who served in the army

№	The sequence	Proportion of men who served	Persons
1	(SC00)	0,905	1005
2	(SC00)-(SC00>SC0E)	0.436	484
3	(SC00>SC0E)	0.436	484
4	(SC0E>SC0E+)	0.389	432
5	(SC00)-(SC0E>SC0E+)	0.356	395
6	(SC00)-(SC00>SC0E)-(SC0E>SC0E+)	0.350	389
7	(SC00>SC0E)-(SC0E>SC0E+)	0.350	389
8	(SC00>SC0L)	0.194	216
9	(SC00)-(SC00>SC0L)	0.194	215
10	(SC0L>SC0L+)	0.166	184
11	(SC00)-(SC00>SC0J)	0.163	181
12	(SC00>SC0J)	0.163	181
13	**(M1C0++L>M1C1++L)**	0.157	174
14	(SC00)-(SC00>SC0L)-(SC0L>SC0L+)	0.150	167
15	(SC00)-(SC0L>SC0L+)	0.150	167
16	(SC00>SC0L)-(SC0L>SC0L+)	0.150	167
17	**(SC00)-(M1C0++L>M1C1++L)**	0.143	159
18	(SC0J>SC0J+)	0.134	149
19	(SC00)-(SC00>SC0J)-(SC0J>SC0J+)	0.125	139

№	The sequence	Proportion of men who served	Persons
20	(SC00)-(SC0J>SC0J+)	0.125	139
21	(SC00>SC0J)-(SC0J>SC0J+)	0.125	139
22	**(SC0E+>P1C0E+)**	0.098	109
23	**(SC00>P1C01)**	0.096	107
24	(SC0E+>SC0++L)	0.095	105
25	**(SC00)-(SC00>P1C01)**	0.092	102
26	(SC0E>SC0E+)-(SC0E+>SC0++L)	0.092	102
27	**(SC0E>SC0E+)-(M1C0++L>M1C1++L)**	0.087	97
28	**(SC0E>SC0E+)-(SC0E+>P1C0E+)**	0.086	96
29	**(SC00)-(SC00>SC0E)-(M1C0++L>M1C1++L)**	0.086	95
30	**(SC00)-(SC0E+>P1C0E+)**	0.086	95
31	**(SC00>SC0E)-(M1C0++L>M1C1++L)**	0.086	95
32	(SC00)-(SC0E+>SC0++L)	0.085	94
33	(SC00)-(SC00>SC0E)-(SC0E+>SC0++L)	0.084	93
34	**(SC00)-(SC0E>SC0E+)-(M1C0++L>M1C1++L)**	0.084	93
35	(SC00)-(SC0E>SC0E+)-(SC0E+>SC0++L)	0.084	93
36	(SC00>SC0E)-(SC0E+>SC0++L)	0.084	93
37	**(M1C0++J>M1C1++J)**	0.083	92
38	(SC00)-(SC00>SC0E)-(SC0E>SC0E+)-(SC0E+>SC0++L)	0.083	92
39	(SC00>SC0E)-(SC0E>SC0E+)-(SC0E+>SC0++L)	0.083	92
40	**(P1C0++L>M1C0++L)**	0.080	89
41	**(SC00)-(SC00>SC0E)-(SC0E>SC0E+)-(M1C0++L>M1C1++L)**	0.080	89
42	**(SC00>SC0E)-(SC0E>SC0E+)-(M1C0++L>M1C1++L)**	0.080	89
43	**(SC00)-(SC00>SC0E)-(SC0E+>P1C0E+)**	0.077	86
44	**(SC00)-(SC0E>SC0E+)-(SC0E+>P1C0E+)**	0.077	86
45	**(SC00>SC0E)-(SC0E+>P1C0E+)**	0.077	86
46	(SC0L+>SC0++J)	0.076	84
47	**(SC00)-(M1C0++J>M1C1++J)**	0.075	83
48	**(SC00)-(SC00>SC0E)-(SC0E>SC0E+)-(SC0E+>P1C0E+)**	0.075	83
49	**(SC00>SC0E)-(SC0E>SC0E+)-(SC0E+>P1C0E+)**	0.075	83
50	**(SC0++L>P1C0++L)**	0.074	82

Note: Sequences containing demographic events are marked in bold.

A-4. Ranking of subsequences by frequency of occurrence among respondents who did not serve in the army

№	The sequence	Proportion of men who did not serve	Persons
1	(SC00)	0.924	879
2	(SC00>SC0E)	0.441	419
3	(SC00)-(SC00>SC0E)	0.440	418
4	(SC0E>SC0E+)	0.306	291
5	(SC00)-(SC0E>SC0E+)	0.284	270
6	(SC00>SC0E)-(SC0E>SC0E+)	0.279	265
7	(SC00)-(SC00>SC0E)-(SC0E>SC0E+)	0.278	264
8	(SC00)-(SC00>SC0J)	0.205	195
9	(SC00>SC0J)	0.205	195
10	(SC0J>SC0J+)	0.182	173
11	(SC00)-(SC0J>SC0J+)	0.171	163
12	(SC00)-(SC00>SC0J)-(SC0J>SC0J+)	0.170	162
13	(SC00>SC0J)-(SC0J>SC0J+)	0.170	162
14	(SC00)-(SC00>SC0L)	0.135	128
15	(SC00>SC0L)	0.135	128
16	**(SC00>P1C01)**	0.129	123
17	**(SC00)-(SC00>P1C01)**	0.127	121
18	(SC0L>SC0L+)	0.111	106
19	(SC00)-(SC0L>SC0L+)	0.102	97

№	The sequence	Proportion of men who did not serve	Persons
20	(SC00)-(SC00>SC0L)-(SC0L>SC0L+)	0.101	96
21	(SC00>SC0L)-(SC0L>SC0L+)	0.101	96
22	**(M1C0++L>M1C1++L)**	0.094	89
23	**(SC00)-(M1C0++L>M1C1++L)**	0.084	80
24	(SC0E+>SC0++L)	0.069	66
25	**(P1C0++L>M1C0++L)**	0.068	65
26	(SC0E>SC0E+)-(SC0E+>SC0++L)	0.067	64
27	**(SC0E+>P1C0E+)**	0.066	63
28	**(SC00)-(P1C0++L>M1C0++L)**	0.064	61
29	**(SC0E>SC0E+)-(SC0E+>P1C0E+)**	0.063	60
30	(SC00)-(SC0E+>SC0++L)	0.062	59
31	(SC00)-(SC00>SC0E)-(SC0E+>SC0++L)	0.061	58
32	**(SC00)-(SC0E+>P1C0E+)**	0.061	58
33	(SC00)-(SC0E>SC0E+)-(SC0E+>SC0++L)	0.061	58
34	(SC00>SC0E)-(SC0E+>SC0++L)	0.061	58
35	(SC00)-(SC00>SC0E)-(SC0E>SC0E+)-(SC0E+>SC0++L)	0.060	57
36	(SC00>SC0E)-(SC0E>SC0E+)-(SC0E+>SC0++L)	0.060	57
37	**(SC0++L>P1C0++L)**	0.059	56
38	**(SC00>SC0E)-(SC0E+>P1C0E+)**	0.059	56
39	**(SC00)-(SC00>SC0E)-(SC0E+>P1C0E+)**	0.058	55
40	**(SC00)-(SC0E>SC0E+)-(SC0E+>P1C0E+)**	0.058	55
41	**(SC00>SC0E)-(SC0E>SC0E+)-(SC0E+>P1C0E+)**	0.056	53
42	**(SC00)-(SC00>SC0E)-(SC0E>SC0E+)-(SC0E+>P1C0E+)**	0.055	52
43	**(SC00)-(SC0++L>P1C0++L)**	0.053	50
44	(SC0L+>SC0++J)	0.050	48
45	(SC0L>SC0L+)-(SC0L+>SC0++J)	0.049	47
46	**(P1C01>SC00)**	0.048	46
47	(SC00)-(SC0L+>SC0++J)	0.047	45
48	**(P1C0++L>M1C0++L)-(M1C0++L>M1C1++L)**	0.046	44
49	**(P1C01>P1C0L+)**	0.046	44
50	(SC00)-(SC00>SC0L)-(SC0L+>SC0++J)	0.046	44

Note: Sequences containing demographic events are marked in bold.