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THE EPIDEMIOLOGICAL TRANSITION AND ITS INTERPRETATIONS

ANATOLY VISHNEVSKY

A critical analysis of A. Omran's theory of epidemiological transition (ET) and its various interpretations. The periodization of ET proposed by Omran is questioned, and the differentiation of the two "epidemiological revolutions" by M. Terris is compared with it. The great world historical significance of ET as a trigger and an integral part of the demographic transition as a whole is noted, and disagreement with the interpretation of ET as an integral part of the "sanitary transition" is substantiated. The concept of the "cardiovascular revolution" is contested. A method of graphical representation of ET is proposed and criteria for its completion are discussed. Grounds are given for disagreement with ideas about the "first", Neolithic, and coming "third" ET, as well as about a "reverse" ET. The problems of "catching-up" ET in developing countries are considered.

***Key words**: epidemiological transition, epidemiological revolution, demographic transition, sanitary transition, stages of epidemiological transition, cardiovascular revolution, probability of death, average age of death.*

The term "epidemiological transition" (ET) was first introduced into scientific circulation by Abdel Omran in an article published in 1971 (Omran 1971; Omran 1977), and since then has been inextricably linked with his name. Omran's article has become one of the most cited, which even causes some irritation among a part of the demographic audience, and publications appear whose main purpose is to prove that too frequent mention of Omran's name is not justified and that his merits are exaggerated. The authors of one of these publications see the reasons for over-citation not in the true merits of Omran, but in the fact that "critics looking for new models or conceptual schemes have found in Omran a convenient starting point, target or whipping boy, to highlight their own conceptual innovations and give them weight" (Weisz, Olszynko-Gryn 2009: 323). This is good advice to everyone who also wants to become famous like Omran and to become a "whipping boy": you just need to put forward an idea that no researcher working in the relevant field of knowledge can ignore.

In fairness, it should be noted that Omran's concept is often highly praised as "a potentially powerful framework for the study of disease and mortality in populations, especially for the study of historical and international variations." (Mackenbach 1994: 330). Apparently, it is no coincidence that Omran's scheme is used as a starting point for new theoretical constructions, although at times these retain a rather tenuous link to the original concept, at which point the question arises whether the appeal to this concept is just a way to give such constructions additional weight.

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And it is no coincidence that when one gets acquainted with such constructions, questions arise for their creators, and sometimes for Omran himself, as to the soundness of the foundation he has laid and the fruitfulness of the directions for the development of his ideas proposed by different authors.

"TRANSITION" OR "REVOLUTION"?

Omran used the term "transition", apparently following a tradition begun in the 1940s by Princeton demographers who coined the term "demographic transition" (Notestein 1945: 40; Davis 1945). In turn, this term has established itself in competition with the term “demographic revolution”, which appeared much earlier (in 1934) (Landry 2019). As early as 1944, K. Davis wrote about a “demographic revolution inseparable from the industrial revolution” (Davis 1944: 57). Even later, American demographers sometimes used the term "vital revolution" in the same sense (Freedman 1964).

Some authors, relying on French tradition, continued to use the term "demographic revolution" thereafter (see, for example, (Pavlik 1964: 234-247; 1982; Pavlik 1979; Vishnevsky 1973; 1976). Nevertheless, in world literature the term “demographic transition” prevailed, although, according to van de Kaa, this weakened the historical depth and meaning of the term (Van de Kaa 2010). The new term was adopted in Landry's homeland, albeit with some reservations. C. Chesnais, the author of a fundamental study of the demographic transition, which is clearly reflected in the title of his book (Chesnais 1986), nevertheless notes that insofar as we are talking about an extremely special, radically new stage of demographic development, “the term “demographic revolution”, somewhat forgotten, seems to be more successful" (Chesnais 1986: 18).

Concluding our brief terminological excursion, we note that the expression "epidemiological revolution" is sometimes used by authors who may not be familiar with the concept of demographic or epidemiological transitions at all. As an example, let us cite an article titled "The Epidemiological Revolution of the 20th Century". This article, published in 2005, states that “The 20th century has been characterized by a fantastic advance in life expectancy and by a shift from infectious to chronic degenerative diseases as prevailing causes of death” and the “roots and rationale for these epidemiological changes” are discussed (De Flora et al. 2005: 892). There are no references to Omran in this article; his name is never mentioned.

An even more interesting example is the use of the term "epidemiological revolution" by Milton Terris; we will look at it a little further on.

In general, the term "transition" prevails in the literature, although the reasons for this choice against the background of the widespread use of the term "revolution" ("industrial revolution", "scientific and technological revolution", etc.) are not entirely clear. As there is probably no point in arguing over the choice of the word, in this article both terms are used interchangeably. But some costs are still associated with this.

WHY "EPIDEMIOLOGICAL"?

In the phrase "epidemiological transition" questions are often raised not only by the word "transition", but also by the word "epidemiological".

In the demographic literature, there is a fairly widespread point of view that the concept of epidemiological transition is too narrow and does not cover all the changes taking place in our time with health and mortality.

In particular, it is argued that in Omran the concept of 'epidemiological transition' is "common to refer to the transition as a period rather than as a process of change" (Frenk et al. 1991: 23), which sounds rather vague. One of Omran's assumptions is that "during the transition, a long-term shift occurs in mortality and disease patterns whereby pandemics of infection are gradually displaced by degenerative and man-made diseases as the chief form of morbidity and primary cause of death" (Omran 1971: 516; Omran 1977: 64). Is there any clearer idea of what is the essence of the process denoted by the term "epidemiological transition"?

Another - central - reproach is that the concept of epidemiological transition does not go further than considering the "long-term process of change in the health conditions of a society, including changes in the patterns of disease, disability, and death", while it is necessary to consider also "the patterns of the organized social response to health condition", the healthcare transition (Frenk et al. 1991: 23). With this approach, the authors of the article believe, the seemingly narrow reduction of the ongoing changes to an epidemiological transition is overcome, and their broader interpretation becomes possible as a "health transition" (Ibid.) or "sanitary transition"[1].

This reproach is hardly justified either. When calling the transition "epidemiological", Omran had in mind its main implication - a change in the epidemiological picture, the epidemiological model of morbidity and mortality. This, in fact, was the essence of the transition. But this does not mean in any way that he ignored the "organized social response" expressed in the mobilization and transformation of the healthcare system.

Of course, the epidemiological transition has its own prerequisites, including changes in "the patterns of the organized social response to health condition." But, firstly, they are by no means the only ones. And secondly, there is no reason to consider the prerequisites of any process to be its essence or even an integral part.

Rather, it can be said that Omran's view of the whole panorama of change, united by the concept of "epidemiological transition," was not narrower, but broader than the view of his critics. He speaks of three main groups of determinants that led to the transition from the era of infectious to the era of chronic non-infectious diseases: 1) ecobiologic; 2) socioeconomic, political and cultural; 3) medical and public health. At the same time, he quite rightly notes that "the reduction of mortality in Europe and most western countries during the nineteenth century, as described by

[1] The term "sanitary transition" ("transition sanitaire") is used in French-language literature, since in French, just like in Russian, it is impossible to form an adjective from the word "health". For the same reason, we accept this very term, although some of the nuances contained in the English expression "health transition" are lost.

the classical model of epidemiologic transition, was determined primarily by ecobiologic and socioeconomic factors. The influence of medical factors was largely inadvertent until the twentieth century" (Omran 1971: 520; Omran 1977: 67). This is now a common idea. "In the past, a significant decrease in mortality in the 19th century has often been attributed to advances in medicine. Nowadays, the prevailing point of view is that immunization and effective treatment methods have borne fruit only in the 20th century (with the exception of smallpox, of course)" (Livi Bacci 2010: 211).

The supporters of the "renaming" of the epidemiological transition turned out to have many followers in the demographic world. In the English version of a multivolume demographic compendium, the title of the corresponding chapter uses the term "Health transition" (in the French version, "Transition sanitaire") (Meslé, Vallin 2002; 2006). The chapter authors saw fit to accept the semantic shift proposed by Julio Frenk et al. (1991) and "include 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 2002: 444; 2006: 250).

But Omran himself did not agree with the proposal to "rename" the epidemiological transition. Whatever the changes taking place - social, economic, demographic, medical, technological, environmental - they affect health not directly, but through a change in the epidemiological situation, that is, the prevalence of certain diseases and causes of death. It is this situation that predetermines a population's health, mortality rate and life expectancy, and it is within it that historically unprecedented shifts take place - that very transition, that very revolution which can be called nothing other than epidemiological. This is what Omran is talking about, arguing that "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; Omran 2019: 178). The last phrase is the key one.

EPIDEMIOLOGICAL TRANSITION AND DEMOGRAPHIC TRANSITION

In the basic article of 1971, Omran pointed out that the impetus for the development of his theory was the realization of the shortcomings of the theory of demographic transition, and, apparently, he believed that the concept of the epidemiological transition, as a more comprehensive one, makes it possible to overcome these shortcomings, since this transition "triggered by economic and social development, encompasses the changing disease and health patterns (the health transition), the changing fertility and population age structure leading to ageing (parts of the demographic transition), the changing lifestyles (the lifestyle transition), the changing health care patterns (the health care transition), the medical and technological evolutions (the technologic transition), and the environmental and ecological changes (the ecological transition)" (Omran 1998: 99; Omran 2019: 178-179).

It seems to me that, in this case, Omran's ambitions are excessive. He - and this is his main merit - undoubtedly deepened the understanding of how, starting from about the 18th century, the mechanism for reducing mortality worked. We can say that Omran completed the theory of

demographic transition due to the fact that he conceptualized the process of reducing mortality, which was previously understood mainly at the level of describing its results.

Even more could be said. When Omran argues that “improved infant and childhood survival tends to undermine the complex social, economic and emotional rationale for high parity for individuals and hence high fertility for society as a whole” (Omran 1971: 530; Omran 1977: 74), he demonstrates a theoretical intuition that favorably distinguishes him from both A. Landry and F. Notestein, with his long list of social and economic changes as reasons for the decline in fertility, and from many other authors who are in solidarity with Landry or Notestein (see more about this: Vishnevsky 2017: 12-16). Omran's clear understanding of the mechanism of not only a decrease in mortality (here he is a pioneer), but also a decrease in fertility, gives reason to consider him one of the classics of the theory of demographic transition.

But when Omran infinitely expands the understanding of the epidemiological transition, including the most diverse, even distant consequences, such "expansion" turns out to be unproductive. It shifts the focus away from analyzing the demographic transition as a key, fundamental shift which, having already taken place in both mortality and fertility declines, is indeed generating countless and extremely important social outcomes. Attention is shifted to considering the entire spectrum of diverse economic, social and other changes, as a result of which their demographic primacy is overshadowed and once again underestimated.

The epidemiological transition has two hypostases, each of which is extremely important, despite the fact that they have completely different meanings.

First, the epidemiological transition is identical to a historically unprecedented decrease in mortality and prolongation of human life. This is indeed a huge revolution, the significance of which cannot be overestimated. It is enormous both for any individual and for those whose professional activities are related to the protection of the health and life of people, as well as for the whole society, which receives enormous benefits from the unexpected "profitability" of universal longevity. With an increase in the average life expectancy from 30-35 to 75-80 years, everything changes: the economy, culture, morality, people’s way of life. Realizing the new opportunities, society directs efforts and resources for their implementation, develops modern healthcare systems, achieves more or less success.

But secondly (in terms of order, but not significance), the epidemiological transition is equivalent to a disruption of the age-old demographic balance, and this is something completely different from the extension of human life. Society's response to the new situation is a decrease in fertility, which makes it possible to restore the balance; this is why the transition to a new type of demographic balance is called the “demographic transition”. It is primarily to this term that the term "epidemiological transition" refers. The epidemiological transition acts as a trigger of the demographic transition, as one of its components, but one can hardly agree with its broad interpretation, according to which the epidemiological transition “includes” a decrease in fertility, population aging and other manifestations of the demographic transition.

Unfortunately, as can be seen in the example of the tug-of-war towards the “sanitary transition”, the second hypostasis of the epidemiological transition and its fundamental significance are often overlooked or underestimated, and this transition itself is perceived as

something that takes place exclusively through the healthcare system[2], which leads to a devaluation of Omran's concept.

PERIODIZATION OF THE EPIDEMIOLOGICAL TRANSITION

Explaining his idea of the epidemiological transition as "shifts in mortality and disease patterns", Omran identifies three successive stages of such shifts (an era of pestilence and famine; an era of a receding pandemic; an era of degenerative and man-made[3] diseases) (Omran 1971: 516-517; Omran 1977: 64). The first of these stages is "the continuation of those health indicators that are characteristic of the pre-modern era" (Ibid.), "the preservation of epidemiological models of the past" (Omran 1998: 103; Omran 2019: 183-184). But what then is the difference between this stage and the rest of the "premodern era"? In essence, Omran includes in the composition of the *transition* both the previous (all human history) and subsequent states, that is, *from which* and *to which* the transition is made. It would seem that this strange logic should first of all provoke corrective criticism: we do not consider the tsarist autocracy and Soviet power to be stages of the revolution that led to the replacement of one by the other. But something completely different happened: Omran's followers and critics began, in competition with each other, feverishly adding new ones to the senseless stages of Omran.

Omran himself joined this game. Shortly before his death, he published an article entitled "The epidemiologic transition theory revisited thirty years later", in which he gave a brief overview of the evolution of the concept (Omran 1998; Omran 2019), where, in particular, he mentioned the authors (Olshansky, Ault 1986; Rogers, Hackenberg 1987), who proposed considering a fourth stage of the transition. In principle, he agrees with this proposal, although his complaisance in this case is not entirely clear. We have seen that he originally designated the third stage as the stage of degenerative and anthropogenic diseases, when life expectancy "reaches an unprecedented level of 70 years and beyond" (Omran 1971: table 4; Omran 1977: 83). Olshansky and Ault in 1986 proposed to supplement the Omran scheme with a fourth stage, which they called "the age of delayed degenerative diseases", when life expectancy will increase "to eight decades, and possibly more" (Olshansky, Ault 1986: 386). Even verbally, their fourth stage is no different from Omran's third stage: delayed degenerative diseases still remain degenerative, and life expectancy of 80 years or more fits well with Omran's wording "70 years and above".

But now Omran himself speaks of the fourth stage of the transition, which he characterizes as "an era of decreasing mortality from cardiovascular diseases , aging, lifestyle changes, the emergence of new diseases" (Omran 1998: 104; Omran 2019: 186). Moreover, he postulates a fifth stage, which will come in the middle of the 21st century and will be "one of the greatest

[2] Perhaps influenced by the fact that one of the ideologists of the "sanitary transition" was Julio Frank, a prominent health figure and the Minister of Health of Mexico in the first half of the 2000s. The "demographic" hypostasis of the epidemiological transition may have been of little interest to him.

[3] In the Russian translation, the expression "*man-made diseases*" is for some reason given as "occupational diseases", while Omran referred to them as "for example, radiation contamination, industrial injuries, exposure to chemical and biological weapons, polluting substances, road traffic accidents and plane crashes, sources of carcinogenic hazards in industry, in the environment or in food additives" (Omran 1998: 104; Omran 2019: 185-186).

achievements of mankind in the field of disease control, health promotion and further prolongation of healthy life" (Omran 1998: 115; Omran 2019: 207), and shares his assumption that "life expectancy will continue to rise, reaching or exceeding 90 years" (Ibid.).

When criticizing Omran's initial identification of three "eras", one cannot but give him his due for the fact that he, with large strokes, divided the entire history of human mortality into three fundamentally different segments and thus gave his periodization a historical scale, which, as we will see below, was noticed and appreciated. In response to his critics, he renounces such an enlarged vision of history, and his initially imprecise periodization takes on a completely bizarre look: there on equal footing are tens of thousands of years of the Paleolithic era, millennia of the Neolithic and several decades after 1970, when developed countries, apparently, just entered the final stage of the transition to a new epidemiological model of mortality. This is a completely natural development of events for a phenomenon understood as a "transition": it must have a beginning and an end.

MILTON TERRIS' TWO "EPIDEMIOLOGICAL REVOLUTIONS"

Almost simultaneously with the beginning of the triumphant march of Omran's idea of an epidemiological transition, and independently of Omran, similar ideas were expressed by another American researcher, a famous epidemiologist, one of the founders of the American National Association for Public Health Policy, Milton Terris. In 1972, in a journal published by the Association there appeared an editorial entitled The Epidemiologic Revolution, authored by Terris (1972). He developed his ideas in more detail in 1976 (Terris 1976), which was followed by many other publications where he invariably addressed this revolution and the new challenges it posed to healthcare. One can only wonder that in the abundant literature on the epidemiological transition, including the American one, Terris's name is usually not even mentioned. However, Terris never refers to Omran's article; perhaps he did not even know about its existence.

Unlike Omran, Terris did not try to fit modern epidemiological changes into a broad historical perspective. His work had more practical goals, was aimed at reorienting the modern healthcare system to meet new challenges. But maybe that is why he very clearly understood the 1960s and 1970s as a boundary separating new tasks from the previous ones, which gave him reason to talk about two different stages of modern epidemiological changes, which he called the first and second epidemiological revolutions. "We are at the beginning of an era ... We have a large and difficult task before us, 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).

Terris listed ten major causes of death that the main public health efforts now needed to tackle: heart disease (primarily coronary heart disease); cancer; vascular lesions of the brain; accidents; flu and pneumonia; bronchitis, emphysema and other chronic obstructive pulmonary diseases; diabetes; cirrhosis of the liver; atherosclerosis; obstetric injuries, difficult childbirth and other causes of infant mortality (Terris 1976: 1156).

This list is, of course, more specific than Omran's general indication of "degenerative and man-made diseases", but basically it fits into this generalized definition. If diseases such as the flu

do not fall under it, then this still does not contradict the general meaning of the tasks in the solution of which Terris saw the meaning of the "second epidemiological revolution." But what is important is that he considered it not as a sum of special "revolutions", but as an integral process.

It is precisely because of this integrity, which allows one to remain at a higher level of generalization, that Terris's two-part scheme for considering the epidemiological transition, if we understand by it the changes in the epidemiological model of morbidity and transition since the 19th century, seems to me more fruitful than the views of the supporters of a “multi-phase” transition.

THE MYTH OF THE CARDIOVASCULAR REVOLUTION

The rejection of a holistic view of the epidemiological transition and the associated costs was clearly manifested in the concept of the so-called "cardiovascular revolution". Of course, no one has a monopoly on the use of certain terms or on giving them one or another meaning. It is quite possible to speak of a "cardiovascular" revolution as well as, say, of a "bacteriological" or "sanitary-hygienic" revolution at the previous historical stage. The question lies in the level of generalization to which this or that term lays claim. A decrease in the level of generalization is a movement from conceptualization to descriptiveness, to empiricism, which of course is also needed, but as a starting point for research, not as a result with heuristic properties. And the loss of an overall perspective is fraught with serious costs.

Recognizing the existence of a “fourth stage” of the epidemiological transition, Omran wrote that “a most distinctive characteristic of this stage, which also marks its beginning, is the leveling off, then decline of cardiovascular mortality which occurred around 1970 in many developed countries” (Omran 1998: 104; Omran 2019: 186). Nevertheless, critics of Omran argue that his concept “ignores the fact that the new era of progress that opened up at the turn of the 1970s is based on a major epidemiological change, a cardiovascular revolution, which is different from that of the victory over infectious diseases that it follows” (Meslé, Vallin 2002: 444). In the English version it sounds even stronger: “is not linked in any way with the end of the era of infectious diseases, even though it did follow closely” (Meslé, Vallin 2006: 250).

From the point of view of historical logic, and logic in general, this is a very strange statement, although, unfortunately, it can often be heard from the lips of other eminent demographers. For example, as J. Caldwell wrote, “What happened in the mortality transition was the conquest of infectious disease, not a mysterious displacement of infection by degeneration as the cause of death” (Caldwell 2001: 159). No less strange is the criticism of “ the idea that some diseases are socially more acceptable than others. The displacement of infections by accidents and chronic diseases is often referred to as a sign of 'progress'. Some go to the extreme of designating the latter as the 'ills of civilization'. Actually, these health problems are a result of a defective process of industrialization that has given priority to economic growth over human welfare” (Frenk et al. 1989: 31).

In fact, there is nothing mysterious about replacing some causes of illness and death with others; some causes are indeed “more acceptable” than others, and the replacement of “less

acceptable" with "more acceptable" is the very essence of the epidemiological transition. There is no doubt that this transition is one of the brightest manifestations of human progress.

Since all people are mortal, the suppression of one cause of death inevitably leads to its replacement by some other; it cannot be otherwise. The rapid decline in mortality from infectious diseases led to an equally rapid expansion of mortality from other causes, among which cardiovascular diseases played the most important role. The assertion that "the cardiovascular revolution is different from the victory over infectious diseases" is, on the one hand, trite, and on the other, false. If the cardiovascular revolution is understood as a decrease in the likelihood of death from cardiovascular diseases, then their place should be taken by some other causes of death, as was the case at the previous stage, when these diseases as the cause of death themselves supplanted infectious diseases. In this sense, there is no difference. The question of at what stage of their "historical career" cardiovascular causes of death really played a revolutionary role is another matter.

At some point, cardiovascular diseases actually became the main "disease of civilization", and, contrary to the philistine journalistic discourse about these diseases as a terrible scourge, this was a tremendous progress and became the most important component of Terris's "first epidemiological revolution" or of Omran's "late stages" of the epidemiological transition. If desired, this could be called a cardiovascular revolution - and with even more reason than what is called such a revolution today.

The standard description of the situation on the eve of the so-called cardiovascular revolution is something like this: "While all European countries recorded a steady increase in life expectancy, mainly as a result of an accelerated decline in infant mortality and infectious diseases, this growth stopped in the 1960s, as new epidemiological threats emerged in the form of increased mortality from cardiovascular diseases, traffic injuries and other causes associated with risky behavior. According to the theory of epidemiological transition, these adverse events should have hindered further progress in life expectancy" (Fihel, Pechholdova 2017: 652).

This description has nothing to do with either reality or the theory of the epidemiological transition, at least in the part where it comes to cardiovascular diseases, which are completely meaninglessly placed next to traffic injuries. "Epidemiological threats in the form of an increase in mortality from cardiovascular diseases" appeared 100 years earlier, and they were not threats at all, because such an increase in mortality at the same time meant an increase in the average age of death - that is, something that should have been aimed at. Moreover, the gain in years of life in this case was the largest possible, because the average age of death from any other class of causes of death was lower than from cardiovascular diseases (Figure 1).

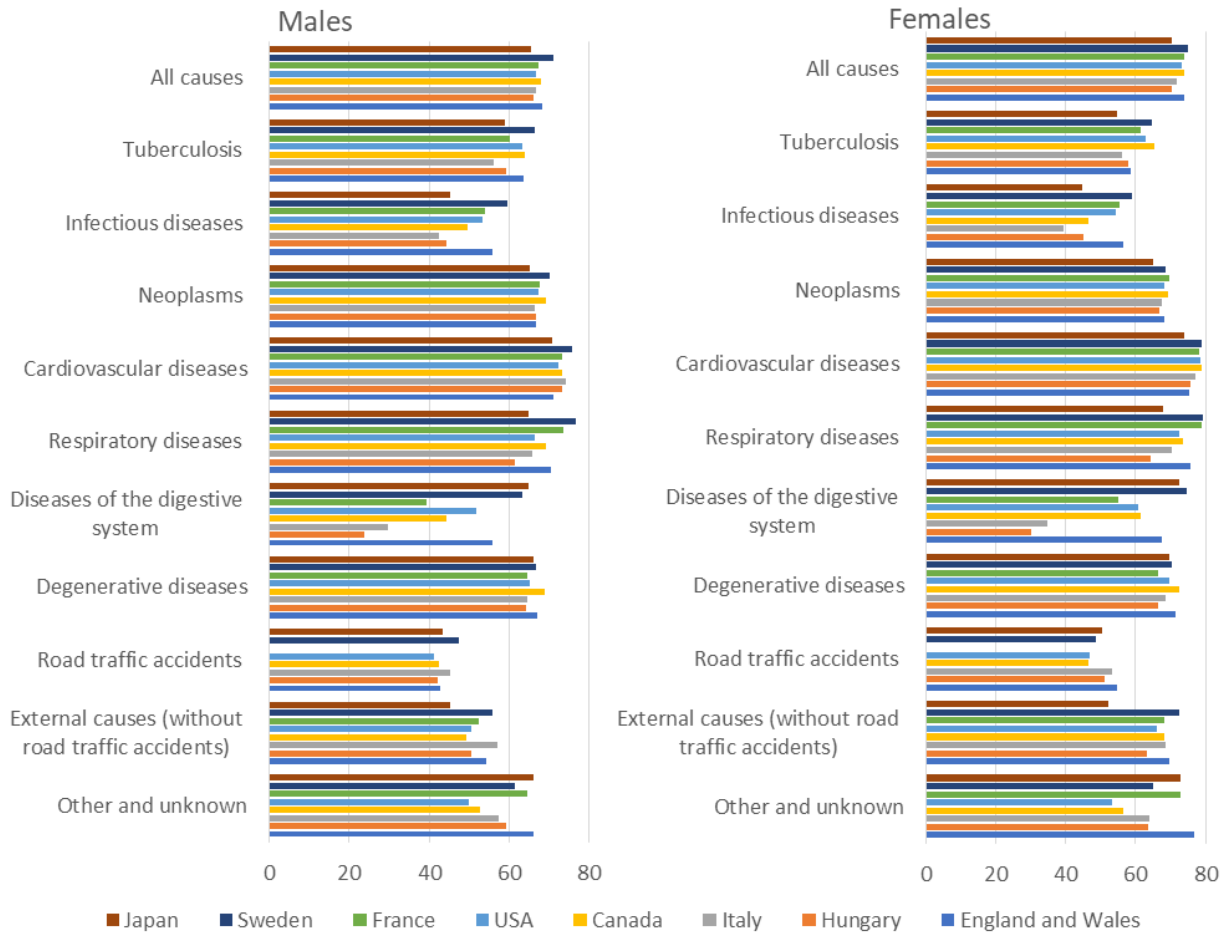

Figure 1. Average age of death from various causes in some countries in 1960, years

Source: (Preston, Keyfitz, Schoen 1972)

What actually happened can be clearly seen in the example of England and Wales, since in this case there are rather long data series. The rapid increase in the likelihood of dying from cardiovascular diseases (Figure 2), in combination with a rapid increase in the average age at death from these diseases (Figure 3) over 100 years, was the main driver of the increase in life expectancy. The average person who died from this cause could be considered to have drawn a lucky ticket, because any other cause would have brought him to the brink of the grave sooner.

What did the shift in the 1970s mean, when the chances of a newborn dying from causes belonging to the class of cardiovascular diseases began to decline? It is this decline that is called the "cardiovascular revolution." What is its meaning? When the chances of dying from these causes increased in the previous stage, the chances of dying at a later age also increased. What is happening now?

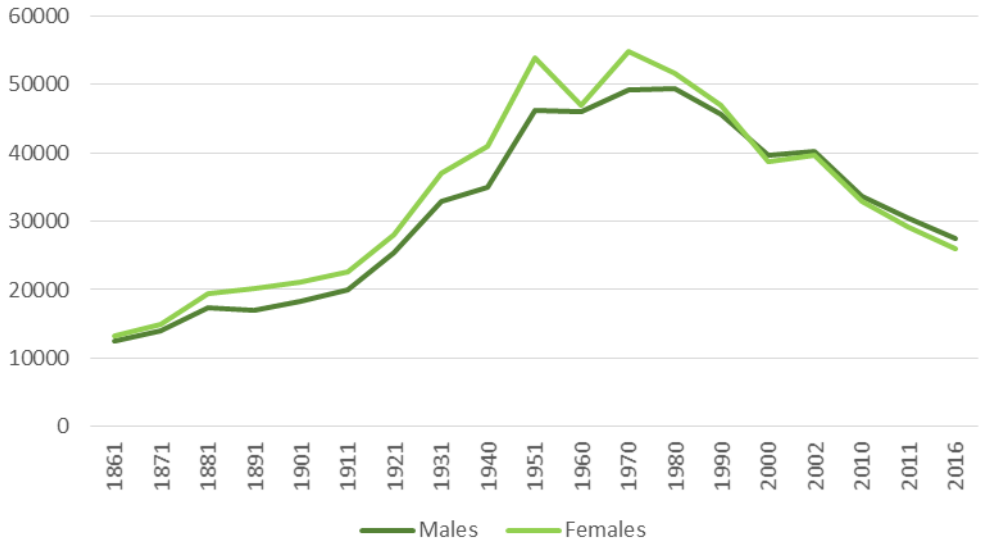

Figure 2. Probability of a newborn dying from cardiovascular diseases, England and Wales, 1861-2016, per 100 thousand births

Sources: (Preston, Keyfitz, Schoen 1972; Human Cause-of-Death Database; WHO Mortality Database).

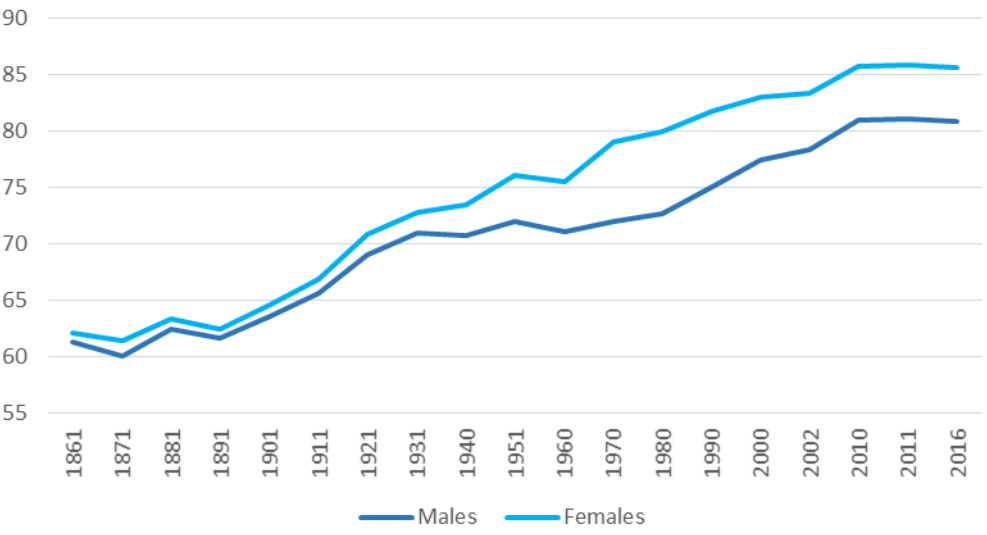

Figure 3. Average age at death from cardiovascular diseases , England and Wales, 1861-2016, years

Sources: (Preston, Keyfitz, Schoen 1972; Human Cause-of-Death Database;WHO Mortality Database).

Does not the decrease in the role of cardiovascular diseases as a cause of death mean that they have more successful competitors, with an even higher average age of death, and that the situation of a century ago is being repeated, when cardiovascular diseases demonstrated their competitive advantages over infectious diseases that often interrupted a person's life at the very beginning?

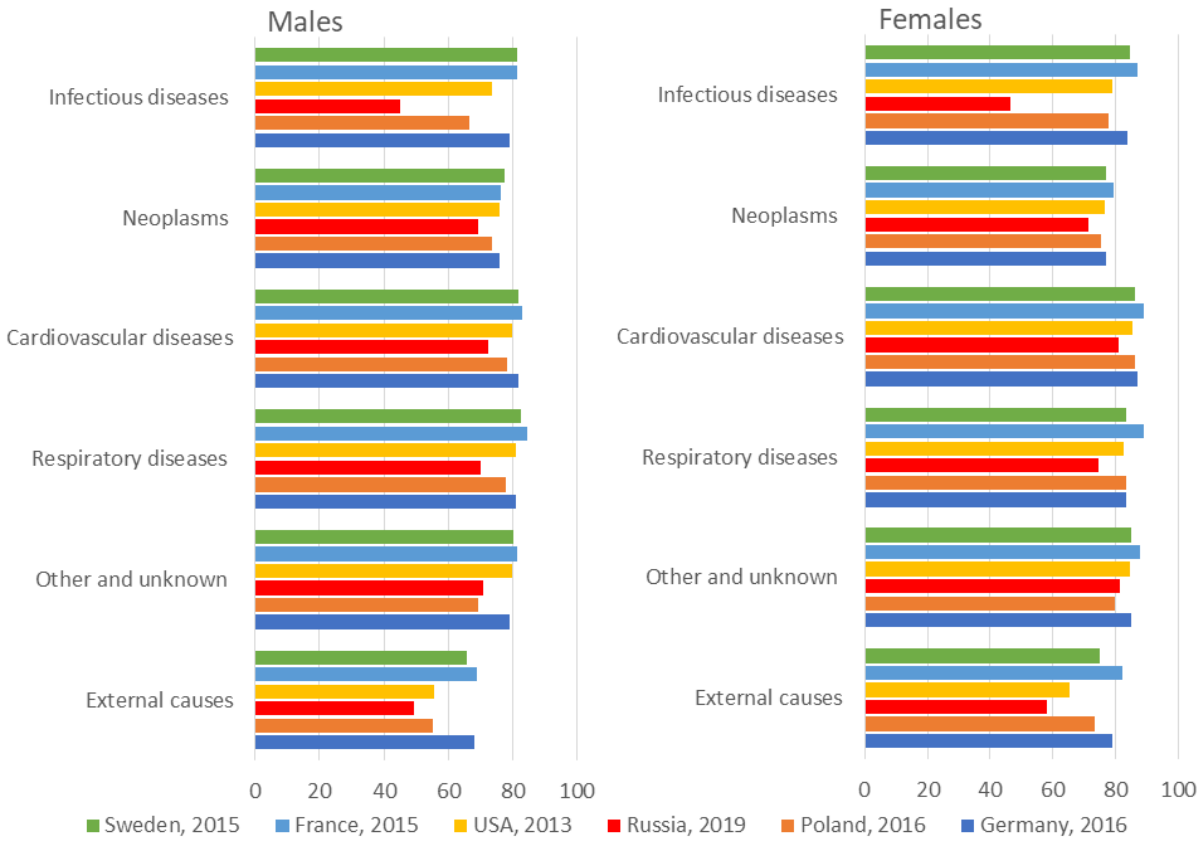

Figure 4. Average age at death from various causes in some countries, years. Latest available data

Sources: (Preston, Keyfitz, Schoen 1972; Human Cause-of-Death Database; WHO Mortality Database).

Comparison of Figure 1 with Figure 4 shows that there have been no fundamental changes in the ratio of the average ages of death from various causes over the past half century. True, cardiovascular diseases have a competitor with a slightly higher average age of death - respiratory diseases. This, apparently, is a consequence of the fact that, having already reached a very old age, people become more vulnerable to colds and pneumonia, from which, on the contrary, children have stopped dying - hence the increase in the average age of death from these causes. Otherwise, cardiovascular diseases are still the most "profitable" cause of death, and in this sense their advantage continues to increase: the average age at death from them has continued to grow, at least until recently (Figure 3). In this sense, no revolution has taken place; the tendencies that developed back in the middle of the 19th century persist. The decrease in the likelihood of death from cardiovascular diseases , hailed as a revolution, is actually a rather negative fact, although apparently inevitable.

The real picture of changes in the process of the ongoing epidemiological transition is determined by the complex interaction of the causes of death among themselves, and not directly, but through their relationship with age. As a person goes through life he resembles a fairy-tale Gingerbread Man: He escaped from grandfather, he escaped from grandmother ... but you can't outwit the old fox.

If someone lives to old age with a healthy heart, but dies of pneumonia, this can be regretted: if not for pneumonia, he could have lived for some more time. Nevertheless, based on

the above current figures for England and Wales, he is, in the average sense, in a better position than most people in his cohort, who died of cardiovascular disease younger than before their pneumonia.

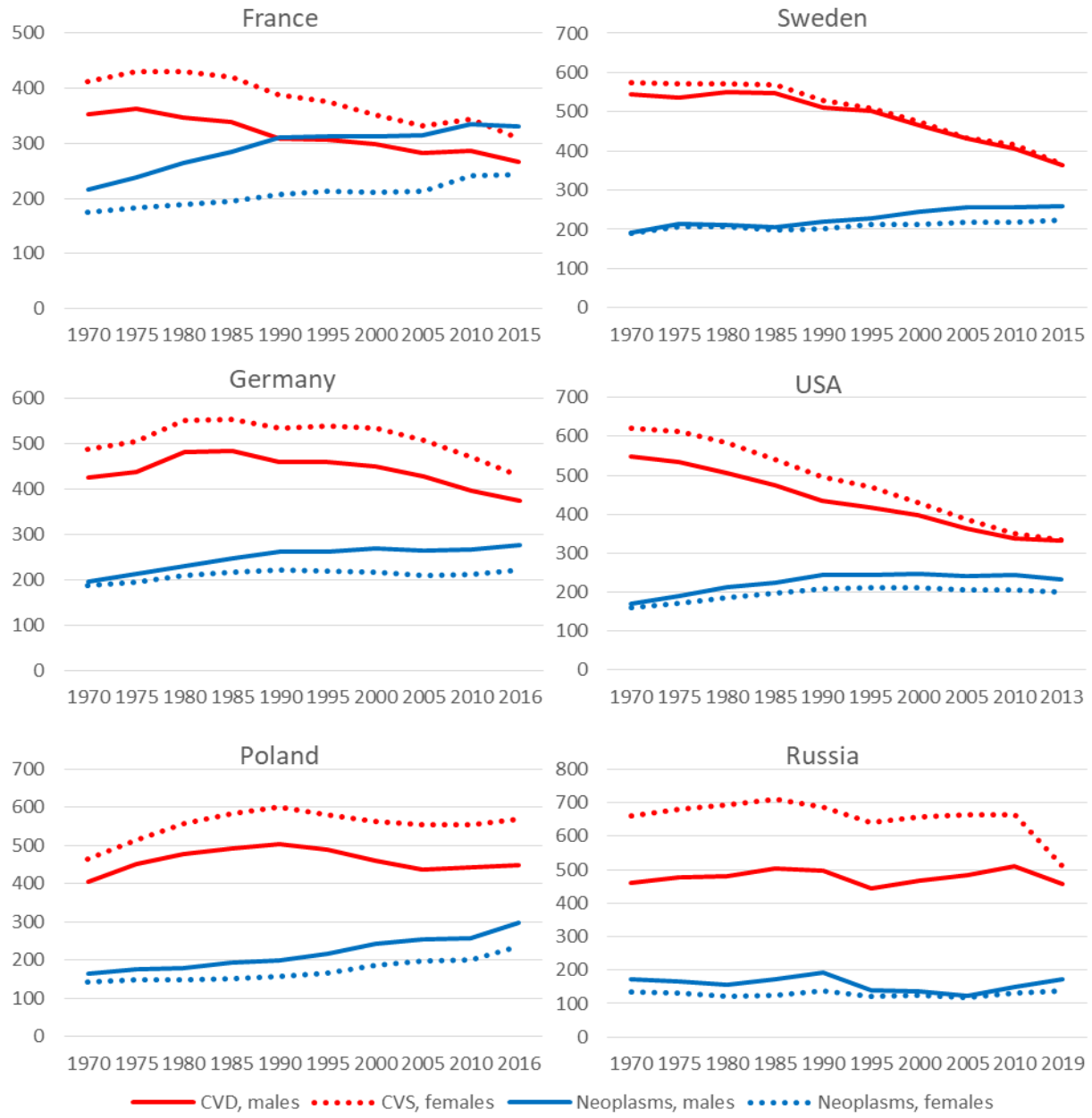

Figure 5. Probability of a newborn dying from cardiovascular diseases and from cancer since 1970 in some countries, per 1,000

Sources: (Human Cause-of-Death Database; WHO Mortality Database).

But if we replace pneumonia with cancer in our reasoning, the conclusion will be different. A person who lived to see his cancer and died from it loses in comparison with the part of his cohort that dies from cardiovascular diseases . But this happens to him precisely because he did not die from such diseases earlier. An increase in the average age at death from cardiovascular diseases preserves a part of the cohort for cancer, and this is exactly what is happening to one degree or another in all developed countries: the probability of a newborn dying from

cardiovascular diseases is decreasing, while the probability of dying from neoplasms is increasing (Figure five).

But at the same time, the average age of death is increasing for both groups of causes of death (unfortunately, this is only partially true for Russia) - see the table.

Table. Increase in the average age of death from cardiovascular disease (CVD) and neoplasms since 1970 in 6 countries, years

	Men		Women	
	Neoplasms	CVD	Neoplasms	CVD
France, 1970-2015	8.3	8.9	7.7	9.1
Sweden, 1970-2015	5.7	5.7	5.2	5.1
Germany, 1970-2016	7.6	8.9	7.4	8.5
USA, 1970-2013	8.2	7.3	7.0	5.2
Poland, 1970-2016	3.5	2.9	4.3	5.5
Russia, 1970-2019	5.3	0.0	5.4	2.4

Sources: (Human Cause-of-Death Database; WHO Mortality Database).

Considering that cardiovascular diseases and neoplasms account for 50-70% of all deaths, their interaction determines primarily the evolution of the epidemiological model of mortality at the current stage of the epidemiological transition. And this interaction develops in such a way that cardiovascular diseases, as a cause of death, lose to cancer: more and more people from each conditional cohort have a chance of dying from cancer earlier, while the chances of dying from heart or vascular disease, but later, decrease. Can this be called a revolution?

GRAPHICAL REPRESENTATION OF THE EPIDEMIOLOGICAL TRANSITION

In order to better understand the interrelated dynamics of mortality from different causes of death during the epidemiological transition, it is necessary to consider the associated changes in the prevalence of certain causes, on the one hand, and the age of death from each of them, on the other, and not individual causes, but all of them together. As a convenient tool for such analysis, back in the 1980s we proposed a graphical representation of such associated changes which gives a clear picture of the simultaneous shifts in the values of both these parameters: the probability of death from each of the causes and the average age of death from it.

Each graph is a set of rectangles, the number of which corresponds to the number of consolidated causes under consideration, with the width corresponding to the values of the probabilities for a newborn to die from the cause $i(P_i)$, $(i = 1,2,3 \ldots n; \sum P_i = 1)$, and the height to the values of $\overline{x}_i$. Accordingly, the area of such a rectangle is the expected number of person-years that people from the considered initial population of births who die from a given cause of death will live. The sum of the areas of all rectangles corresponds to the number of person-years that people who died from all causes will live, or, which is the same, the totality of all those born. This value is equivalent to the *T(0)* value of the life table. Divided by the root of the table, it gives *e(0)*, the life expectancy for the entire population of births. Since in this case we are considering the distribution not of absolute numbers, but of probabilities, which add up to one $(\sum P_i = 1)$, then we must divide by 1.

Accordingly

$$e(0) = \sum P_i \bar{x}_i$$

The larger the combined area of all rectangles, the greater the lifespan.

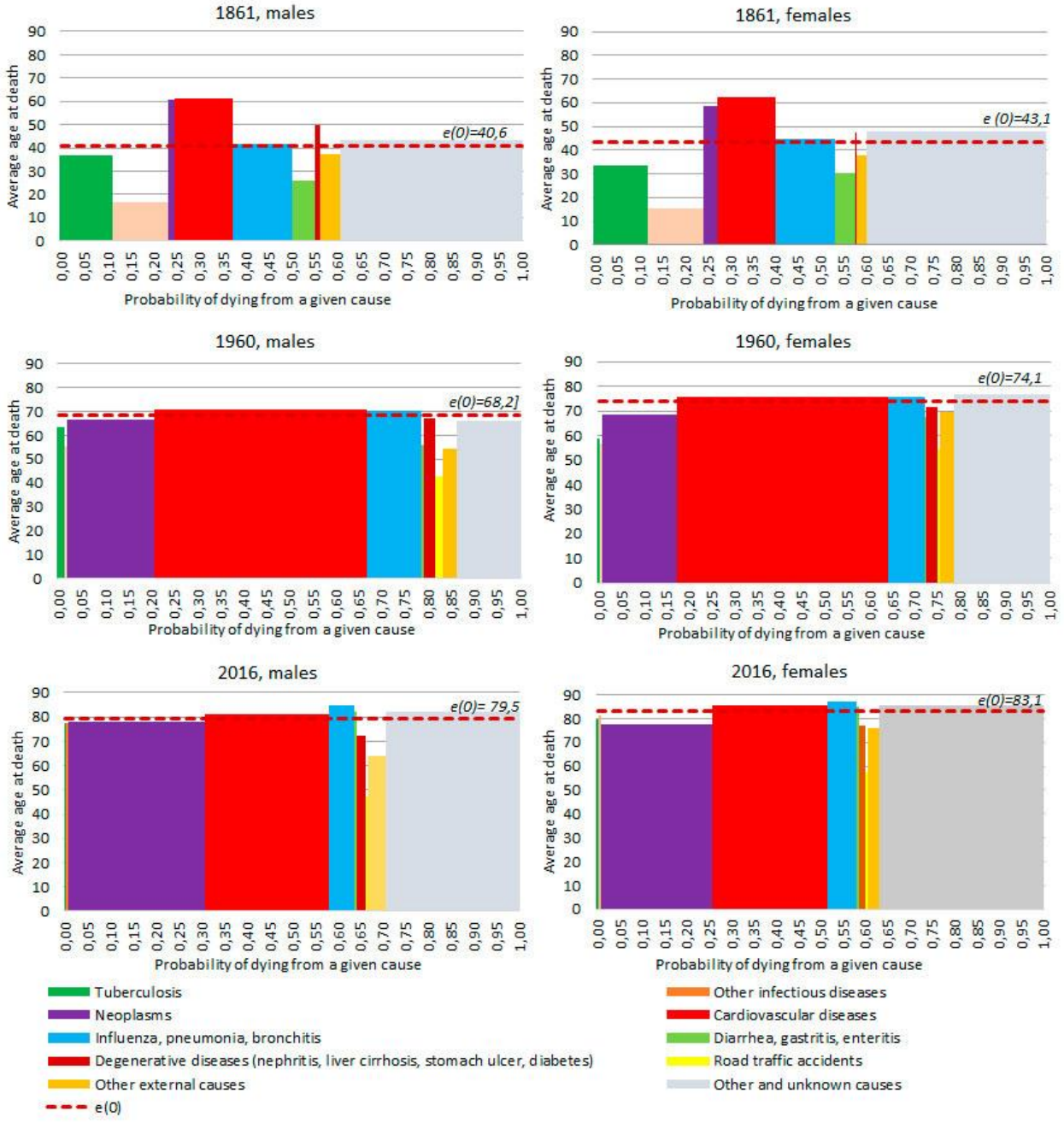

Figure 6. Lifespan of generations of men and women and its distribution by the number of years lived depending on the cause of death in terms of mortality in England and Wales in 1861, 1960 and 2016, person-years (areas of rectangles)

Sources: (Preston, Keyfitz, Schoen 1972; Human Cause-of-Death Database).

Each individual graph can be viewed as a current epidemiological model of mortality for a particular country or a particular region, but a comparative analysis showing changes over time or spatial differences indicates the existence of typical models and the evolution from one type to

another. Sharp and similar differences between the types arising in the course of such evolution at its present stage give grounds to speak of the formation of a new type of epidemiological model of mortality, which is the essence of the epidemiological transition.

Figure 6 shows the distribution of the lifespans of generations of men and women under mortality conditions in England and Wales in 1861, 1960 and 2016.

A huge increase in the life expectancy of generations over little more than a century and a half from 1861 to 2016 is obvious. Life expectancy for men and women increased by 38.9 and 40 years – a factor of 2 and 1.9, respectively. 71% of the increase in life expectancy for men and 77.5% for women was achieved in the first 100 years from 1861 to 1960; these are the fruits of Terris's "first epidemiological revolution". The contribution of the last 50 years of the "second epidemiological revolution" is more modest, however, and the period is twice as short.

But what matters is how the epidemiological picture of mortality has changed. During the transition from the 1861 mortality model to the 1960 model, mortality from tuberculosis, other infectious and gastric diseases, i.e., causes associated with the lowest age of death, sharply decreased. Their place was taken by completely different causes, and in the transition from one model to another, on average, those who were lucky to die from cardiovascular diseases and, for women, also those who died from flu, pneumonia or bronchitis, gained the most - all of these people, again on average, lived longer than all their conditional peers. However, women who died from other and unknown causes even gained a little more.

By 1960, causes with a pronounced low age of death had largely lost their importance. The main reserve for growth in life expectancy now became an increase in the average age of death from the remaining causes. This is happening now in all countries as a result of more or less coordinated actions of health systems and other state and public structures responsible for the preservation of the health and life of citizens. The relatively low average age of death from its key causes in Russia (Figure 4) is an undoubted sign of its lagging behind.

COMPLETION OF THE EPIDEMIOLOGICAL TRANSITION

Graphs similar to those shown in Figure 6, but referring to England and Wales in 1861, 1911 and 1964, were first used in a 1986 article (Andreev, Vishnevsky, Shaburov 1986). The concept of the epidemiological transition was absent in this article, although it spoke of a "new historical type of mortality" in developed countries, which was associated with "an abrupt increase in society's control over exogenous factors of mortality as a result of the transition from an agrarian to an industrial economy" (Andreev, Vishnevsky, Shaburov 1986: 114). But a few years later, two-dimensional graphs of the structure of mortality by causes of death were already considered precisely as a tool for analyzing the epidemiological transition (Vishnevsky, Shkolnikov, Vasin 1991; Vishnevsky, Shkolnikov, Vassin 1991). The authors preferred the term "epidemiological transition" to the more neutral "transition to a new type of mortality", because Omran's term pointed to the differentia specifica of this transition, to the essence of the changes.

Based on an analysis of the structure of causes of death in 31 developed countries in 1974-1976, the authors of the above publication in 1986 came to the conclusion that "the period of

radical restructuring of the structure of causes of death is basically now behind us" and, in contrast to the previous period, there is no longer a clear connection between the average life expectancy and the probability of dying from various causes (Andreev, Vishnevsky, Shaburov 1986: 122). It was also noted there that biologists who studied the problems of life expectancy had come to a similar conclusion, formulating - albeit in the form of a hypothesis and on other grounds – the position that "the elimination of individual causes of death cannot change the magnitude of the age increment in the intensity of mortality" (Gavrilov 1984: 908-909). Developing this idea and claiming universality, the assertion that "causes of death are an unnecessary entity which can be completely dispensed with when predicting human mortality" (Gavrilov, Gavrilova 1986: 82) was clearly untenable in relation to the period of the epidemiological transition. But the fact of the growing independence of life expectancy from changes in the ratio of causes of death, which coincides with the conclusion of the Gavrilovs, can be interpreted as evidence of the end of the epidemiological transition.

Usually - and this is one of the most surprising features of the scientific discourse about the epidemiological transition – in the constant expectation of the next stages which will bring new successes in the fight against disease and death and increase life expectancy (however, sometimes there is also talk of new threats), the question of completing the transition is not even put. Meanwhile, since we are talking initially about a transition, that is, about a process that, by its very essence, must be localized in time and have a beginning and an end, it certainly cannot be infinite, just as there cannot be an infinite bridge connecting one riverbank with another.

What will the completion of the epidemiological transition look like? To some extent, the answer to this question is suggested by Figure 6, which shows the disappearance of fundamental differences in the age of death from various causes. As soon as this happens, the change in the epidemiological picture, while continuing to be very important from the point of view of an epidemiologist, doctor or healthcare organizer, ceases to interest the demographer, because it ceases to be part of the *demographic* transition. A decrease in mortality and an increase in life expectancy can continue after that, but already in an "evolutionary", not a "revolutionary" mode, as during the transition. They will already occur "on the other side of the river". The successes will be much more modest, the decrease in mortality will shift to older ages and will practically not affect the demographic balance.

"THE FIRST EPIDEMIOLOGICAL TRANSITION"?

Before moving on, let us note that the mixing of generalization levels is characteristic of the interpretation not only of the epidemiological transition, as discussed above, but also of the demographic transition as a whole, which includes the epidemiological transition as one of the main components.

The huge, unprecedented shift in the balance of mortality and fertility caused by the epidemiological transition, which irreversibly changed the conditions for the reproduction of human populations, and the consequent decrease in fertility necessary to restore demographic equilibrium constitute the essence of a single historical process called the "demographic transition" ("demographic revolution").

The demographic transition meant unprecedented changes in the very foundation of the most important, fundamental socio-biological process, and they could not but lead to radical changes on all floors of the building standing on this foundation. Such changes have really taken place and continue to occur. They are very important for the life of the society they affect. However, we are not talking about independent changes, but only about the consequences of the main, fundamental shift - the transition to a new demographic balance. After this transition began and was grasped, all its consequences were predictable - unlike the very shift of balance which human history had never known and people even in the 18th century could not imagine.

Meanwhile, a tradition has already developed of considering these consequences as adjacent, equivalent to the main shift, of splitting it into separate "revolutions" or "transitions" - "first", "second", "third", etc. (Van de Kaa 1987; Coleman 2004; Eggleston, Fuchs 2012). It seems that every self-respecting demographer strives to acquire his own transition, but in the end we see only an increasing shift towards descriptiveness to the detriment of conceptualization.

If, as is usually done, the pedigree of the theory of the demographic transition (demographic revolution) is traced to A. Landry, one cannot fail to see that although Landry, unlike Omran, focused on changes not in mortality, but in fertility, he also, like Omran, identified three stages of these changes, which he called “demographic regimes” (Landry 2019: 95). In the historical past, there existed a pervasive “primitive” regime with no conscious restriction of fertility. This was then replaced by an "intermediate" regime which in France lasted until the end of the 18th century and in other European countries until the end of the 19th century, after which it gave way to the "modern" demographic regime. All of demographic history is thus reduced to two main stages, separated by a third which is both intermediate and short.

In essence, the American demographers who developed the theory of demographic transition in the 1940s held the same view. All of demographic history seemed to them like “a long, thin powder fuse that burns slowly and haltingly until it finally reaches the charge and then explodes... The first real burst of world population growth came with the latest stage in cultural progress - the Industrial Revolution.” (Davis 1945: 1).

Omran was thinking along the same lines when he characterized all past history as a “premodern era”, during which “the major determinants of death are the Malthusian "positive checks," namely, epidemics, famines and war” (Omran 1971: 517; Omran 1977: 64). But by the time his article appeared in 1971, such ideas about the demographic uniformity of the "premodern era" and, accordingly, about the steady growth of the Earth's population in the past were questioned.

In 1960 Scientific American published a well-known article by Edward Deevey, The Human Population (Deevey 1960). This article argued that throughout human history the number of people on Earth did not increase uniformly, but in leaps, each of which was a response to a revolution in culture. According to Deevey, there have been three such revolutions (and, accordingly, such leaps) in all of history. The first occurred in the early Paleolithic, when man learned to create and use tools; the second occurred in the Neolithic era, the so-called "Neolithic revolution", which marked the transition from foraging to a productive, agrarian economy; and the third is a product of the modern scientific and industrial revolution. Each such revolution expanded the ecological niche available to man; once it was filled, demographic growth stopped and a

relative equilibrium was established, which did not exclude constant fluctuations in the population size. This was, in any event, the case with the first two revolutions. Now, the idea of three demographic revolutions formulated by Deevey - the Upper Paleolithic (as opposed to Deevey, who attributed it to the Lower Paleolithic), Neolithic and Modern - has become quite widespread (see, for example, (Birabin 2006: 16)). However, understanding the similarities and differences between these world historical demographic upheavals will apparently still require a considerable amount of time, including for those who reflect on the epidemiological transition.

In 1998, the American annual Review of Anthropology published an article by a group of authors entitled "The Emergence and Re-emergence of Infectious Diseases: The Third Epidemiological Transition" (Barrett et al. 1998). The authors of the article drew from the concept of Omran and referred to it, but developed the idea that the epidemiological transition highlighted by Omran is not the only one in human history. At the same time they, at least in part, followed the pattern that had developed by that time in the analysis of the history of demographic transitions.

The first epidemiological transition was attributed by Barrett et al. to the era of the Neolithic demographic revolution (the "second" in the Deevey frame of reference), the very fact of which was not immediately recognized, despite, it would seem, its almost complete obviousness. As the Hungarian researchers Acsádi and Nemeskéri wrote confidently in 1970, the new economic system not only served as a basis for the reproduction of mankind, it accelerated a process that, due to its striking similarity to the demographic revolution of our time, can be called the "demographic revolution of the Neolithic era" (Acsádi, Nemeskéri 1970: 196). However, this thesis was long in doubt[4]. Thus, recognizing significant changes in the demographic situation in many regions of the world and the undoubted acceleration of population growth in the Neolithic, Soviet specialists in the history of primitive societies did not agree that "some authors interpret these changes as the "first demographic revolution" and associate them with the transition to a productive economy, which, strictly speaking, is inaccurate", while "the mechanisms and scale of this "demographic revolution" remain very uncertain" (Shnirel'man 1986: 444).

Now the very fact of the demographic revolution of the Neolithic era seems to be beyond doubt, but disputes over its mechanisms have been going on for many years. And perhaps the main reason for the endlessness of these disputes is that they are dominated by the desire to see the meaning of the changes then taking place through the prism of the experience of the modern demographic transition.

Its trigger was indeed an epidemiological transition, a rapid change in the epidemiological model of mortality which ultimately led to a radical change in the conditions of demographic equilibrium, a decrease in mortality, a resulting decline in fertility and everything that followed. But nothing suggests that the mechanisms of previous demographic revolutions (transitions) were the same.

[4] I still have a letter from my Czech colleague and friend Zdenek Pavlik, at that time the main "promoter" of the theory of the demographic revolution in the "socialist camp", which he sent after the publication of my article in the journal Voprosy Filosofii, which, in particular, spoke about the Neolithic demographic revolution [Vishnevsky 1973]. He praised the article, but with the proviso: "I do not think," he wrote, "that there really are two demographic revolutions that have the same meaning, but otherwise our views are not different."

I have written before, with reference to (McEvedy, Jones 1978: 14-15), that the Upper Paleolithic (the “first”, according to Deevey) demographic revolution did not occur because mortality decreased (Vishnevsky 2018). No matter how great were the achievements of Paleolithic gatherers and hunters, the dynamics of the Paleolithic populations of Homo sapiens, like their predecessors in the wild, still depended on their density. The number of primitive communities did not increase, and the mortality rate of Australian aborigines at the time of the first contacts with Europeans at the end of the 18th century differed little from the mortality rate of Cro-Magnons. The breakthrough was in something else: the technologies and forms of social organization developed by our ancient ancestors allowed them to infinitely expand the ecumene, which made possible the growth of the world population *without an increase in population density*. And it can be assumed that it was the development of more and more new spaces in different natural and climatic zones of the planet that was one of the main motivators of technological, cultural and social innovations that constituted the essence of the Upper Paleolithic revolution, so that “initially it was demographic factors that were the cause, and the change in technology — the consequence” (Vishnyatsky 2000: 265). In demographic terms, the acceleration of population growth in the Paleolithic was of a migratory nature.

The situation is different with the demographic revolution of the Neolithic era (“the second,” according to Deevey), associated with the transition from a foraging to a producing economy. A productive agrarian economy for the first time weakened the dependence of the dynamics of human populations on density and made possible not only a new acceleration in population growth, but also the emergence of huge clusters of people, such as that which arose, for example, several millennia ago in the Nile Valley. Of course, this could not have happened without changing the demographic balance, the ratio of fertility and mortality.

The demographic balance can change due either to an increase in fertility or a decrease in mortality, or to both. The question of what exactly happened in the era of the Neolithic revolution is endlessly controversial. For more than a decade there has been discussion, in particular, of the point of view according to which one of the consequences of this revolution was an increase (not a decrease) in mortality, the so-called "Neolithic mortality crisis" - see, for example, (Caldwell, Caldwell 2003). But even if we take the opposite point of view and recognize the predominance of positive changes in mortality over negative ones, does this give grounds to speak of a "Neolithic epidemiological transition"?

The emergence of a manufacturing economy has significantly expanded the economic limits of population growth, but they have not disappeared. Apparently, the ecological and biological barriers which limited the possibilities of concentration of people and of their economic activity have not been completely overcome. Accordingly, the natural mechanisms for controlling the dynamics of population numbers have not ceased to function either. They have only acquired new, crisis forms, embodied in the image of the biblical horseman of the Apocalypse: "a pale horse: and his name that sat on him was Death, and Hell followed with him. And power was given unto them over the fourth part of the earth, to kill with sword, and with hunger, and with death, and with the beasts of the earth." (Rev. 6: 7-8).

These were the "deterrents" listed by Omran - epidemics, famine and wars - which he, with reference to Malthus, ascribes to all "premodern" history (Omran 1971; Omran 1977: 64).

Yet, most likely, they did not always exist, but appeared as a result of the Neolithic breakthrough and made themselves felt as the possibilities of an expanded ecological niche were exhausted and the population was approaching a new dangerous line. In the Paleolithic, the longest segment of human history, when mortality was of course quite high but the population density was low, these factors hardly played an equally important *demographic* role.

With the advent of a productive economy and a settled way of life, the epidemiological picture probably changed and became more complex, and for the epidemiologist these changes are important - for him they can really mean a revolution. But this is a revolution not on the scale that is inherent in the modern epidemiological revolution of Omran (who preferred the word "transition"): its meaning lies *in the transition from an uncontrolled to a controlled epidemiological picture of human existence*. There has never been such a transition in the history of mankind. Accordingly, history has not known such radical shifts in mortality rates. Even if the life expectancy of a medieval European or a Russian peasant at the end of the 19th century was slightly higher than the life expectancy of a primitive man, it was not by much; the differences were not fundamental. A significant break from the level of all past eras was first seen in some European countries no earlier than the first half of the 18th century, when they entered Omran's "period of a declining pandemic", i.e. when the epidemiological transition itself began there and the red dotted line in Figure 7, though referring already to the middle of the 19th century, irrevocably separated the modern era from all previous ones.

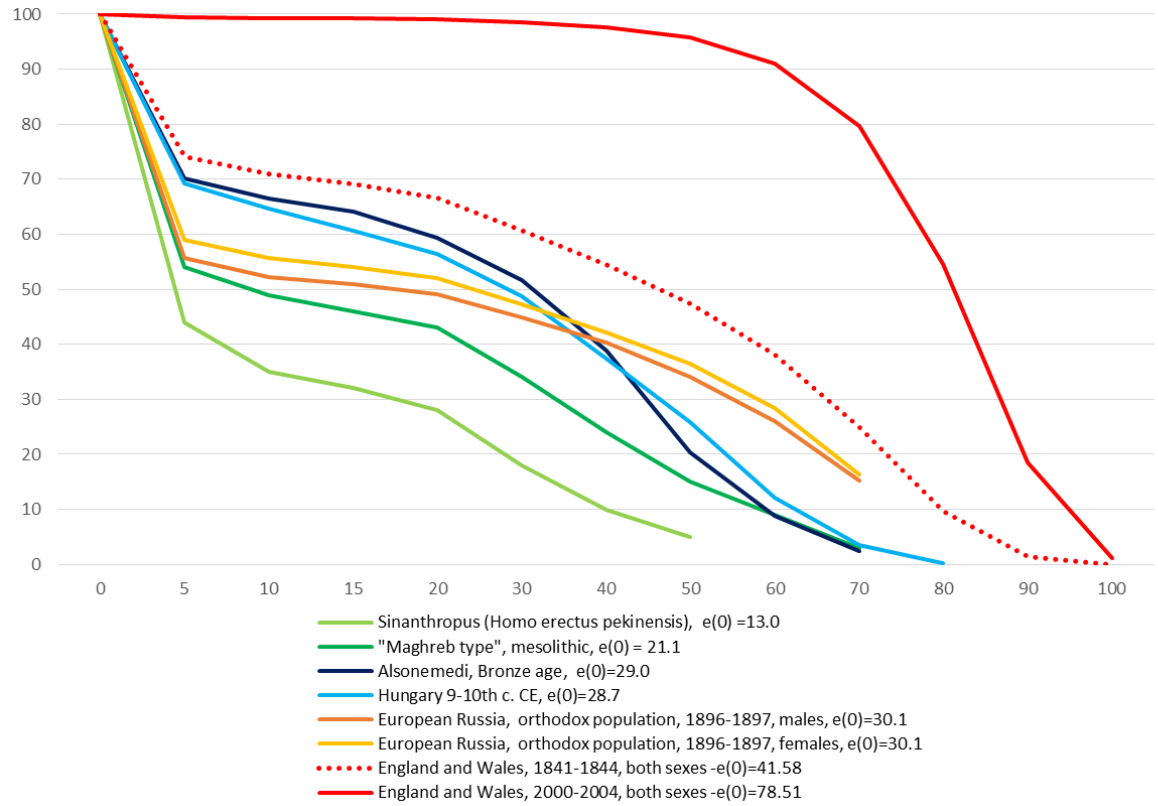

Figure 7. Life table number of survivors l_x in different historical epochs

Sources: (Acsádi, Nemeskéri 1970: 172, 266-267,282-283, 130-309; Paevsky 1970: 290; Preston, Keyfitz, Schoen 1972).

Therefore, if there is reason to talk about a *demographic* transition of the Neolithic era, which was of an *economic* nature, there are no grounds for statements about the Neolithic *epidemiological* transition. Most likely, the modern epidemiological transition is the first and, so far, the only one that the history of mankind has known.

"A THIRD EPIDEMIOLOGICAL TRANSITION"?

In the aforementioned article by Barrett et al. (1998), recourse to the authors' concept of a supposed first epidemiological transition is linked to building a historical chain in which the current epidemiological transition has not only an antecedent, but also a subsequent link. It is this last link that is named the "third epidemiological transition."

If I deny the existence of epidemiological revolutions in the past, does this mean that I deny the possibility of their occurrence in the future? Of course not; I have no reliable grounds for this. Nevertheless, since the idea of the possibility of a new epidemiological transition has been expressed and has received some support in the literature, I would like to more accurately understand what, in fact, is at stake.

The article by Barrett et al. is titled "Emerging and re-emerging infectious diseases: the third epidemiologic transition," and this title already contains the thought developed in the article. It notes three new trends: 1) the emergence of previously unknown infectious diseases that cause death in the adult population; 2) an increase in the incidence of pre-existing infectious diseases that were considered to be under control; 3) the ability of many emerging pathogens to generate antimicrobial resistant strains faster than safe new drugs can be developed (Barrett et al. 1998: 256).

The authors of the article are not the first to point out all these trends and the danger of the return of infectious threats that would seem to be in the past. However, earlier authors, who also wrote in sufficient detail about these new trends, were still not sure that they gave grounds to speak of a separate stage in epidemiological history; rather, they tended to believe that this was not the case (Olshansky et.al., 1997 , Box 1). Barrett et al. unambiguously interpret the resurgence of infectious threats as the onset of a new stage which they call the "third epidemiological transition" (Barrett et al. 1998: 248).

One cannot but agree that the tendencies noted indicate new threats and, accordingly, new challenges for modern societies. But do they also represent a challenge to the epidemiological model of mortality resulting from the transition conceptualized by Omran?

Grounds to talk about a transition appeared when the role of infectious diseases fell sharply for the first time, "and they were not replaced by others, so that the overall mortality rate at a given age remained at the same level. The age of death itself has risen, and life expectancy has increased. The term epidemiological transition is used to denote the transition not only from one dominant structure of pathology to another, but also a radical transformation in the age of death" (Meslé, Vallin 2002: 440).

This idea (which, as we have seen when considering the question of the "cardiovascular revolution," was greatly underestimated by Meslé and Vallin themselves) can be expressed even

more concretely. Although during the epidemiological transition changes in mortality affect the entire age scale, reducing infant and child mortality is of fundamental importance, especially in the early stages of transition. Can those quite real threats, about which many authors anxiously write, once they have occurred, shake the current epidemiological model of mortality? Is there any reason to believe that infectious and parasitic diseases will regain their former role as the main source of infant and child mortality, due to which, in the past, the long-term balance of high fertility and high mortality was mainly maintained? Is it possible for the survival curve to drift to its previous shape?

One should probably not underestimate the epidemic nature of infectious diseases, their ability to spread quickly as a result of contacts between people and the associated risks. But if we ignore this feature of infectious diseases for a moment, then, as causes of death, they are no different from any other cause. In competition with other causes, as we saw with the example of cardiovascular diseases and cancer, they can win or lose only depending on what is the average age at death from each of them. If the average age of death from infectious and parasitic diseases becomes approximately the same as from most other causes of death, these diseases "fit" into the new epidemiological model of mortality, do not contradict it, do not speak of a step backwards or a transition to some other model. If the epidemiological transition is completed - in the sense mentioned above - then even an increase in mortality from infectious diseases in this case does not give grounds to speak of any new transition.

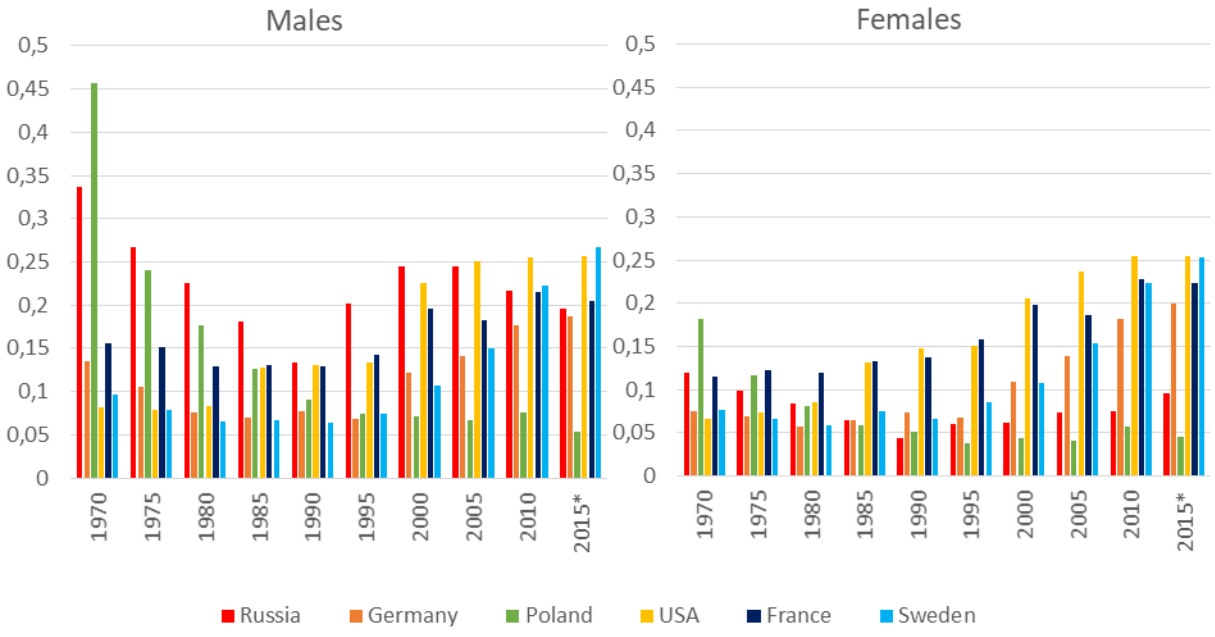

Figure 8. Probability of a newborn dying over a lifetime from an infectious or parasitic disease in selected countries, 1970-2015*

** Russia - 2019, Germany and Poland - 2016, USA - 2013, France and Sweden — 2015.*

Sources: (Preston, Keyfitz, Schoen 1972; Human Cause-of-Death Database; WHO Mortality Database).

Infectious and parasitic diseases have not disappeared completely anywhere; even in the most prosperous countries, there are both tuberculosis and AIDS, as well as outbreaks of measles or other infectious diseases. Everyone knows about seasonal flu epidemics. Among the groups of

causes of death named by Terris, the establishment of control over which he saw as the task of the "second epidemiological revolution", the main place, like Omran's, was occupied by chronic diseases and "man-made" external causes. But in fifth place on his list - after heart disease, cerebrovascular disease, cancer and external causes - were influenza and pneumonia, whose role, he expected, would be diminished thanks to flu vaccination of at-risk populations and improved antibiotic therapy.

It is now clear that such expectations were overly optimistic. This is indicated by both the already mentioned return of old infectious diseases and the emergence of new ones, as well as the growth of their resistance to drugs. This is also evidenced by the mortality statistics in economically developed countries: the probability of dying from infectious diseases, which had been decreasing for a long time, has begun to increase (Figure 8).

But the same mortality statistics also indicate that, simultaneously with an increase in the likelihood of dying from infectious diseases, the average age of death from infectious diseases is also increasing (Figure 9), that is, infectious diseases are increasingly becoming the cause of death of elderly people, competing in this sense with cardiovascular or oncological diseases, and not, say, with diphtheria or measles. Only Russia is showing its usual lag. Turning again to the data for England and Wales, in 1861 the average age of death from cardiovascular diseases in men was 44.8 years higher than from infectious diseases, in 1960 it was 15.4 years higher, and in 2016 - only 2.5 years higher. Corresponding gaps for women were 47.0, 19.1, and 3.6 years. As seen in Figure 4, in countries with low mortality the average age at death from infectious diseases is often higher than from cancer.

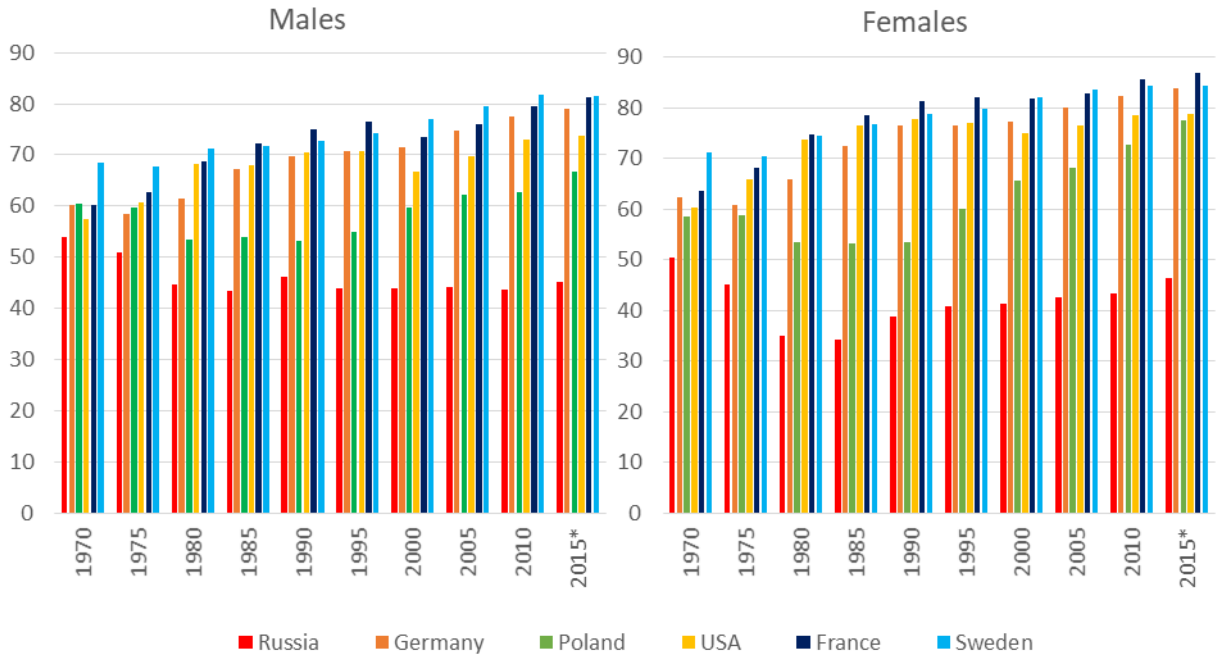

Figure 9. Average age at death from infectious or parasitic diseases in some countries, 1970-2015*, years

** Russia - 2019, Germany and Poland - 2016, USA - 2013, France and Sweden — 2015.*

Sources: (Preston, Keyfitz, Schoen 1972; Human Cause-of-Death Database; WHO Mortality Database).

But this speaks of the continuation and final stages of the current epidemiological transition, and in no way of the beginning of a new one. There is, in this case, no “radical transformation at the age of death” (Meslé, Vallin 2002: 440) - the above-mentioned fundamentally important feature of the epidemiological transition of Omran.

Even COVID-19, an undeniable confirmation of the accuracy of all the alarming warnings about a possible revanche of infectious diseases, fits well into the current epidemiological model of mortality in the sense that it turned out to be almost harmless for children, and especially dangerous for older and very old adults.

"The third epidemiological transition" sounds impressive, but is there any reason to multiply entities unnecessarily? This does not bring one closer to understanding the actual tasks of the struggle for human longevity, but rather moves one farther from it. Now these tasks are associated with the implementation of the current - and, I repeat once again, the *only* - epidemiological transition.

"REVERSE EPIDEMIOLOGICAL TRANSITION"?

“The reverse epidemiological transition in Russia” is the title of the book which, as stated in its annotation, “established general and specific patterns of development of the epidemiological transition in Russia up to the last third of the 20th century, which created the preconditions for the possibility of reverse epidemiological development … the epidemiological transition which is taking place in modern Russia” (Semenova 2005).

The fact that Russia, like other European republics of the USSR, for decades has been an amazing example of marking time and even going backwards in everything related to mortality and life expectancy is a well-known fact. But how can this example be interpreted in the context of the concept of epidemiological transition? Is there really a fundamental possibility of a "reverse transition"?

There are authors who are convinced that such a possibility exists: “The evolutionary changes in the patterns of morbidity and mortality are reversible, giving place to what could be called a counter-transition” (Frenk et al. 1989 : 31). Omran also believed that “reversal or stagnation of the transition is possible during economic, political, environmental, morbidity or other crises” (Omran 1998: 100; Omran 2019: 179).

It is hard to dispute the possibility of a temporary "regress" during crises. Much harder to accept is a backward evolutionary movement. What might be considered an indicator of such a backward movement, how might it manifest itself? Attempts known to us to find an answer to this question can hardly be considered successful.

When V. Semenova, who has devoted a whole book to the “reverse transition” in Russia, in conclusion stresses that its indicator cannot be “the increase in mortality from one cause or another” (Semenova 2005: 266), it is rather an evasion from an answer than an answer. An opportunistic, relatively short-term increase in mortality is always possible, but this may have nothing to do with the epidemiological transition. If, however, a complete or at least partial return to the previous epidemiological model does occur - only in this case is it possible to speak of a

reverse transition - then this should be signaled above all by an increase in mortality, and it should be significant and stable. If there is no such increase, then there is no reason to speak of a "reverse transition". But - here we can agree with V. Semenova - there are no such grounds even if the mortality rate increases in a time of no social crisis. The coronavirus pandemic may lead to an increase in mortality, but it can hardly fundamentally change the already established epidemiological model of mortality.

It is obvious that the epidemiological transition is a historical process that has its own determinants and is extended over time. It cannot be absolutely independent of other processes - economic, political, etc. - taking place in society, which can accelerate and slow it down. If a country goes through a period of political crisis or economic and social stagnation, this cannot but slow down the epidemiological transition, and then the indicators of this transition simultaneously become indicators of the general situation in the country. As applied to Russia, this is clearly seen in the example of the dynamics of infant mortality - not the only, but one of the main, possibly the most important, indicator of the epidemiological transition.

In the second half of the 19th century, in Western Europe it was the decline in infant mortality that became the most noticeable sign of the new demographic order. In 1900, there were only two countries in Europe (Norway and Sweden) where the infant mortality rate dropped just below 100 per 1000 births - a very low rate for the time. In Russia at that time it was 250 per 1000, making it hardly possible to speak even of the beginning of a transition. By 1950, this coefficient had dropped to 28.2 in Norway and to 21.0 in Sweden, but in Russia too it had dropped, to 88.4, meaning that the epidemiological transition had also come to Russia. Russia was still far from Sweden, but it was close to Portugal, also a Western European country, although backward for that time.

Until about the mid-60s, infant mortality in Russia decreased much faster than in Portugal, and the gap between them - in favor of Russia - increased. But then Russia entered a period of stagnation, and in 1982 was overtaken by Portugal, after which the gap began to grow now in favor of Portugal (Figure 10). The seemingly innocent infant mortality rate has proven to be a reliable marker of the general situation in the country. Stagnation and even growth of this indicator in the 1970s gave grounds for E. Todd's prophetic prediction about the entire Soviet political system[5]. But even then, there was no reverse epidemiological transition. The transition only slowed down, and the convergence of the Russian indicator with the now low Portuguese or Swedish indicator was only postponed to a later date.

[5] "In Brezhnev's USSR, the growing frequency of violent deaths is accompanied by a new phenomenon, an increase in infant mortality ... The state is no longer capable of positive action ... It is impossible to foresee in what form the Soviet crisis will express itself and whether or not the decay characteristic of this system now will result in a general spasm - reformist, revolutionary or military. But we can already observe the first manifestation of the crisis - sanitary regression and an increase in violent mortality ... The disintegration of the first of the communist systems has already begun" (Todd 1990: 333). (The 1990 edition reproduces the text of a 1978 speech published in 1980 in Economie et humanisme, no. 252).

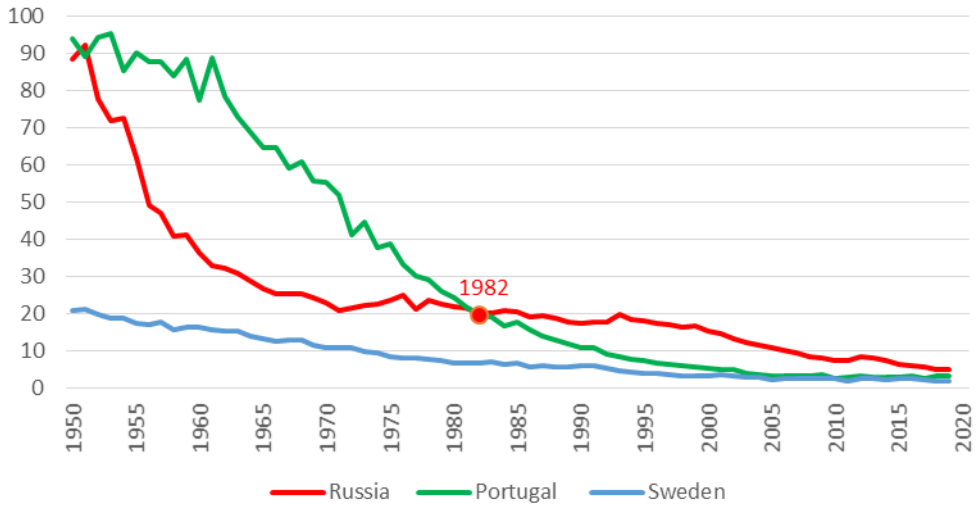

Figure 10. Infant mortality in Russia, Portugal and Sweden, 1950-2019, per 1000 births

Source: (Demoscope Weekly).

Incompleteness of the epidemiological transition as a continuing and protracted process is a normal state. It can be overcome more quickly or more slowly, depending on the general pace of modernization of a society. Counter-modernization trends in the economy, public life, culture and politics can slow down the epidemiological transition. But if we rule out global catastrophes of irreparable proportions or some serious backward movement, there can be no return to the models that existed even at the beginning of the twentieth century. The epidemiological transition is irreversible.

THE EPIDEMIOLOGICAL TRANSITION IN DEVELOPING COUNTRIES

The concept of the epidemiological transition proposed by Omran reflected the experience accumulated in economically developed countries, not only in the European countries of the classical transition, but also in a country like Japan, where the transition began later, but proceeded at an accelerated pace.

For developing countries, Omran noted, there was "the relatively recent and yet-to-be completed transition" (Omran 1971: 535; Omran 1977: 88), which he characterized as "slow". At the same time, he noted that, despite the similarity of trends in the developing countries of Latin America, Asia and Africa, there are still significant differences between them (Omran 1971: 536; Omran 1977: 89). As the epidemiological transition gained momentum in the developing world, the real problems associated with these differences became more apparent, and in his 1998 paper Omran provided a more extensive and detailed outline of "non-Western" transition models (Omran 1998; Omran 2019).

It is not surprising that at this time interest in the problems of developing countries increased among other researchers, and inevitably they again and again turned to Omran's concept. But, in a strange way, the use of this concept was almost always accompanied by criticism of its

creator, often completely unfair and, most importantly, testifying to a refusal to use the cognitive possibilities that are inherent in it.

In 2014, a special issue of the journal Global Health Action was published under the general title Epidemiological Transitions - Beyond Omran's Theory, focusing on the pressing problems of developing countries.

The author of the introductory article for the issue concludes that the concept of epidemiological transition "was relevant as a way of describing and understanding to some extent the relation among disease and mortality patterns in the course of population change in Western societies until the 1950s, rather than as a universal description or prediction regarding population health patterns enlightening to the formulation of health policies in contemporary societies or in developing countries" (Defo 2014a: 13).

The conclusion about the "irrelevance" of Omran's theory in relation to developing countries is made, in particular, on the basis of testing seven hypotheses that supposedly follow from the theory of epidemiological transition but are not confirmed by the experience of Africa. Let's give, for example, one of these hypotheses and its verification.

Hypothesis 4: "According to Omran's epidemiological transition theory, mortality from infectious diseases in non-Western countries was projected to decline from 42.1% of all deaths in less developed regions in 1970 to 19.4% in 2015, as a result of which life expectancy at birth should increase from 57.5 to 68.5 years".

Test of hypothesis 4: "Africa is far from the rest of the world ... Infectious and parasitic diseases alone account for 41% of all deaths in Africa, compared with 15% in the world as a whole ... 64% of all deaths in the world are caused by noncommunicable diseases; this figure is 87% in developed regions and 28% in Africa. In most developing regions, the contribution of noncommunicable diseases (causes of death in group II) exceeded the contribution of causes of death in group I already in 1990, while in sub-Saharan Africa this ratio was only 0.4 ... Almost 20 years later, this ratio is still 0.4 for Africa versus 2.4 for the world as a whole, 12.4 for developed countries, 11.9 for East Asia, 4.9 for Latin America and the Caribbean, and 1.4 for South Asia."

Should a theory of epidemiological transition indicating a natural decrease in the proportion of deaths from infectious diseases as a global trend really predict this decrease with an accuracy of a tenth of one percent by a certain date for entire continents? Apparently, the author of the article believes that this is so, because this is how he formulates his "hypothesis 4" and, naturally, comes to the conclusion that "hypothesis 4 in Africa is not confirmed" (Defo 2014b).

The sum of such conclusions leads to the general conclusion that modern theoretical approaches are unsuitable for analyzing the demographic situation in Africa and the demographic prospects of this continent. "By and large, the conjectured linkages between mortality, fertility, and population growth find little empirical support in much of Africa, calling into question the basic premise of the transition approach embodied in the demographic, epidemiological, and health transition models. Despite signs of an onset of fertility decline in a handful of African countries, the widening gap between fertility and mortality patterns within and across countries combined with the enduring prevalence of infectious diseases in the continent suggests that a new and

different perspective is needed for understanding health and disease trends in Africa." (Defo 2014b).

IS IT REALLY SO?

Africa, the homeland of Humanity, is now indeed the world's most underdeveloped continent. However, this does not mean that the law of universal gravitation does not work in Africa or that the periodic table is incorrect there. Demographic theory establishes patterns common to all, and this also applies to the theory of epidemiological transition. As noted above, its semantic dominant (admittedly, very poorly articulated by Omran) is not just that some diseases and causes of death are replaced by others, but that their new set sharply pushes up the age of death of the overwhelming majority of people, and as a result the entire demographic picture of the world changes. This prediction is universal: if an epidemiological transition takes place at all, it cannot happen differently in either developed countries or developing countries. Any differences in the path, that is, whether it is longer and more rugged or less long and rugged, depending on historical circumstances, can only lead to a similar result. And Omran constantly pointed out this difference in paths when talking about different models of transition.

Unfortunately, neither Omran himself nor his followers or critics, when discussing developing countries, explicitly use the concept of catch-up epidemiological transition, although, in fact, they constantly operate with facts that point to precisely this nature. This is especially clear in those cases when they write about the "overlapping" of some stages of the transition with others. Such an overlap arises precisely due to the fact that different stages of the transition are not implemented sequentially, as occurred (and could not have occurred otherwise) in the pioneering countries, but in parallel - through the borrowing and uneven development of ready-made medical technologies and social practices. The coexistence in time of different stages of the transition is evidence of its incompleteness.

This is what Omran had in mind when he wrote about the triple burden of health problems in non-Western societies at different stages of transition. "It entails at least three major health burdens superimposed upon one another: unfinished old health problems; rising new health problems; and ill-prepared health systems and medical training." (Omran 1998: 106; Omran 2019: 190).

This absolutely correct reasoning has been confirmed by the experience of many "catching up" countries, was indicated, for example, by an analysis of the incomplete epidemiological transition in the late USSR at the turn of the 1980s-1990s. "The incompleteness is explained by two reasons: 1) the main tasks of the early stages of the epidemiological transition have not been fully resolved and elements of the traditional structure of pathology and causes of death remain ... 2) as the epidemiological transition (the second epidemiological revolution) is completed, the fight against pathogenic factors dangerous at a new stage of development has not been sufficiently developed". Regional contrasts were superimposed on the general incompleteness of the epidemiological transition in the USSR - a consequence of the fact that different republics of the USSR were at different stages of the transition (Vishnevsky, Shkolnikov, Vasin 1991: 1014; Vishnevsky, Shkolnikov, Vassin 1991: 93). From this it was concluded that in some republics, in

which 75% of the population of the USSR lived, “the epidemiological transition had advanced the most, a “new” pathology clearly prevailed, and the main efforts should be directed towards combating it. This requires a new strategy to promote the health and lives of people. In the rest of the republics, the situation is far from so clear; there are still very strong, especially among the rural population, elements of the "old" pathology, and the old strategy still retains its significance" (Vishnevsky,Shkolnikov, Vasin 1991: 1020-1021; Vishnevsky, Shkolnikov, Vassin 1991: 95). The differences noted were explained by the "unevenness of the epidemiological transition of various groups of the population" (Vishnevsky, Shkolnikov, Vasin 1991: 1014; Vishnevsky, Shkolnikov, Vassin 1991: 82) and were perceived not as an indicator of the inconsistency or incompleteness of Omran's theory, but rather as confirmation of its explanatory power.

Meanwhile, in the literature, the fact of "overlapping" of some stages of the transition by others, discovered, for example, in Mexico, is considered as inconsistent with the theory, requiring its modification (Frenk et al. 1989: 31). This is yet another of many examples of how a general theory is required to be able to predict in detail any given situation and almost give instructions on how to “formulate health policies” for each country. Can such requirements be imposed on the theory? A theory may have no direct applied value at all, yet still have meaning as a worldview, thus contributing to a better understanding of objective processes, and this in itself is very important. It seems to me that Omran’s generalization has such a semantic meaning: it highlights the decrease in mortality, which is obvious to everyone, as a kind of integral and natural historical phenomenon. But this generalization is also important for practical activities; it provides guidelines for choosing priorities at different stages of the epidemiological transition and allows one to formulate its forecast.

On the other hand, for practical activity a single universal strategy based on a general, albeit correct theory, is not enough; in each case you need a certain tactic of action which takes into account many specific circumstances from which the theory is just abstracted in order to reach the highest level of generalization. In life, both strategy and tactics are needed, but strategy is more important. To use Clausewitz's words, “strategy is the doctrine of the use of combat for the purpose of war”, and tactics are “the doctrine of the use of armed forces in battle” (Clausewitz 2017). It is important to win the battle, but the main thing is to win the war.

The limitless variety of climatic, hygienic, economic, socio-political, socio-cultural and other conditions makes inevitable an equally limitless variety of tactics for implementing the epidemiological transition, its "models", in the words of Omran. In developing such tactics, his theory is a poor helper, but it does not pretend to be. The theory says only one thing, but it is an important one. If we ignore those developing countries that are generally incapable of making the epidemiological transition, then sooner or later, after overcoming enormous difficulties, they will arrive at exactly what Omran predicted: a new epidemiological model of morbidity and mortality, in which the indicators of general and healthy life expectancy will become approximately the same as in developed countries, and the main obstacles to further improvement of these indicators will be chronic diseases and anthropogenic environmental factors.

This has not yet happened, but life expectancy in the less developed, and especially in the least developed countries, is growing faster than in the developed countries, and the trend towards convergence is evident (Figure 11).

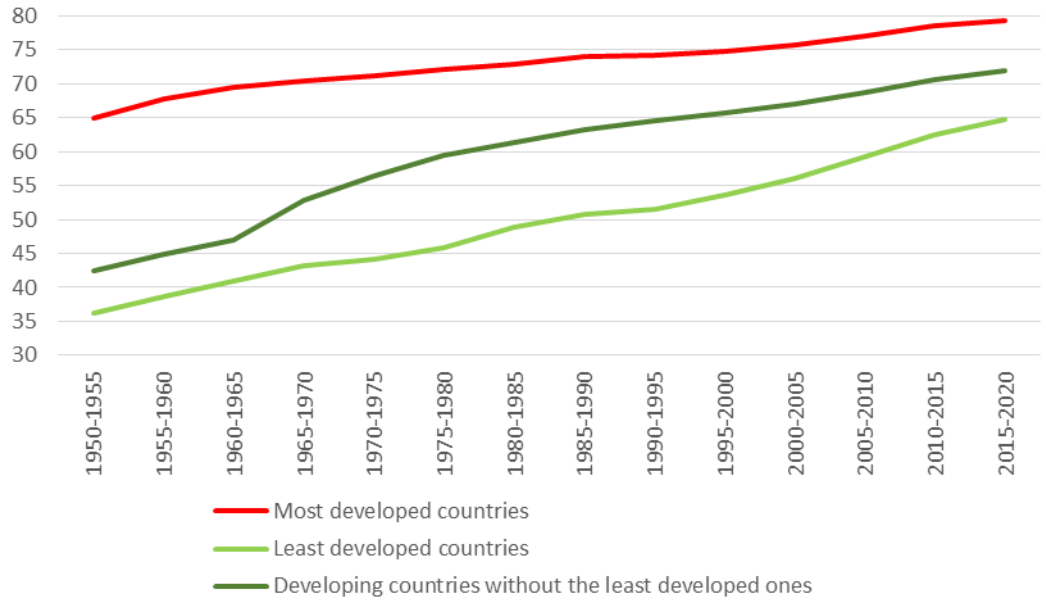

Figure 11. Life expectancy at birth in developed, less developed and least developed countries, years

Source: (World Mortality Report 2019).

Of the world's 48 least developed countries, 34 are in Africa, which, as already noted, is the least developed region of the world, including in terms of its position along the path of the epidemiological transition. Nevertheless, it would be a great exaggeration to say that in Africa nothing is changing in this sense, and that it is moving along a path completely different from that described by Omran.

According to UN estimates, infant mortality in sub-Saharan Africa in 2015-2020 (51 per 1000 births) was two times lower than in the most advanced European countries at the turn of the 20th century or in the USSR in 1950, and almost 5 times lower than in Russia at the end of the 19th century. In the region itself, it has decreased by a factor of almost 3.5 since the middle of the twentieth century (UN WPP-2019, file MORT / F01-1); such a decrease cannot but be attributed to significant changes in the epidemiological model of mortality. It is another matter that these changes are insufficient, that African countries are still in the early stages of an epidemiological transition, along the path of which other developing countries are significantly ahead of them (Figure 12). But this is no reason to deny the general direction of their movement, which is precisely characterized in a generalized form by the theory of epidemiological transition.

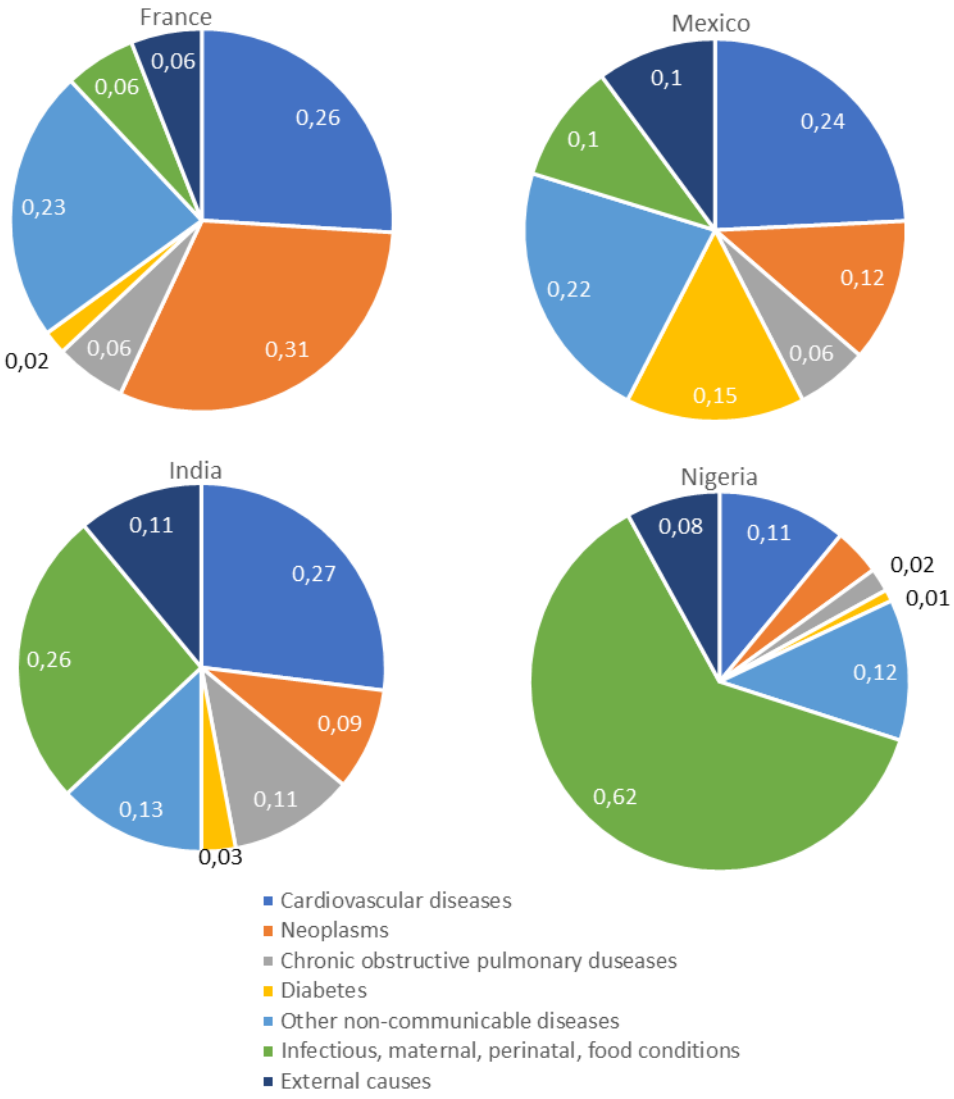

Figure 12. Structure of mortality by causes of death in France, Mexico, India and Nigeria, 2016

Source: (WHO 2018).

CONCLUSION

The emergence of the concept of epidemiological transition was an important stage in the development of scientific ideas about the demographic transition in general. Prior to that, for several decades the attention of researchers of the demographic transition was completely focused on the study of fertility and the search for explanations for its decline (a fact also, by the way, mentioned by Caldwell (2001: 159)).

Of course, the researchers also knew about the decrease in mortality, and to one degree or another took it into account when constructing their explanatory schemes - see, for example, (Davis 1963) - although, as it seems to me, with great incompleteness (Vishnevsky 2017). But from the point of view of the general logic of the theory of demographic transition, it was enough to point to the "mortality transition", the response to which was the "fertility transition".

The transition in mortality can be studied by analyzing its quantitative results, changes in mortality rates, which is being done quite successfully. An example of such an analysis is a study of mortality declines since the mid-18th century in Finland (Kannisto, Nieminen, Turpeinen 1999) or an analysis of the rectangularization of the survival curve in France in the 20th century (Robine 2001). The authors of these studies correlate their results with the stages of the epidemiological transition identified by Omran, but this is just a tribute to the prevailing discourse in the literature, which at that time could no longer do without references to the concept of Omran.

The reasons for the decrease in mortality did not raise any big questions; it seemed sufficient to point out economic, hygienic, and general cultural changes, at best to specify the reasons for the decrease in mortality, as, for example, McKeown et al. (McKeown, Brown, Record 1972) did. They concluded that the decline in mortality in Western Europe in the 19th century was mainly due to an increase in living standards and agricultural success, which led to improved nutrition and changes in hygiene conditions, thanks to which, in particular, mortality from intestinal infections decreased. Causes not depending on the action of people may have been important, too, for example, a decrease in the virulence of pathogenic bacteria.

For Notestein and other theorists of demographic transition, the very fact of the decline in mortality was important, but Omran went further, reflecting on the nature of this decline. "Notestein`s approach to mortality analysis is most fully elaborated in Omran`s epidemiology of the population change recognizing that mortality transition involves more than simple quantitative reductions in mortality levels and their short-term fluctuations... The main aspect that separates the epidemiological transition from the demographic transition is the addition of a new element, a shift in cause-of-death patterns and the stage-wise characterization of the transition stages by the configurations of the causes of death as well as the influences on them" (Defo 2014b). "The concept of the epidemiological transition helps to understand the "anatomy" of historical changes in mortality as an independent revolution that led to a radical change ... in the structure of <causes of death>" (Vishnevsky 2017: 10).

Omran just slightly shifted his angle of view and looked at the changes in mortality not from the side of their causes, but from the side of the result that he saw in a generalized form: not as the sum of the gains from reducing mortality from tuberculosis, childhood infections, stomach diseases, maternal mortality and others, but as a general qualitative shift, which in a short time fundamentally changed the entire epidemiological picture. This was the discovery whose meaning is precisely expressed in two words: epidemiological transition.

Perhaps Omran made this discovery by chance and it would have been more fair if such luck had fallen to the lot of the same McKeown or, say, Frank Notestein or Kingsley Davis. But it fell to Omran, and this fact cannot be changed.

As soon as this happened, Omran did not become a "citation classic" by accident. No researcher studying the historical or modern evolution of health and mortality in a broad sociobiological context can do without the fruitful, albeit not very simple, concept of the epidemiological transition, without attempting to use its analytical and prognostic potential.

But hence the possible costs. Omran formulated the concept in the most general form; many of the positions he expressed are not perfect, and the concept as a whole needs to be developed.

A deeper understanding is needed of the mechanisms of formation and evolution of the modern epidemiological model of morbidity and mortality, its "two-dimensionality", internal relationships, possible options and limitations and, apparently, of the ways of protecting it in the face of probable threats. The solution of these tasks can be successful only if we keep in sight the entire process of transformation of the two-dimensional epidemiological model of morbidity and mortality - the transformation that the concept of epidemiological transition implies.

And all attempts to alter, fragment or rename this concept or misuse it are not very effective attempts of Penelope's suitors to pull Odysseus's bow.

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LABOR MIGRATION IN RUSSIA DURING THE CORONAVIRUS PANDEMIC

MIKHAIL DENISENKO, VLADIMIR MUKOMEL

The introduction of quarantine measures in connection with the coronavirus pandemic was accompanied by the blocking of cross-border communications and the restriction of the activities of enterprises in most sectors of the economy. Labor migrants and members of their families staying on the territory of Russia found themselves in a difficult situation. The decline in employment, primarily in those areas where migrants work, has made foreign citizens one of the most vulnerable social groups. The first layer of issues considered in the article is associated with an assessment of the situation in which migrants have found themselves in Russia. In what types of economic activity has the decline in employment become particularly painful for migrants? What is their financial situation? To what extent are they ready to leave Russia if transport communications are restored? What are their immediate and long-term plans related to work and life in Russia? The second focus of the study is on potential migrants who were unable to enter Russia after the severance of international transport links. What is their economic situation at home? How quickly are they going to leave for Russia if restrictions on international travel are lifted? What are their short-term and long-term plans related to their stay in Russia? This article is devoted to finding answers to these questions, based on an online survey of 2,695 foreign citizens (including 1,304 migrants located in Russia and 1,391 abroad), as well as a telephone survey of 300 labor migrants in the Moscow metropolis conducted in the first half of June 2020.

***Key words**: labor migration, migrants, COVID-19, foreign workers, online survey, CATI, employment, migration plans.*

The coronavirus epidemic has worsened the situation of labor migrants around the world (ILO 2020; OECD 2020). Russia is no exception in this regard. The introduction of quarantine measures in March 2020 suspended partially or completely the activities of many enterprises, especially in those industries where a large number of foreign workers are employed: the restaurant and hotel business, cleaning, wholesale and retail trade and, partly, construction. Like Russian citizens, some of the labor migrants lost their jobs or switched to part-time work, which led to a complete or partial loss of income. The consequence of this was the reduction in remittances to their homeland from Russia. According to the Central Bank of the Russian Federation, the volume of transfers through payment systems to CIS countries in April 2020 was 1.7 times less than in April 2019.

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THE INTERNET SURVEY WAS IMPLEMENTED WITH THE SUPPORT OF THE DIRECTORATE FOR EXPERT AND ANALYTICAL WORK OF THE HIGHER SCHOOL OF ECONOMICS WITHIN THE FRAMEWORK OF THE APPLIED PROJECT OF THE CENTRAL RESEARCH UNIVERSITY HIGHER SCHOOL OF ECONOMICS TZ-125: "SYSTEMATIZATION OF WAYS TO ACHIEVE NATIONAL GOALS IN ENSURING SUSTAINABLE NATURAL GROWTH IN THE POPULATION OF THE RUSSIAN FEDERATION AND INCREASING LIFE EXPECTANCY TO 78 YEARS (BY 2030, TO 80 YEARS)". THE CATI SURVEY WAS CARRIED OUT AS PART OF THE HSE CENTER FOR FINANCIAL RESEARCH PROJECT TZ-151 "ANALYSIS OF THE RISKS OF SOCIAL TENSION AND PROPOSALS FOR POLICY MEASURES AIMED AT INCREASING SOCIAL RESILIENCE".

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According to estimates of the Main Directorate of Internal Affairs of the Ministry of Internal Affairs, working legally on the territory of Russia in March 2020 were more than 1 million citizens of Uzbekistan, about 500 thousand from Tajikistan and more than 350 thousand from Kyrgyzstan (the three main countries of origin of labor migrants). The termination in March of transport links with these countries made it impossible for them to return to their homeland. In total, as of April 1, 2020, according to data from the Central Data Bank for the Registration of Foreign Citizens and Stateless Persons (TsBDUIG), there were 10.2 million foreign citizens, including workers, students, tourists and others, on the territory of the Russian Federation. Of these, 4.2 million were foreigners who arrived in Russia for the purpose of "work for hire" (Florinskaya 2020: 14). Taking into account foreigners who had a residence permit and a temporary residence permit, as well as working foreign students, the total number of foreign workers in Russia was close to 5 million people.

The restrictions on the entry of foreigners and stateless persons introduced by the Government of the Russian Federation on March 18 disrupted the normal course of labor migration, in which there was a clear seasonal component. Traditionally, the number of labor migrants is minimal in January. Starting in March, as shown by the dynamics of the number of work licenses (“patents”) issued to workers from Uzbekistan, Tajikistan, Ukraine, Moldova and Azerbaijan (Figure 1), their number increases rapidly along with the increasing seasonal demand for labor, the flow of migrants reaching its maximum values in April-May. But in 2020, due to the coronavirus pandemic, this did not occur. Thus, the number of first-time work licenses in May was 3.5 times lower than in January. In total, according to the Main Directorate of Migration Affairs of the Ministry of Internal Affairs of the Russian Federation, there were 1.3 million fewer foreigners registered for migration in April-June 2020 in connection with work than in the same period of 2019.

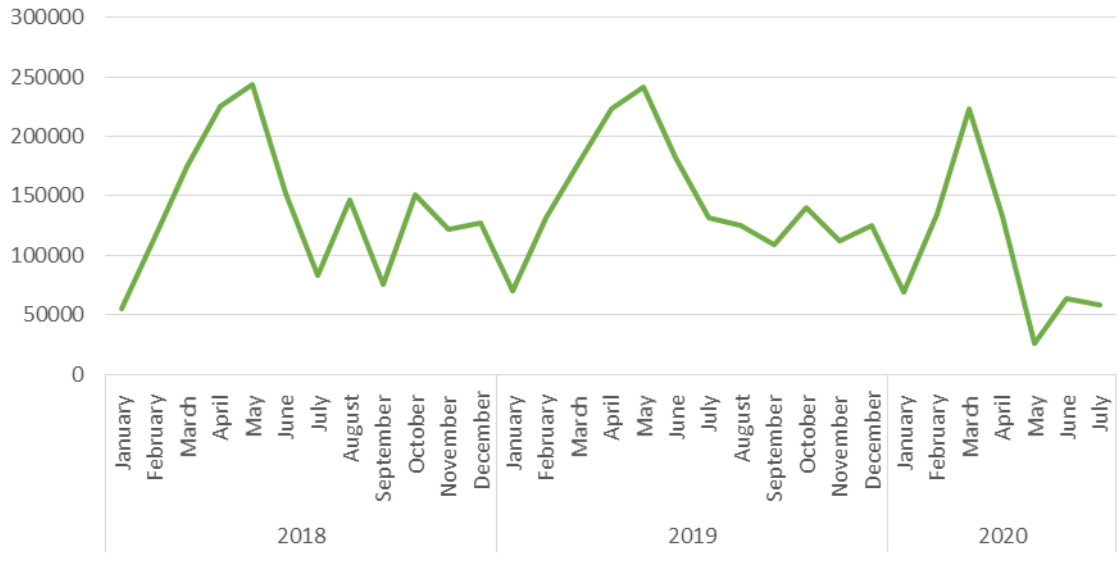

Figure 1. Number of work licenses issued in Russia from January 2018 to July 2020

Source: (Main Directorate of Migration Affairs of the Ministry of Internal Affairs of the Russian Federation 2020).

The lack of information about the situation of foreign workers in Russia during the coronavirus pandemic has given rise to all sorts of speculation and rumors. Public opinion was agitated by mass media horror stories predicting an increase in crime among foreigners deprived of their livelihoods. A surge in alarmist sentiment took place in mid-April[1]. As usual, these sentiments were initiated by law enforcement officers[2] and politicians[3], odious personalities from the Russian Orthodox Church[4] and nationalists[5], as well as by "experts" who assert that "criminal sentiments among migrants are more pronounced than among Russians" (Pogrebnyak 2020) or who believe that migrants in Moscow work for a salary of 8 thousand rubles[6]. To them were added persons positioning themselves as representatives of migrants[7] or human rights defenders.

Thus, in the generally even-handed Report of the Moscow Bureau for Human Rights (MBHR), "COVID-19: manifestations of racism, xenophobia and migration processes in a pandemic", there were unverified references to cases where migrants were not discussed at all[8], or to an incident from 3 years before[9]. However, these cases were referred to by the media, based on the MBHR report[10].

[1]According to the information and analytical system "Medialogia", 11% of all publications for February-June 2020 devoted to the problems of migrants during the pandemic fell on the week from 12 to 20 April.
[2]See: M. Falaleev (2020). Inconvenient guests. Coronavirus may be causing an increase in crime among migrants in Russia. Rossiyskaya Gazeta, Federal issue 122 (8176), 06/07/2020. URL: https://rg.ru/2020/06/07/koronavirus-mozhet-vyzvat-v-rossii-rost-prestupnosti-sredi-migrantov.html; Mikhailov Mikhail (2020). A virus for migrants. How dangerous is it for the whole society? Vmeste-RF, 06.05.2020. URL: https://vmeste-rf.tv/analytics/virus-for-migrants-how-dangerous-is-it-to-society/
[3]See: RIA Novosti (2020). Zhirinovsky proposes to limit the return of labor migrants to Russia. 05/23/2020. URL: https://ria.ru/20200523/1571877700.html; Vakhrushev Alexey (2020). Plenipotentiary Envoy Tsukanov declares homeless people and migrants a threat during the coronavirus epidemic. Ura.ru., 13.04.2020. URL: https://ura.news/news/1052427087
[4]See R. Golovanov (2020). Father Dimitri Smirnov: Russia will die out. And we will be replaced by migrants. And Russians will become janitors, couriers and taxi drivers. KP, 26.04. 2020. URL: https://www.kp.ru/daily/27122.5/4206121/.
[5]See: Rosbalt (2020). Russian nationalists call for the expulsion of all migrants from Central Asia before the crisis escalates into a "criminal catastrophe." 23.04. 2020. URL: https://www.rosbalt.ru/russia/2020/04/23/1840030.html
[6]See: E. Sokolova (2020). Coronavirus has caused an explosion of xenophobia: migrants are taking jobs from locals / *Moskovsky Komsomolets*, 05/20/2020; Actual Comments (2020). *Powder keg: how the coronavirus has affected migrants,* 05/13/2020. URL: http://actualcomment.ru/porokhovaya-bochka-kak-koronavirus-skazalsya-na-migrantakh-2005131429.html
[7]President of the Federation of Migrants of Russia Vadim Kozhenov, who has begun to scare people with the explosive growth of crime among migrants in the first half of April (see: Steshin D. (2020). President of the Federation of Migrants Vadim Kozhenov "If unemployed migrants do not leave, the growth of crime will be explosive!" 04/14/2020. URL https://www.kp.ru/daily/27117/4197954/). A few days later, he acknowledged the absence of an increase in migrant crime, but continued to scare the average person with it (see: Govorit Moskva (2020). *The Federation of Migrants has not recorded a surge in crime among foreigners in Russia*, April 24, 2020. URL: https: // govoritmoskva. ru / news / 232071 /
[8]Lenta.ru (2020). *Robber stabs Russian with knife for a bag of groceries*, 05/02/2020. URL: https://m.lenta.ru/news/2020/05/02/dikost/?fbclid=IwAR3V2NekwFZ_nivMMyeZpHiryzGPBEYI0oWVCi87AXLZzDbpij90PH2G6kI
[9]KP (2020). *In Voronezh, guest worker who robbed and severely beat a pensioner and her grandson will be tried,* 30.04.2020. URL: https://www.vrn.kp.ru/online/news/3856774/?utm_source=yxnews&utm_medium=desktop&utm_referrer=https%3A%2F%2Fyandex.ru%2Fnews
[10]Kompaniya (2020). In Moscow, migrants have become more likely to commit crimes, 05/12/2020. URL: https://ko.ru/news/v-moskve-migranty-stali-chashche-sovershat-prestupleniya/

Of course, the voices of specialists were also heard (Abashin 2020; Poletaev 2020)[11]. Their position was formulated most aphoristically by D. Aleksandrov: "Migrant workers seem to me to be almost the least dangerous group of the population"[12]. But sane voices were drowned out by a chorus of voices screaming about migrant crime. Denials by the Moscow and federal authorities of the growth of migrant crime also had no significant impact on the media coverage of the problem[13]. The article titles speak for themselves[14]. However, the mass media[15] continued to frighten the layman until the end of June with the looming increase in crimes[16].

Less prominent is the topic of the prevalence of coronavirus among migrants, also presented under scary headlines. A problem does exist, but it is largely due to the fact that, according to V. Chupik, "migrants are very stigmatized, and therefore they are even ready to hide the coronavirus disease"[17]. The matter has not been limited to words. Already in February, representatives of "visible minorities", especially people from China and South-West Asia, in many countries of the world (USA, France, Italy, etc. - and in Russia too) faced discrimination not only in everyday life (HRW 2020).

In such circumstances, due to a lack of objective information that would make it possible to evaluate the situation in which migrants find themselves, the staff of the Institute of Sociology of the Federal Research Center of the Russian Academy of Sciences and the Higher School of Economics conducted a study focused on analyzing the employment situation of migrants, their financial situation and readiness to return home (or, for those in the country of origin, to come to Russia), their short- and long-term plans regarding work and stay in Russia.

RESEARCH METHODOLOGY AND MIGRANT PROFILES

As part of the study, in the first half of June 2020 an online survey was conducted of about 8 thousand foreign citizens, in the vast majority citizens of CIS countries. The respondents had to meet two conditions: they must not have Russian citizenship and, if they were outside of Russia,

[11]See also: Kommersant (2020). Stories about how migrants are going to rob non-migrants due to quarantine are a bogeyman, 04/03/2020. URL: https://www.kommersant.ru/doc/4312764

[12]Lenta.ru (20202). *General mistrust, general fear are growing*, 05/22/2020. URL: https://lenta.ru/articles/2020/05/22/migrant/

[13]See: Izvestia (2020). *Moscow mayor's office has not seen an increase in crime among migrants during the pandemic,* 05/25/2020. URL: https://iz.ru/1015171/2020-05-25/v-merii-moskvy-ne-uvideli-rosta-prestupnosti-sredi-migrantov-vo-vremia-pandemii; Egorov I. (2020). Who sits on the Darknet. *Rossiyskaya Gazeta (Moscow), Federal issue*, 108 (8162). 05/20/2020

[14]Surprisingly, an article citing the words of the Deputy Secretary of the Security Council of the Russian Federation A.N. Grebenkina, "the law enforcement agencies have managed to prevent the growth of crime in the migration sphere", was published under the heading "Growth of crime among migrants recorded in Russia". See: Telegraph (2020). *Growth of crime among migrants recorded in Russia*, 05/21/2020. URL: https://rustelegraph.ru/news/2020-05-21/rost-prestupnosti-sredi-migrantov-zafiksirovali-v-rossii-90995

[15]See: Unclassified Materials (2020). *Several million migrants travel to Russia: the first flight at the end of July*, 06/29/2020. URL: https://nesekretno-net.ru/blog/43776301420/V-Rossiyu-edet-neskolko-millionov-migrantov-pervyiy-reys-v-konts?utm_referrer=mirtesen.ru

[16]Also contributing to the hysteria was D.A. Medvedev, whose statement in June about the risk of an increase in migrant crime was widely disseminated by the mass media. See: TASS (2020). *Medvedev warns of the risks of increased crime among migrants who have lost their jobs*, 06/09/2020. URL: https://tass.ru/obschestvo/8687177

[17]Radio Azattyk (2020). *Corona crisis in Russia: consequences for labor migrants*, 17.05. 2020. URL: https://rus.azattyk.org/a/30617025.html

must express their intention to come to Russia in 2020. After adjusting the database (leaving out those who did not meet these requirements and those who did not complete the survey), the sample came to 2,695 respondents. 1304 respondents located on the territory of Russia and 1391 located abroad were interviewed. With a few exceptions in the wording of the questions, the questionnaire was identical for both those staying in Russia and those in the sending countries.

Along with the online survey, at the same time a similar questionnaire was used to conduct telephone interviews (Computer Assisted Telephone Interviewing, or CATI) of citizens of Kyrgyzstan, Tajikistan, Uzbekistan and Ukraine, the vast majority of them staying in Moscow and the Moscow region (300 respondents). For the telephone survey, we used data on respondents who had previously taken part in surveys by the Institute of Sociology of the Federal Research Center of the Russian Academy of Sciences. Both the online survey and the CATI survey were conducted in Russian.

The profiles of online respondents in Russia and abroad are almost identical. Men predominate among the respondents, more than a quarter of the respondents have a higher education, and one in ten has an incomplete higher education. The average age of the respondents is 37 years old (among men - 35 years old, women - 39 years old). Almost a third of the respondents identified themselves as Russian; for the majority of respondents, Russian is their mother tongue. Those who took part in the CATI survey represent a different social stratum of foreigners - migrants with a lower level of qualifications and education (17.1% of them with higher and incomplete higher education). Among them are significantly fewer Russians, with only a quarter of the respondents naming Russian as their mother tongue (Table 1).

Table 1. Main socio-demographic characteristics of migrants (online survey and CATI), % of respondents

Parameters		Online survey (interviewed in Russia and abroad)	CATI
Sex	Male	62.4	68.9
Age, years	Under 20	4.6	0.3
	20-29	27.9	25.0
	30-39	28.4	35.1
	40-49	22.5	27.0
	50-59	11.4	12.5
	60 and older	3.1	0.0
Marital status	Never married	28.9	15.4
	Married (including civil and religious)	54.7	71.2
	Widowed, divorced	16.4	13.4
Higher education completed	Primary and incomplete secondary	6.3	3.6
	General secondary	25.8	48.5
	Basic vocational	9.1	8.0
	Intermediate vocational	22.4	22.1
	Incomplete higher	10.3	4.0
	Higher	26.0	13.1
Ethnicity	Russian	29.6	8.2
Native language	Russian	61.3	25.7

Online polls are fraught with biases due to the specifics of the Internet audience, which is dominated by young, educated, urban respondents. In our case, the sample is also biased towards more educated migrants, which is especially evident when compared with the CATI survey, where a different contingent is represented. Other obvious biases: a higher proportion of Russians and

those for whom Russian is their native language. At the same time, a prevalence of young contingents of foreign citizens is not observed. Probably, the share of migrants with an irregular legal status is underestimated: only 8.3% of foreigners in Russia reported not having valid documents for stay/ residence and/or employment, and another 6.1% found it difficult to answer.

Based on previous mass polling conducted by the staff of the Institute of Sociology of the Federal Scientific Research Center of the Russian Academy of Sciences for the needs of the Higher School of Economics (2011 - 8.5 thousand respondents; 2017 - 8.6 thousand respondents) and on departmental statistics of the Ministry of Internal Affairs of Russia, we can observe an underrepresentation of Central Asian migrants and an overrepresentation of Moldovans and Armenians (Figure 2).

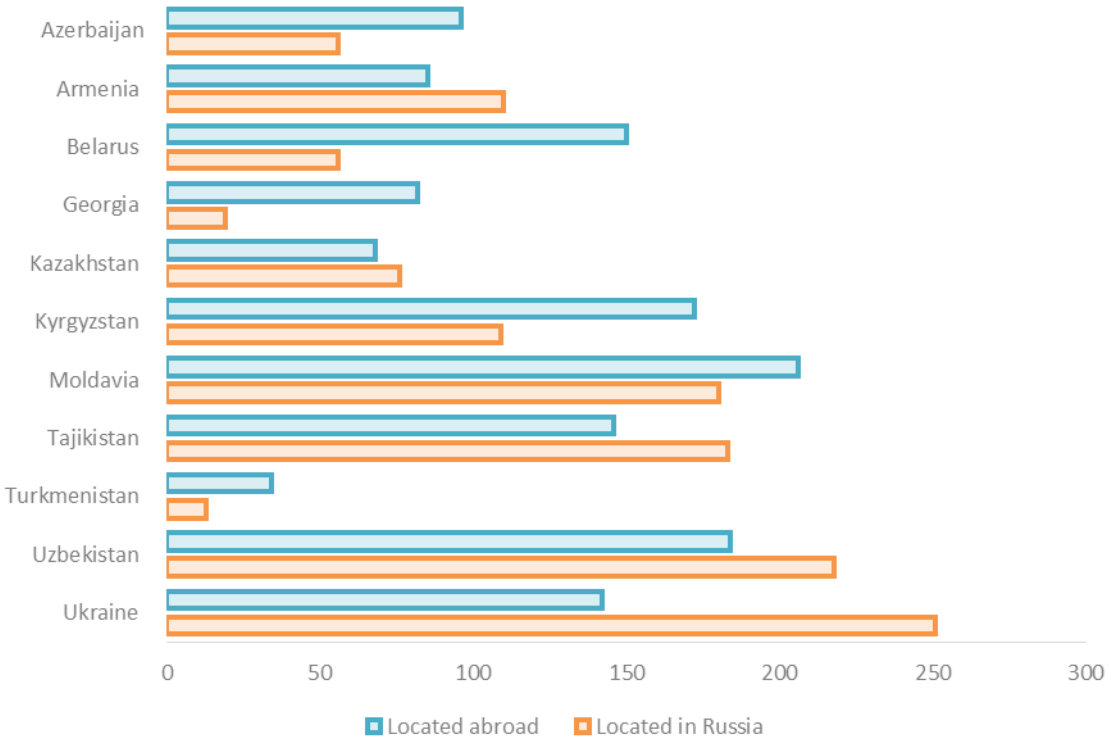

Figure 2. Distribution of respondents by country of citizenship, people

The majority of migrants in Russia - 71.1% of respondents[18] - are working or are looking for work and are ready to start it. Almost the same number of respondents - 70.7% - outside Russia intend to work after arriving in Russia. The main economic activities of those whose most recent job was in Russia (both for those now on its territory and abroad) are construction, the hotel and restaurant businesses, trade, and domestic service. Other areas of employment of the CATI survey participants: one third are employed in trade and a significant share in construction and housing and communal services (Table 2).

[18]Hereinafter, unless otherwise stated, the results of the online survey are given.

Table 2. Types of economic activities of migrants (online survey and CATI), % of respondents

Types of economic activity	Online survey	CATI
Construction	26.8	17.1
Hotels and food service	14.1	3.9
Wholesale and retail trade; repair of cars and motorcycles	9.8	33.6
Domestic service	9.2	4.6
Transport, storage	7.5	8.6
Manufacturing industries	6.4	3.6
Housing and communal services, cleaning of buildings and grounds	4.5	15.0
Health care, social services	1.8	1.1
Other personal services	3.5	3.9
Others, no answer	16.4	8.6
Total	100.0	100.0

The overwhelming majority of respondents work alone and in micro-enterprises with up to 15 employees (69.0% according to the online survey, 64.7% according to CATI) or in small enterprises with 16 to 100 employees (19.4 and 24.8%). These are the businesses where informal and illegal employment is most prevalent and most affected by the economic impact of the pandemic.

MIGRANTS IN RUSSIA

Labor migrants and members of their families staying on the territory of Russia have found themselves in a difficult situation. The Russian authorities have taken a number of measures to prevent their social exclusion, primarily by prolonging the documents allowing migrants to stay in Russia and engage in labor activity[19] The measures taken were in line with those typical for other countries, consisting in simplifying legal procedures, automatically prolonging documents necessary for migrants and facilitating their access to medical services[20]. However, these measures did not enjoy the unconditional support of Russians[21]. In general, they have not alleviated the economic situation of migrants: the decline in employment, primarily in those areas where migrants work, has made foreign citizens one of the most vulnerable social groups.

The online survey was conducted to answer the following questions: In which types of economic activity has the employment decline been particularly painful for migrants? What is their financial situation? To what extent are they ready to leave Russia if transport communications are restored? What are their immediate and long-term plans related to work and life in Russia? The survey involved foreign citizens who do not have a second (Russian) citizenship, located in

[19]Official Internet portal of legal information. (2020). Decree of the President of the Russian Federation dated April 18, 2020 No. 274 "On temporary measures to regulate the legal status of foreign citizens and stateless persons in the Russian Federation in connection with the threat of the further spread of a new coronavirus infection (COVID-19)." URL: http://publication.pravo.gov.ru/ Document / View / 0001202004180001

[20]For an overview of the practices of various countries, see: (Malakhov, Motin 2020; OECD 2020; The World Bank 2020a).

[21]According to one of the online polls, 3/4 of the respondents of one of the business social networks spoke out against them. See: Telegram poll "BE IN THE KNOW" (2020). *Russians are against Government proposal to pay migrants the minimum wage*, 24 TM, 04/26/2020. https://24tm.ru/articles/40511-rossijane-protiv-predlozhenija-pravitelstva-vyplachivat-migrantam-mrot-opros-telegram-bud-v-te.html

78 regions of Russia, of whom 52.4% are in Moscow and the Moscow region and 10.9% in St. Petersburg and the Leningrad region.

Among the respondents there are many students (12.3%), as well as a number of housewives (6.2%) and non-working pensioners (1.4%). Another 3.5% are persons with no definite type of occupation, who did not classify themselves as belonging to a certain category and who indicated that they were neither working nor seeking work. The socio-demographic profiles of foreigners who are not present in the Russian labor market differ significantly from the profiles of those who are employed or seeking work (Table 3).

Table 3. Main socio-demographic characteristics of migrants in the labor market and other categories of migrants in Russia, % of respondents

Parameters		Working and seeking work	Other categories of migrants	Total
Sex	Male	64.9	50.0	61.2
Age, years	Under 20	1.2	15.6	4.7
	20-29	27.9	42.7	31.5
	30-39	31.2	14.2	27.1
	40-49	26.1	14.9	23.4
	50-59	11.9	9.8	11.4
	60 and older	1.7	2.7	2.0
Marital status	Never married	22.7	52.0	29.9
	Married (including civil and religious)	58.6	40.1	53.6
	Widowed, divorced	18.7	7.9	16.5
Higher education completed	Primary and incomplete secondary	6.7	8.7	7.2
	General secondary	31.2	16.7	27.7
	Basic vocational	8.5	7.3	8.2
	Intermediate vocational	22.2	23.0	22.4
	Incomplete higher	8.5	23.3	12.2
	Higher	22.8	21.0	22.4
Ethnicity	Russian	22.5	30.3	24.5
Native language	Russian	52.6	55.3	53.3

There are many more young people among non-working migrants: over half are under 30, mostly students. While in age groups up to 40 years men predominate, among those over 40 it is women. In fact, unemployed migrants are a conglomerate, on the one hand, of young male students (average age 22) and, on the other hand, of 40-year-old housewives and pensioners, with a few patches of retirees.

However, the majority of foreign citizens are working or looking for work. The main types of economic activities of respondents outside the Moscow metropolis are construction, hotels and restaurants, trade, domestic service and manufacturing. A somewhat different structure of employment exists in the Moscow metropolis, where the share of those employed in construction and trade is smaller, but there are more people employed in the hotel and restaurant business, domestic service and housing and communal services and who provide personal services (Table 4).

Table 4. Types of economic activity of migrants in the Moscow metropolis and other regions of Russia in the last place of work, % of respondents

Types of economic activity	Moscow and Moscow Region	Other regions of Russia
Construction	25.1	28.4
Hotels and food service	15.9	13.5
Wholesale and retail trade; repair of cars and motorcycles	9.8	13.2
Domestic service	12.7	5.8
Transport, storage	7.4	7.7
Manufacturing industries	4.8	8.8
Housing and communal services, cleaning of buildings and grounds	6.4	2.5
Health care, social services	1.2	3.3
Other personal services	4.2	2.5
Others	12.5	14.3
Total	100.0	100.0

The work of the respondents is well paid: the average salary is 43.2 thousand rubles (the median value is 36 thousand rubles). The best paid are those working in the field of professional, scientific and technical activities, in the fields of information and communications technology, culture and leisure (79.1 thousand rubles, median 62.4 thousand rubles) and construction (49.4 thousand rubles), while the worst paid are those employed in housing and communal services (35.3 thousand rubles) and trade (35.1 thousand rubles). The earnings of less qualified workers (CATI survey) are slightly lower: the average wages in construction are 42.8 thousand rubles, in trade - 32.6 thousand rubles, in housing and communal services – 30 thousand rubles.

Let us note the entrepreneurial spirit of some respondents: 3.8% of them are company owners, 3.7% are registered individual entrepreneurs, and another 7.7% are self-employed.

The overwhelming majority of those present on the Russian labor market worked last year (88.8%). This year, 8.7% of them were unemployed from January to May. The maximum employment among those who worked in Russia this year was in February, and the peak of unemployment was in April: if we take the number of employees in January as 100 pp, then in February the percentage was 103.1, in March - 97.7, in April — 66.2, and in May - 71.2. A similar picture emerged according to the CATI survey, with an adjustment for the fact that the main type of economic activity of respondents, mainly from Central Asia, is trade: February - 103.6, March - 85.8, April - 53.5, May - 67. 2.

However, employment processes of migrants are fundamentally different in the regions and the metropolis. Moscow had the most stringent lockdown, with a rather strict regime also in the Moscow region[22], while in other regions - with a few exceptions and, as a rule, later – the quarantine was looser. As a result, the decrease in the migrant labor market in the megalopolis was more significant than in the regions (Figure 3).

[22]It should be noted that many labor migrants working in Moscow live in the Moscow region, and the restriction of transport links between Moscow and the region has reduced their opportunities to work in Moscow.

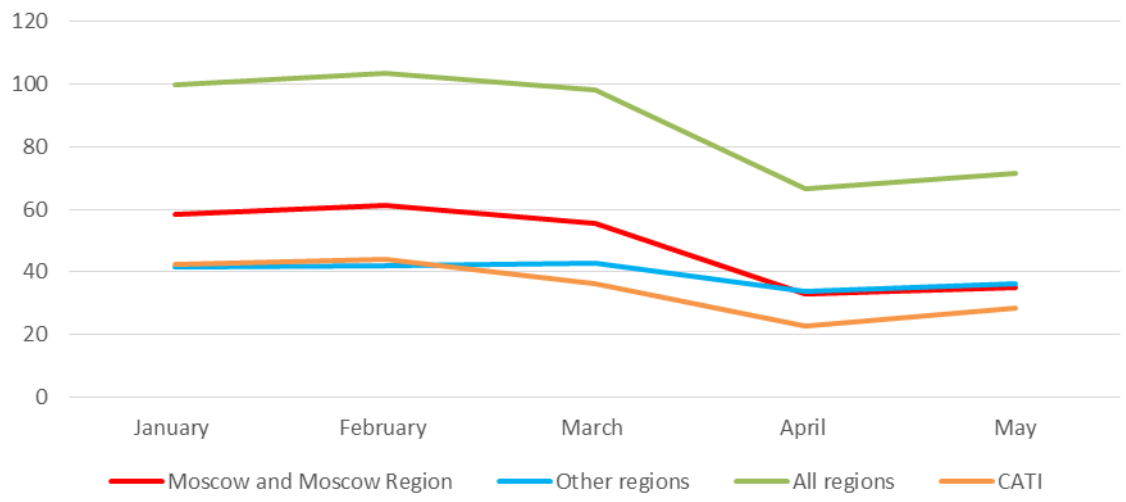

Figure 3. Dynamics of the number of employees in January-May 2020 in the Moscow metropolis and regions of Russia (all regions January 2020 = 100%)

Employment in the metropolis began to decline in March, while in the regions there was a continuation of the traditional seasonal growth in migrant employment. While in the megalopolis in April the number of working respondents decreased compared to March by 40.8% (and compared to February by 47.5%), in the regions the decrease was only by 21.2%. It is noteworthy that the data from the CATI survey demonstrate the same dynamics of migrant employment as the online survey in the metropolis. On the one hand, this is not surprising: 95% of CATI respondents reside in the Moscow region. On the other hand, CATI respondents are employed in the worst jobs, and this is an argument in favor of the fact that the crisis affected workers of different occupations in the same way.

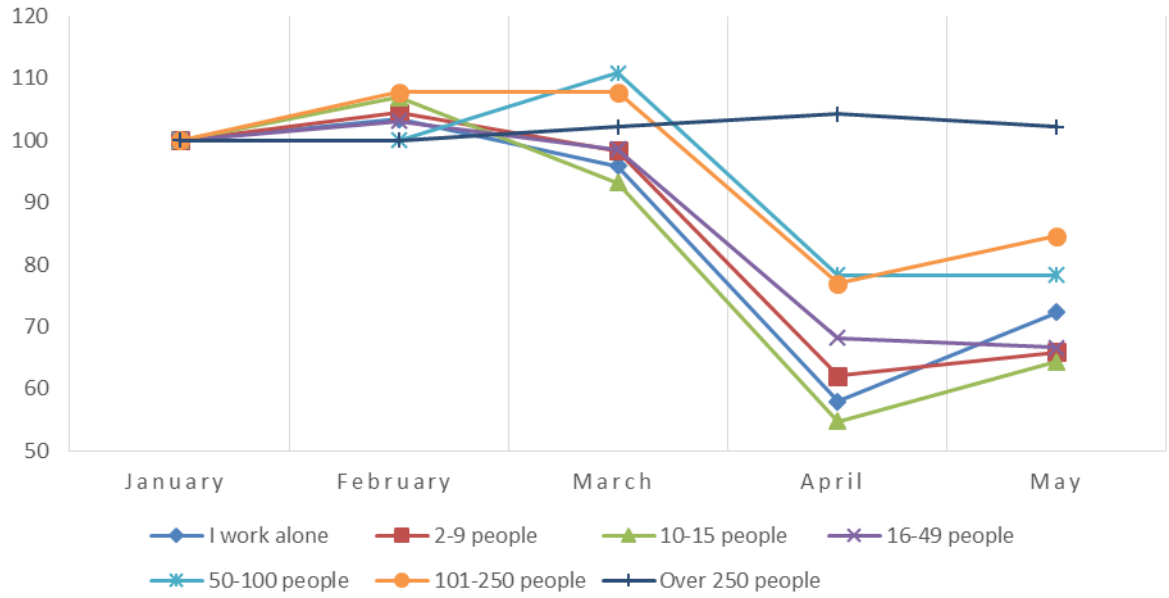

Figure 4. Change in the number of employees depending on the number of employees of an enterprise (organization) in January-May 2000, % (January 2020 = 100%)

In the spring of 2020, the greatest resilience was shown by medium and large enterprises. Hardest hit were the self-employed and those working in micro-enterprises; their numbers declined greatly in April (Figure 4).

The labor market contraction in April bypassed workers who were the backbone of the business. Employers appear to have focused on retaining the most valuable employees, getting rid above all of less experienced and skilled workers. More than half of those working in January-May 2020 (55.0%) were those who did not lose their jobs at this time. These were the most educated (28.9% with higher education), with a better command of the Russian language and among whom were many Russians (32.0%). The worst-paid, most socially vulnerable groups of migrants suffered the most: those with an irregular legal status - without valid documents for stay/residence and/or employment in Russia (those who had a residence permit or a temporary residence permit lost their jobs much less often) - and the informally employed, whose labor relations were based on verbal agreements (or self-employed who had not formalized their relations with the State). While among all respondents the share of informally employed was 38.7%, and among those employed in teams of up to 10 people - more than half (51.8%) of those who worked constantly during January-May 2020 - it was significantly less - 24.2%. The most vulnerable social groups of migrants, forced out of the labor market, on the one hand join the ranks of the unemployed and on the other formally improve the statistics of informal employment.

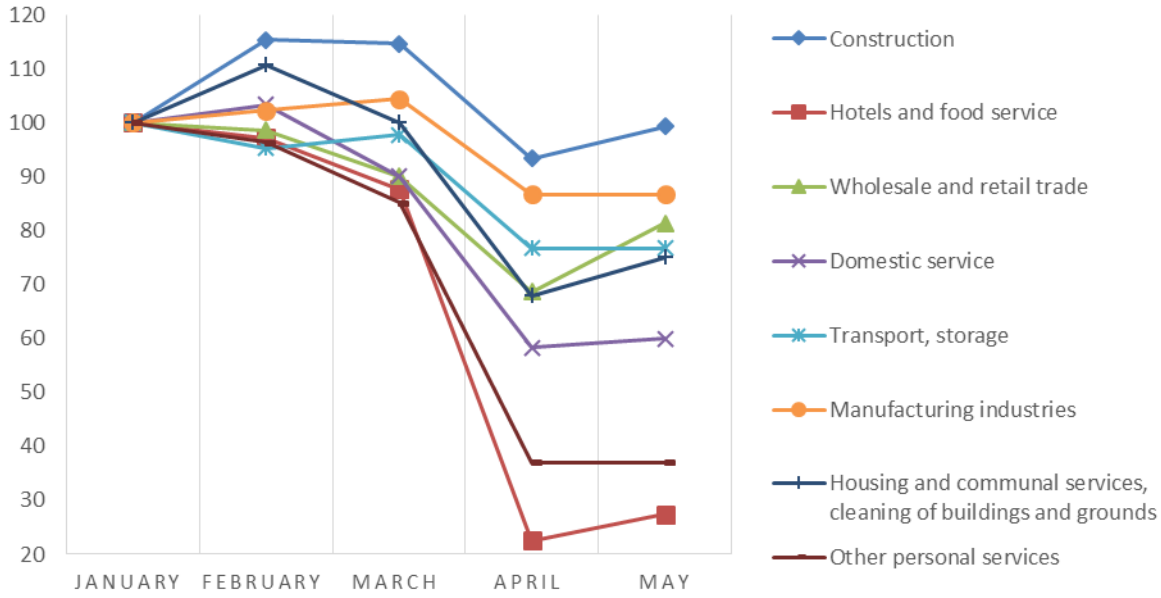

Figure 5. Change in the number of employed by the main types of economic activity of migrants in January-May 2000, % (January 2020 = 100%)

The crisis associated with the pandemic, as expected, hit the hotel and restaurant business hardest of all, where in the most difficult month (April) only 23.3% of those who had worked in February were still employed, followed by personal services (38.4% of those who worked in February), domestic service (56.4%), and trade (69.6%), while in construction the figure was 81.0% (and in May reached its January level; Figure 5).

However, for less skilled workers (CATI survey) the situation was more dramatic: in April, at the most difficult time, only 40% of those working at the peak of employment in February were employed in construction, trade and transport.

Citizens of Belarus, Kazakhstan, Armenia and Ukraine suffered the least from the reduction in employment. The hardest hit were citizens of Kyrgyzstan, Uzbekistan and Tajikistan: in April, among citizens of Kyrgyzstan, 47.1% of those working in February were still employed, among citizens of Uzbekistan - 52.2%, and of Tajikistan - 69.1% (among the latter, there were fewer people employed in the hotel and restaurant business, the sector most affected during the lockdown). A similar picture was recorded among less qualified migrants: according to the CATI survey, in April only 52.8% of the citizens of Central Asia who worked in February were employed.

While almost 10% of Russian workers who had been employed before lockdown lost their jobs after its introduction, (Gimpelson, Kapelyushnikov 2020)[23], among migrants the figure was about 40-45%[24] (in the online survey, one in three, and in the CATI poll, one in two).

It seems that, unlike Russian workers, who experienced a massive decline in wages – a reaction of employers characteristic of the economic crises of the 2000s -, migrants faced massive layoffs due to the closure of businesses. Wage cuts also occurred, especially in the hardest hit sectors of the restaurant and hotel business and wholesale and retail, where employers cut primarily better-paid older workers. However, in a number of types of economic activity (domestic service, construction) wages even slightly increased (by 4.8 and 2.9% respectively in April compared to February).

The most significant reasons given for job loss were objective ones, caused by the closure of an enterprise (31.5% of respondents)[25] or layoffs (8.5%). It is extremely rare for workers to show initiative and leave on their own, even if they were not being paid (15.1%). A quite common situation was that in which, due to lockdown, an organization was not working and an employee, though not paid, was helped as much as possible (with food, for example) and was still officially employed while waiting to resume his job (18.9%). A significant part of the respondents (26.0%) did not detail the reason for losing their jobs, vaguely indicating the pandemic. 58.1% of the respondents know relatives, friends or acquaintances who lost their jobs in Russia this year and returned to their homeland, but even more (62.8%) reported that those who lost their jobs remained in Russia.

Job seekers find themselves in the most difficult situation: 57.3% of them do not have enough money for basic necessities. The situation is not so catastrophic for working people, housewives, students and pensioners, among whom 27.9% are in dire need. The worst situation is in Moscow, where 44.8% of foreign citizens do not have enough money for basic necessities.

[23]According to other estimates — one in four. See: K. Pipia (2020). From isolation to migration. Vedomosti, 03.06.2020. URL: https://www.vedomosti.ru/opinion/articles/2020/06/03/831861-izolyatsii-migratsii

[24]Higher estimates of the number of migrants who lost their jobs have appeared in the media, citing unknown polls. See: Chiromon B. (2020). IOM: about 60 percent of migrants in Russia have lost income, *Radio Ozodi*, 03.06.2020. URL: https://rus.ozodi.org/a/30650669.html

[25]The percentage of respondents facing the closure of an enterprise has been especially high in the Moscow metropolis (37.2%), while in other regions - 21.9%.

According to a telephone survey, one in seven migrants in Moscow complained of having no money even for food, and one in three - no money to buy clothes.

The fear of being left without a livelihood prevails over the fear of coronavirus: the first is three times greater than the second. Covid dissidence, coupled with bravado, also occurs: 16.7% are not afraid of either one. In the CATI survey this figure is even higher - 23.4%, which suggests a greater prevalence of covid dissidence among less educated migrants.

In 2020, the vast majority of respondents are planning to work, including students, housewives and retirees who have not previously been on the labor market: 78.7% are definitely planning to work, another 7.8% are considering the possibility. Only 6.5% of respondents in Russia unequivocally reject working this year, and 7.0% found it difficult to answer. Among those who plan to continue working or start working in Russia this year, 42.7% are confident that they will be able to keep their jobs, and 42.8% that they will be able to find a job (although some of them doubt that this will be done quickly). 5.9% are not sure that they will find a job at all, and 8.7% found it difficult to answer.

Experts' assessments of the possible outflow of migrants from Russia after the resumption of interstate transport links differ. Some of them suggest a significant exodus from Russia. The possible scale of the outflow has also been given - up to a third (Abashin 2020) or even more than half of foreign citizens (Ryazantsev 2020). But this outflow, months later, will turn into a significant return movement. Supporters of a large-scale reduction in the number of labor migrants most often point to the precedents of previous economic crises, to the growing competition of foreigners in the labor market with Russian workers who have lost their jobs. More moderate assessments are based on fundamental differences between the current economic crisis and the previous ones, on the assessment of the economic situation in the main sending countries, and on the factors pushing potential migrants into the Russian labor market.

However, 78.2% of working respondents and 75.4% of those looking for work have not even considered leaving Russia in the coming months (at least until September-October); only one in ten has considered the possibility of temporarily returning to their homeland, waiting out the difficulties there and returning to Russia again (table 5). The telephone survey showed similar figures: 78.9% intend to stay in Russia for the time being, 10.0% intend to wait out the problems at home. Foreign workers relying on their employment opportunities here are reluctant to leave the Russian labor market[26]. The possibility of returning to their homeland, more often temporarily, is considered mainly by students, persons without specific occupations, pensioners and housewives (Table 5).

[26]Similar data were obtained on the intentions of Ukrainian labor migrants in Poland, 85% of whom were not planning to leave their homeland. See: Ukrinform (*85% of employees want to stay in Poland during pandemic*, 05/05/2020. URL: https://www.ukrinform.ru/rubric-society/3019588-85-rabotnikov-v-period-pandemii-hotat-ostatsa-v-polse.html)

Table 5. Immediate plans of respondents to stay in/out of Russia, % of respondents

"What are your immediate plans (until September-October 2020)"?	Online survey		CATI	
	Working and seeking work	Not working and not seeking work	Working and seeking work	Not working and not seeking work
Stay in Russia	77.3	62.5	80.9	67.4
Return home, wait out the difficulties there and then come to Russia	9.2	16.0	7.8	23.3
Return home for good	3.6	5.1	5.9	4.7
Don't know	9.9	16.5	5.5	4.7
Total	100.0	100.0	100.0	100.0

Especially important is how the situation is assessed by immigrants from Central Asian countries - the main countries of origin of migrants. But the intentions of migrants from Kyrgyzstan, Tajikistan and Uzbekistan are similar to those of migrants from other countries: to stay in Russia no matter what (Table 6). Most likely, their short-term plans are determined not so much by the current situation in Russia as by the situation at home and the assessment of all the pros and cons of a short-term and expensive departure.

Table 6. Immediate plans to stay in/out of Russia for citizens of Kyrgyzstan, Tajikistan and Uzbekistan, % of respondents

"What are your immediate plans (until September-October 2020)"?	Online survey	CATI
Stay in Russia	70.9	78.8
Return home, wait out the difficulties there and then come to Russia	11.2	9.2
Return home for good	4.7	6.5
No answer, hard to say	13.1	5.4
Total	100.0	100.0

Considering that a significant part of the respondents have not decided on their immediate plans, it can be assumed that, taking into account the emerging economic situation, about 20% of migrants may leave Russia in the coming months (subject to the restoration of transport links and a relatively stable situation with coronavirus in Russia and the countries of origin), two thirds of whom will return to the Russian labor market in this same year.

More than half of those few who are going to leave Russia are ready to leave immediately after the restoration of transport links. But 21.5% of respondents link their readiness to leave with the coronavirus situation in Russia and at home, one in five with having money for a ticket, and one in seven with other circumstances related to family, work, etc.

The majority of those who took part in the survey are integrated into Russian society. They value their work in Russia and are afraid of losing it. A significant part of migrants have a residence permit or a temporary residence permit (24.8% among respondents to the online survey and 30.1% according to the CATI survey) - documents that allow them to feel more free in everyday life in Russia, and especially in the labor market. The overwhelming majority of them have acceptable housing, most often a rented separate apartment, and 11.8% of the respondents or members of his/her family were homeowners, while 6.9% of the respondents had housing owned by their spouse or partner. Almost half of those who live in Russia with a spouse or partner have Russian citizenship. It is not surprising that, when asked about long-term migration plans,

the overwhelming majority intend either to stay in Russia forever or to carry out circular migrations between Russia and the country of origin.

MIGRANTS AT HOME

Over the past two decades, foreign workers have become an integral part of the Russian labor market. According to results of a federal statistical survey of the use of migrant labor, in 2019 foreigners were hired by 168 thousand Russian entrepreneurs and almost 1.4 million Russian households (Rosstat 2020a). In turn, mass labor migration from the former Soviet republics to Russia mitigates the problem of unemployment in these countries. In total, according to our estimates based on the data of the Main Directorate of Internal Affairs of the Ministry of Internal Affairs of the Russian Federation and on the statistics of the International Labor Organization, more than 16% of the labor force of Armenia and Kyrgyzstan went to work in Russia before the coronavirus crisis, while about 13% from Uzbekistan and more than 45% from Tajikistan did so. For millions of households, working in Russia has become an important source of income. For example, in 2019, the volume of migrant remittances accounted for almost 30% of the gross domestic product of Kyrgyzstan and Tajikistan, with 3/4 of all remittances to these countries coming from Russia (The World Bank 2020b).

The introduction of a self-isolation regime in Russia and the suspension of international transport links came as a tremendous shock not only for those who were in Russia, but also for those who were planning to come to it in March-June 2020. It is they, those who returned home from Russia in 2020 as well as those potential migrants who could not enter Russia after the severance of international transport links, who were the second focus of our study. What is their economic situation at home? How soon are they ready to return to Russia if the borders are opened? What are their long-term migration plans? These questions were answered by 1,391 foreign citizens outside Russia at the time of the survey. Among the respondents, 15% were citizens of Moldova, 13.2% of Uzbekistan, 12.4% of Kyrgyzstan, 10.9% of Belarus, 10.5% of Tajikistan, 10.3% of Ukraine, 6.9% of Azerbaijan, 6.1% of Armenia, 4.9% of Kazakhstan, 2.4% of Turkmenistan and 1.4% of other states.

We emphasize once again that the sample turned out to be strongly biased towards Russians and people with higher education. Thus, among the respondents, the share of those who identified themselves as Russians by ethnicity was 34.7%. The second largest ethnic group were Tajiks (9.2%), and the third, Uzbeks (8.9%). Note that according to migration registration data, citizens of Uzbekistan and Tajikistan clearly predominate in the total number of labor migrants (almost 60% in 2019). Almost a quarter of the respondents are bilingual, that is, they named not only Russian as their native language, but another language as well. 28.7% of respondents had a higher education and 31.9% had incomplete higher and secondary vocational education. This roughly corresponds to the level of education of the Russian population aged 15 to 59 years - in 2010, 25.8% of Russians had higher education and 39% had incomplete higher or secondary vocational education. But the level of education of the respondents was higher than that of their compatriots at home. Thus, in Kyrgyzstan, about 15% of the adult population have a higher education, and in Tajikistan, about 10%.

The survey method suggested that the sample would provide a bias in favor of younger ages, but this did not happen. Almost 20% of respondents were aged 50 and over, 30% of respondents were under 30 years old and the other half were in the middle working age range of 30 to 50 years. About 2/3 of the respondents were men, which generally corresponds to the gender structure of the flow of labor migrants to Russia.

Most of the respondents (over 70%) had previously visited Russia. Of the total number of respondents, 20.5% recently arrived from Russia and cannot return due to coronavirus restrictions, 35.8% travel to Russia from time to time, another 28.4% are planning to go to Russia for the first time. The rest are somehow connected with Russia (relatives, business trips, business, tourism, etc.). Among the respondents, of particular interest are those who came for a period of three months or more, that is, to work or study[27]. There were 63% of such labor and educational migrants in the sample. More than 28% of respondents last entered Russia in 2019, about 10% - in 2018, 8% - in 2020, and the remaining 54% - before 2018. But more than half of the respondents (55%) left Russia in 2019 (27.5%) and 2020 (27.5%).

As noted above, the coronavirus epidemic and the isolation regime disrupted the normal course of migration processes with their characteristic seasonal component. In January, entry to Russia is traditionally at a minimum; most labor migrants arrive in the country in March-May and return to their homeland in late autumn and early winter until January-February of the following year. According to the survey, in 2019 the number of those who returned home in March was about the same as in January, February or April, and almost 6 times less than in December. In 2020, the number of respondents who left Russia in March was 2.5 times more than the number of those who left in January.

Job loss and the coronavirus epidemic were the main push factors out of Russia. Among those who returned to their homeland in 2020, constructions workers (more than 30%), workers in hotels and food service (11%) and those in trade and transport (8.2% each) predominated. But returning migrants have faced the same difficulties in their homeland as in Russia: due to the coronavirus measures taken, employment opportunities have noticeably decreased. Among those who returned home in 2020, only 40% had a job in early June, more than 50% did not have a job, and slightly less than 10% were students. Among all the respondents, 51.6% had work, 24.5% were looking for work, about 6% did not work and were not looking for work, 6.7% were students, 6% housewives and 5% pensioners.

Returning home in the context of the coronavirus epidemic and measures to combat it, of restricted international travel by all states, negatively affected the well-being of families of labor migrants in their countries of origin. The average monthly earnings of labor migrants in Russia at the beginning of 2020 was 47 thousand rubles. It was approximately the same in 2019. According

[27]Recall that 3 months or 90 days is a significant interval in Russian migration legislation. According to its provisions, the period of temporary stay in the Russian Federation of a foreign citizen arriving in a manner that does not require a visa cannot exceed ninety days in total during each period of one hundred and eighty days. Upon the expiration of this period, it is required to obtain permits for residence, including for employment (a work license or an application from an employer), or an application from an educational organization in which a foreign citizen is studying. See Federal Law No. 115-FZ of 25.07.2002 (as amended on 24.04.2020) "On the Legal Status of Foreign Citizens in the Russian Federation" (as amended and supplemented, entered into force on 07.07.2020). Article 5. Temporary stay of foreign citizens in the Russian Federation.

to Rosstat data, this generally corresponds to the average earnings in Russia in February 2020 (Rosstat 2020b: 232). If we rely on the results of previous mass polling conducted by the staff of the Institute of Sociology of the Federal Research Center of the Russian Academy of Sciences for the needs of the Higher School of Economics (2011 - 8.5 thousand respondents; 2017 - 8.6 thousand respondents), then we can assume that, on average, they transferred more than 40% of their monthly income to their homeland. The cessation of money receipts from Russia has complicated the already difficult economic situation of the families of labor migrants. Only 20% of respondents said that they were not experiencing want, and another 17.5% hope to hold out without outside financial and material assistance for the next two months. The rest to one degree or another are forced to economize or resort to external support. This applies to both those who have never worked in Russia and those who only recently, in 2019 or 2020, returned from it. Particularly difficult is the situation for those respondents who were not working at the time of the survey. Material difficulties are faced by 75% of families of non-working respondents and half of families of working respondents.

For most of the respondents, the prospects for improving their financial situation are in one way or another connected with work in Russia. Among the respondents who worked or studied in Russia, 54% are planning to come to Russia for a period of three months or more and 11.4% for a period of less than three months, while the rest had not made a decision at the time of the survey. Among the respondents heading to Russia for the first time, the share of those intending to leave for a period of three months or more is 35%, for a period of less than three months - 23%, and the rest were undecided. Of those surveyed who returned from Russia in 2019 and 2020, 57% plan to return to Russia for a period of three months or more.

Almost half of potential migrants are ready to come. About 60% of those who are going to come for 3 months or more, and 55% of those who are going to come for a short period (less than three months), answered that they will come to Russia as soon as transport links are restored or they get enough money for a ticket. The situation with coronavirus is the deciding factor for 22% of respondents intending to stay in Russia for more than three months and for 27% of those planning to stay less than three months. According to the rest of the respondents, the moment of departure for them is determined by other, above all family, circumstances. Note that among the migrants who returned from Russia in 2019 and 2020, almost 75% are ready to return to Russia immediately after the restoration of transport links.

At the time of the survey, respondents were optimistic about getting a job in Russia. In total, 67% of respondents are confident that they will find one quickly. Among those who are going to leave immediately after the restoration of transport links, the figure is 80%. Those coming to Russia for the first time are less optimistic: slightly more than half (54%) of them are sure that work in Russia can be found quickly. But in general, almost 90% of potential migrants are sure that sooner or later they will find a job in Russia.

Thus, in the CIS countries, in the context of anti-coronavirus measures, there is a growing potential for migration to Russia. This is facilitated by the coronavirus crisis in the countries of origin of migrants, accompanied by a contraction of the labor market there and a drop in the income of a significant part of the population. The survey showed that potential migrants among respondents are “not afraid” of the coronavirus situation in Russia: one in four (25%) is dismissive

of the likelihood of contracting coronavirus. Most (40%) of the respondents are afraid of the prospect of being left without means of subsistence. Migration intentions are especially strong among those who have had work or study experience in the Russian Federation, including those who were in Russia in 2019 and 2020, supported by the belief that work can be quickly found in Russia.

CONCLUSION

Unlike previous economic crises, when the number of labor migrants changed in accordance with the economic situation in Russia, during the coronavirus pandemic a fundamentally different situation has developed, in which factors pushing potential migrants from their countries of origin to the Russian labor market have become more significant. Labor migrants staying in Russia show no desire to leave, and those who had intended to wait out the difficulties in their homeland until autumn are now, due to the lack of transport links, feeling less inclined to leave Russia with each passing day. On the contrary, the "excess" number of potential labor migrants in sending countries is constantly growing. Its scale can be judged by the data of the Main Directorate of Internal Affairs of the Ministry of Internal Affairs of the Russian Federation, according to which in Russia in April-June 2020 almost 1.3 million fewer foreign citizens were put on migration registration for the purpose of "work" than in 2019. According to the Russian Border Service of the FSB, over the same three months of this year only 1,900 (!) foreigners crossed the border intending to work, versus 1.2 million in the same period the year before. In July-September, restrictions (with some relaxation) on international transport links with countries that are the main suppliers of labor migrants generally remained. Assuming that the state of the labor market in 2020, in the absence of a pandemic, should not have differed significantly from the previous year, over the period from April to September, due to coronavirus restrictions, more than 2.2 million labor migrants did not enter Russia. Taking into account the persistence of transport restrictions until the end of the year, this estimate will increase and exceed at least 3 million people.

Migration is of paramount importance to sending countries. First, labor migration eases pressure on the labor market in countries with rapidly growing young populations (Kyrgyzstan, Uzbekistan, Tajikistan) or countries with a "shrinking" labor market (Armenia, Moldova, Ukraine). So, in 2019, in Tajikistan 47% of the labor force participated in labor migration, in Kyrgyzstan - at least 17.5%, in Armenia - at least 16%, and in Uzbekistan - 14%. Although there is a partial reorientation of the flows of labor migrants from Ukraine and Moldova to Europe, Russia still remains among the main migration destinations from these countries as well. Secondly, the countries of origin of migrants are suffering significant losses from a decrease in the inflow of remittances from labor migrants. This applies, above all, to those countries in which remittances from Russia make up a significant amount in relation to GDP (Armenia, Kyrgyzstan, Tajikistan). According to our estimates, based on data from the Bank of Russia and statistics from the World Bank, should restrictions on entry to the Russian Federation continue, the volume of migrant remittances in 2020 compared to 2019 may decrease in the CIS countries by 30%, which will severely affect the welfare of these countries' populations and the stability of their financial systems and will reduce the amount of investment in their economies.

In the context of an economic downturn and a reduction in labor demand, a decrease in the supply of foreign labor appears in Russia, as in other countries, natural and expected. However, in regions and industries with a high concentration of migrants, in industries with a strong seasonal component (agriculture, individual construction), the lack of cheap labor can complicate the process of their recovery.

Due to the coronavirus crisis in Russia, there has been a shortage of workers of low and medium qualifications in construction, trade, transport and warehousing, as well as of those with medium and high qualifications in the spheres of domestic service and personal services (types of economic activities in which the share of labor costs is maximum and where migrant labor is especially noticeable).

This was partly observed already at the bottom of the crisis: in transport and warehouses, in households and construction, the wages of the migrants interviewed increased by 10, 4.8 and 2.9%, respectively, in April compared to the peak in February. Rosstat also signals this: the average salary of Russians in transportation and storage increased by 10.3% in February-April, and in construction - by 0.8%. This means that, on the one hand, part of the "migrant" jobs may be occupied by Russians, both local and internal Russian migrants. On the other hand, an increase in the cost of goods and services is inevitable in those types of economic activity where migrants occupy or have occupied significant positions.

The study showed that the potential for labor migration from the CIS countries remains quite high. At the same time, the potential for resettlement and integration in Russia is also quite high and unrealized (Figure 6).

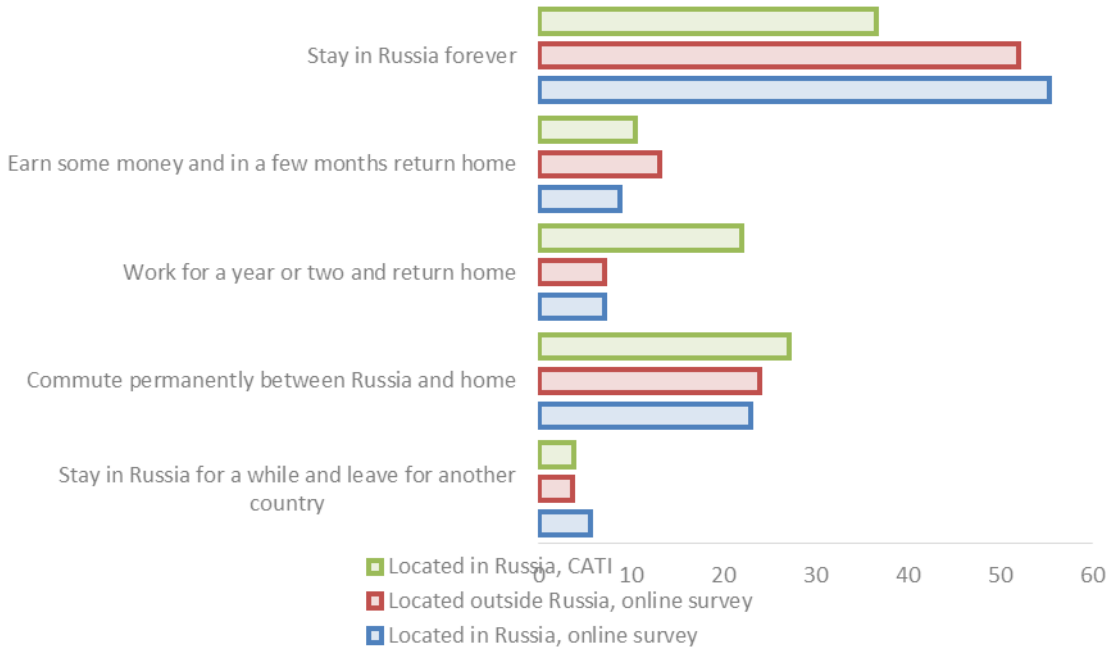

Figure 6. Long-term migration plans of respondents, % of respondents

If you look at the respondents' plans for their future, more than half of them expressed their intention to eventually stay in Russia forever. Such plans are nothing new to less skilled workers in Central Asia (CATI). It is noteworthy that the largest share of such respondents among those

outside Russia is among Russians and Azerbaijanis (slightly more than 66%); the smallest is among Belarusians (22%).

A desire of a significant part of migrants to integrate is recorded in all surveys. The current hard to predict socio-economic and epidemiological situation in Russia and the sending countries could affect the long-term plans of immigrants from the post-Soviet states and lead to an increase in the number of those who will tend to circular migrations, allowing them to more flexibly respond to the standard of living and the labor market situation in countries of origin and countries of destination. At the same time, the post-pandemic Russian economy will need migrants in the same way as in the pre-pandemic past.

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CENTER-PERIPHERAL DIFFERENCES IN LIFE EXPECTANCY IN RUSSIA: A REGIONAL ANALYSIS

ALEKSEY SHCHUR, SERGEY TIMONIN

Elevated mortality (compared with the West) and significant spatial differences in life expectancy are serious challenges facing Russia. The goals of improving Russians' health and increasing their life expectancy by reducing inequality in mortality between regions and settlements are closely intertwined with the goals of spatial development of Russia, aimed at reducing interregional differences in the quality of life.

This paper presents an assessment of the scope and dynamics of changes in mortality differences between the 'center' and the 'periphery' in 67 regions of Russia, which are home to three-quarters of the country's population. The selected research period - 2003-2018 - is characterized by a steady increase in life expectancy at birth (LE) in Russia. Using unpublished data from Rosstat for cities, we estimated life expectancy at birth in 67 regional centers and in the rest of the regions ('periphery'). Depending on the magnitude of the differences in LE and the dynamics, we identified 6 types of regions. For those regions with a LE gap between center and periphery larger than the average, the decomposition method was applied, which made it possible to determine the key age groups and causes of death responsible for such high differences.

In 36 regions of Russia classified as types I-III, the center-peripheral gap exceeded the average Russian level, while only in six regions in 2003-18 was there a tendency towards a reduction in the size of this gap. The decomposition results showed that elevated mortality of males in the periphery is due to a higher mortality rate at working age from external causes of death, especially from traffic accidents, homicides and suicides, as well as from 'alcoholic' causes of death; females in the periphery suffer from higher mortality rate at older ages from chronic non-communicable diseases.

Despite the seemingly 'objective' nature of the mortality differences between the center and the periphery (the advantage of the former being due to the socio-demographic characteristics of its residents and the educational structure of the population, as well as to selective migration), the positive experience of other countries shows that effective public health policies can substantially reduce the degree of spatial inequality in mortality even if significant heterogeneity in the level of socio-economic development remains.

***Key words**: life expectancy, mortality, Russian regions, regional capitals, center and periphery.*

INTRODUCTION

The administrative centers of Russia's regions, concentrating a significant part of the country's human, institutional, financial and political capital, are strikingly different in terms of the level of economic and social development from the surrounding territories (Leksin 2009).

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The period after the collapse of the USSR is characterized by an increase in spatial polarization between the "center", both at the level of the entire country, represented by the Moscow metropolitan region, and at the level of the subjects of the federation, represented by the regional capitals, and a vast "periphery", both external (poorly developed areas of the North, Siberia and the Far East) and "internal", defined in each region according to its position in relation to the "center"[1] (Nefedova, Treyvish 2020). Spatial polarization affects various aspects of life of the population of Russia. One of the most important, in our opinion, is the issue of spatial inequality of Russian mortality. Not without reason has it been noted that it is precisely the differentiation of population groups in terms of mortality that so accurately characterizes the level of socio-economic inequality in a society (Sen 1998).

The study of geographical differences in mortality in Russia has always been the focus of attention of domestic demographers, geographers and social hygienists (Novoselsky 1911; 1916). In the 1970s and 1980s, based on data collected around the time of the census, it was shown that life expectancy decreases as one moves across Russia from south to north and from west to east (Andreev 1979; Shkolnikov 1987). The lowest mortality rates were observed in the North Caucasus, in the Chernozem zone and in certain regions of the Volga region, and the highest in the North of European Russia, Eastern Siberia and the Far East. This pattern has been called the “southwest/northeast mortality gradient”. Moreover, this phenomenon has turned out to be strikingly stable, despite significant fluctuations in mortality in Russia from the mid-1980s to the early 2000s (Vasin, Costello 1997).

The current stage of sustainable growth in life expectancy, the beginning of which is usually attributed to 2003-2005 (Vishnevsky, Shchur 2019), includes all regions of the country, (Timonin et al. 2017; Zakharov 2017) thus posing a logical question: is the period of growth in life expectancy accompanied by a reduction in interregional inequality in mortality? Responding to this question, Timonin et al. found that interregional variance, one of the quantities making it possible to quantify spatial differences in life expectancy, has remained virtually unchanged since 2005. However, the decomposition of changes in this measure of inequality by age shows that, in terms of mortality in childhood and working age, Russian regions are converging, while for older ages, on the contrary, there is a pattern of divergence, primarily due to a more rapid decline in mortality among the elderly population in Moscow and St. Petersburg (Timonin et al. 2017).

The special, privileged position of Moscow and St. Petersburg on the “mortality map” of Russia was first identified in the late 1990s and continued to grow throughout the 2000s (Andreev, Kvasha, Kharkov 2006; Papanova, Shkolnikov Timonin 2019). Probably, an important role in this was played by the increasing political and economic role of Moscow and, to a lesser extent, of St. Petersburg starting in the early 2000s. The consequences of this role include, among other things, a significant migration inflow to these centers and their regions, an overconcentration of human capital in them, and a higher standard of living, including greater spending on health care – all factors directly affecting life expectancy (Marmot 2005). At the same time, due to limited data, the study of geographic inequality in mortality in Russia until very recently concerned only

[1] Here and further in the text, "centers" will mean the administrative centers of the constituent entities of the Russian Federation, and "periphery" - the rest of the territory of the constituent entities.

the highest level of the administrative-territorial division. As a consequence, much of the center-peripheral differences in mortality rates remained hidden from researchers (Timonin et al. 2020).

Having access to data on the distribution of deaths by sex, age and cause of death in regional centers other than just Moscow and St. Petersburg made it possible for us to estimate life expectancy at birth for nearly all capitals of Russia's oblasts, territories and republics, as well as to calculate some other indicators characterizing the epidemiological patterns of mortality in them.

The aim of the study is to assess changing trends in life expectancy of the population of regional centers and the other parts of Russian regions (the periphery) in the context of a nationwide decline in mortality rates observed since 2004. How great is the advantage of regional capitals in life expectancy over "their regions"? How has it changed over the past 15 years? How do regions differ in the magnitude and direction of changes in the center-peripheral inequality in mortality? In what age groups and from what causes of death does mortality make the greatest contribution to the differentiation of life expectancy between regional centers and the rest of the territory of the regions? In this study, we have tried to answer these and some other questions.

DATA AND METHODS

The Federal State Statistics Service of Russia (Rosstat) does not publish estimates of life expectancy for Russian cities other than Moscow, Saint Petersburg and - since 2015 - Sevastopol. However, Rosstat develops tables with the distribution of deaths by sex, age and cause of death for all Russian cities with a resident population of over 100 thousand people, and also estimates the average annual population by sex and one-year age groups. Based on these data, abridged (up to age 85+) life tables were constructed separately for men and women, and estimates of life expectancy at birth (e_0) for 2003-2018 were obtained for 67 Russian regional capitals.

In addition to Moscow, St. Petersburg and the Moscow and Leningrad regions, as well as the Republic of Crimea and Sevastopol, our study excluded regions whose capitals in 2003 were cities with a population of less than 100 thousand people (Chukotka and the Yamalo-Nenets Autonomous Okrug, the Magadan Region, Jewish Autonomous Region and the Altai Republic)[2]. Also excluded were 6 republics of the North Caucasus Federal District for which there are reasonable concerns regarding the quality of demographic data, primarily estimates of the resident population and the completeness of death registration (Andreev 2012; Mkrtchyan 2012). Nevertheless, in the regions covered by the study, in 2018 there lived almost 110 million people, or about ¾ of the total population of the country.

Data on the number and age of deaths, as well as on the average annual population for 67 regions whose centers are the selected cities, were taken from the Russian Fertility and Mortality Database of the Russian School of Economics (RusFMD) (Russian School of Economics 2019). By subtracting one dataset (by city) from another (by region), the corresponding estimates

[2] Exceptions are the Khanty-Mansi Autonomous Okrug (where Surgut was chosen as the "center", and not the formal capital, Khanty-Mansiysk) and NAO (the Nenets Autonomous Okrug), in this study considered together with the Arkhangelsk region.

of the number of deaths were obtained for 67 regions without their centers; for new units - regions without centers (periphery) - we also calculated the values of e_0.

Depending on the 2011-2018 average size of the gap in e_0 between the regional center and the rest of the region, all regions were divided into two types: regions in which the gap between centers was higher than the average for all regions (types I-III), and those in which it was lower (types IV-VI). Next, we analyzed the dynamics of the gap for 2003-2018. In accordance with these, each region was assigned to one of three types: regions where there was a tendency towards an increase in the center's advantage (that is, there was a divergence in e_0 between the center and the rest of the region); regions where the gap remained approximately at the same level (no statistically significant trend was observed) and regions where the gap was decreasing (i.e. convergence took place). Thus, the combination of these two characteristics allowed us to identify 6 types of regions (Appendix table).

For the first three types of regions (with a gap above the average for the entire sample), we applied the decomposition method (Andreev 1982) at one time point (in 2018) to identify which age groups and causes of death determine the center's advantage over the periphery in life expectancy at birth. For the first three types of regions, standardized mortality rates were also calculated according to the 1976 European population standard for the main classes and groups of causes of death separately in regional centers and beyond.

ON THE TEMPORAL COMPARABILITY OF ESTIMATES OF THE POPULATION SIZE WITHIN REGIONS

There are two main sources of information on the size and age-sex structure of the population in Russia: population censuses, which are the main source of data, and vital statistics (registration of demographic events such as births, deaths, change of permanent residence, i.e. migration, etc.) to estimate the size and composition of the population in the intercensal period. Overestimation of the population in some territories and underestimation in others in the intercensal period occurs mainly due to the migration component. Overestimation or underestimation of the official population size, including at certain ages, entails a distortion in the value of life expectancy due to the unreliability of the denominator used to calculate the age-specific mortality rates.

The share of the population living in the centers of the regions in the entire population increased throughout the study period (Figure A1 of the Appendix). The sharp jump in the share of the population between 2010 and 2011, associated with the traditional adjustment of the population size carried out according to the results of the 2010 All-Russian Population Census, stands out strongly. This means that the actual population size in most regional centers turned out to be higher than estimated (mainly due to underreporting of migration), while in other settlements, on the contrary, it was lower than estimated (Rosstat 2012). Since the previous population census in Russia took place in 2002, on the eve of the period under consideration, with each subsequent year the accumulated error in estimating the population size only increased, reaching a maximum in 2010.

By retrospective extrapolation of the linear trend of growth in the share of centers in 2011-2018, we obtained estimates of the population size in the centers and in the rest of the regions

for 2003-2010, adjusted for the results of the 2010 census[3]. It will be shown below what effect the undercounting of the population in the centers and, accordingly, overcounting in the rest of the regions had on the magnitude and dynamics of the gap in e_0 between them.

TYPOLOGY OF RUSSIAN REGIONS DEPENDING ON THE SCOPE AND DYNAMICS OF THE CENTER-PERIPHERAL GAP IN LIFE EXPECTANCY

In 2003-2018 life expectancy at birth in regional centers exceeded the corresponding indicator in other settlements by 1.8-2.8 years, depending on the calendar year (Figure 1). The fastest growing gap in e_0 between the center and the periphery was recorded in 2004-2005, when it increased by 0.7 years. It was during this period, as Timonin et al. (2017) showed, that the level of interregional inequality in mortality in Russia was at its highest since the 1970s. It can be assumed that the regional centers were at the forefront of the decline in the mortality rate in Russia in the 2000s, since the transition to a steady growth of e_0 in them began in 2003, whereas in the rest of the settlements this did not happen earlier than 2006.

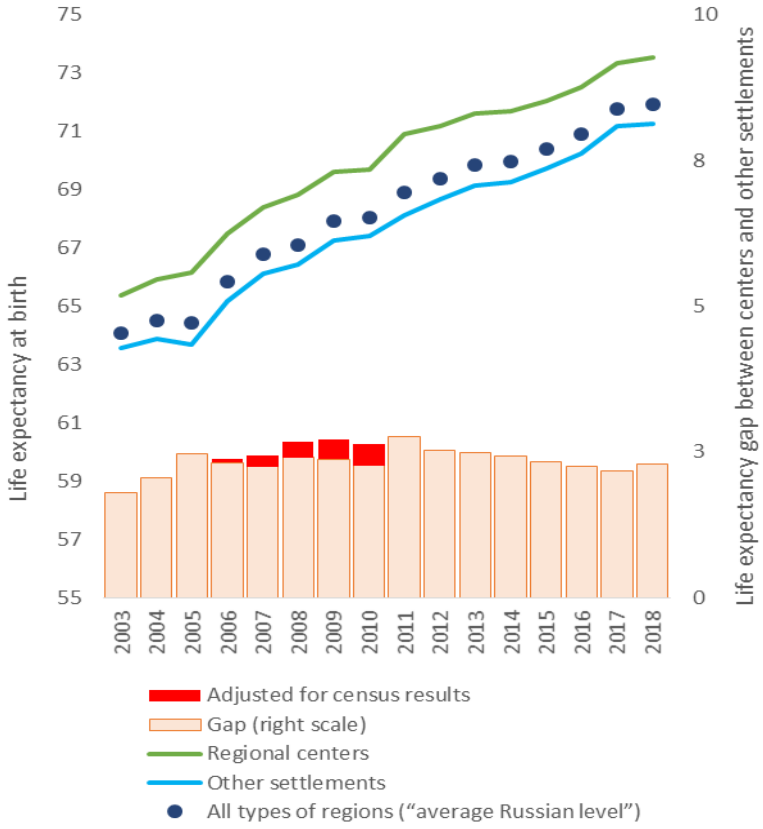

Figure 1. Life expectancy (e_0) at birth in regional centers and other settlements of regions (left scale) and the corresponding gap in e_0 between them (right scale), in years, 2003-2018

[3] Officially, Rosstat makes a retrospective recalculation of the population size only at the level of regions of the Russian Federation.

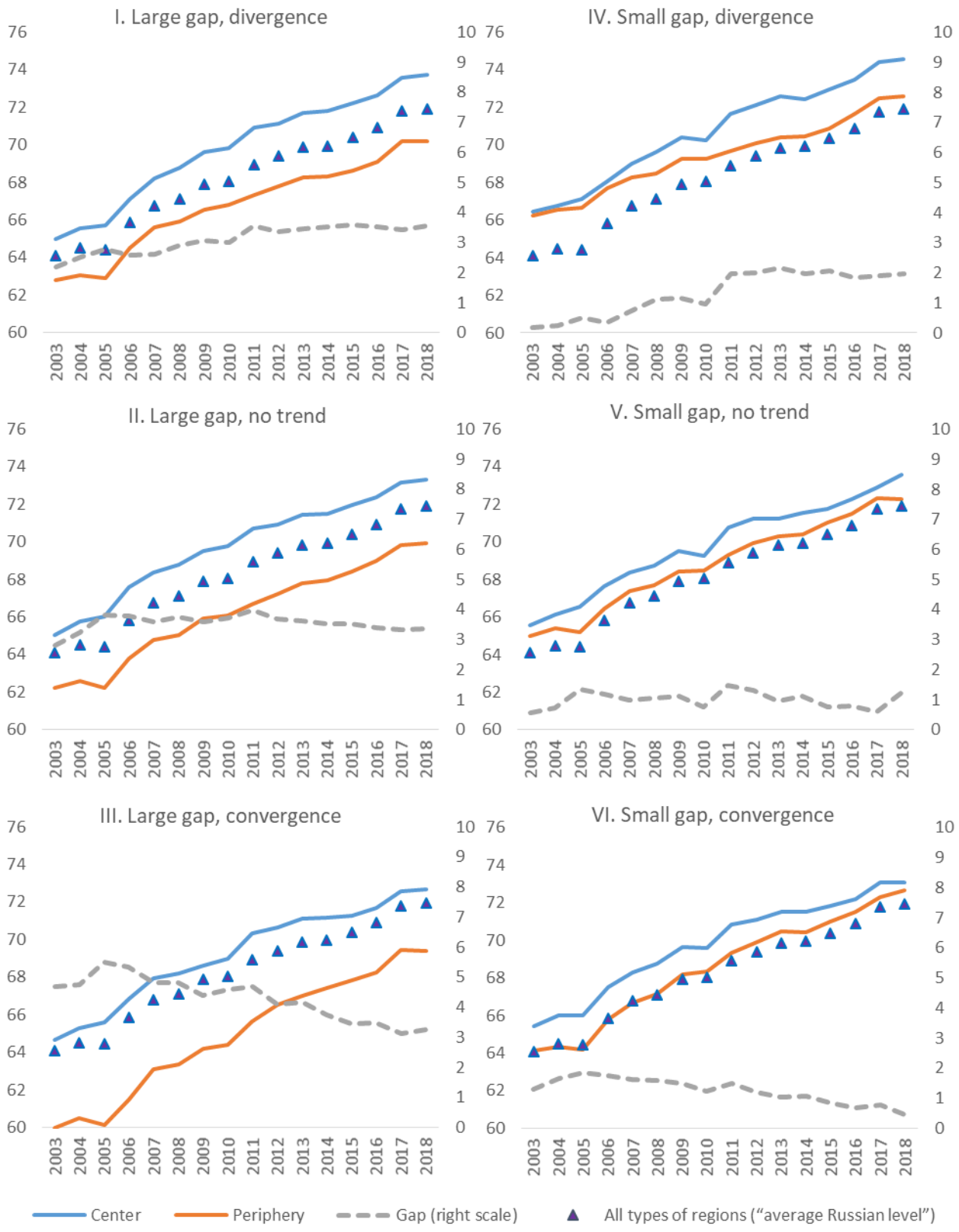

Figure 2. Life expectancy at birth in the centers and at the periphery and the magnitude of the gap between them (right scale) by types of regions, in years, 2003-2018

In 2007-2010 the gap remained at about the same level according to data unadjusted for the census, but according to adjusted data continued to widen until 2011, with the difference

reaching 0.4 years for 2010. After 2011, life expectancy outside the regional centers began to grow rapidly, resulting in a trend towards convergence (the gap in e_0 narrowed from 2.8 years in 2011 to 2.2 in 2017) which, however, was interrupted in 2018. Thus, the period under consideration can be divided into two stages: the first is an increase in the advantage of the centers in life expectancy in 2003-2011, followed by the second stage, a decrease in the differences in e_0 between them and the rest of the settlements.

However, analysis for individual regions showed a significant degree of heterogeneity in the level and dynamics of changes in the gap in life expectancy between the centers and the periphery. Based on these two parameters (the size of the gap and its dynamics), we have identified 6 types of regions (the composition of each selected type is presented in the Appendix table). In 22 regions, the center's lead over the rest of the region in 2003-2018 increased significantly, albeit from different initial levels, while in 17 regions, on the contrary, the gap narrowed, and in the remaining 28 regions there was no clear trend.

Figure 2 for each type of region (I-VI) shows the values of e_0 in the centers and at the periphery and the gap between them, and all the graphs show the life expectancy curve for Russia as a whole ("all types of regions")[4].

As can be seen from Figure 2, the growth in life expectancy in 2003-2018 took place in all types of regions, both in their centers and on the periphery. In types I and IV of the regions (large and small gap; divergence), the growth rates of e_0 in the centers outstripped those in the periphery. Type I, with a significant and growing center-peripheral gap, includes the Baikal macroregion (Irkutsk Oblast, the Republic of Buryatia and the Trans-Baikal Territory), as well as the Republics of Tuva and Yakutia, which form a single megacluster in the east of the country; the Sakhalin Region in the Far East, as well as regions along the Trans-Siberian Railway - Sverdlovsk, Tyumen (without districts), Omsk and Novosibirsk regions. In the west of the country, this type is represented by the Arkhangelsk, Kursk and Rostov regions, and the Republics of Komi and Mari El (Figure 3). Life expectancy in this type of region is lower than the national average, primarily due to the high mortality rate in the periphery[5].

In type IV regions, on the contrary, are observed the highest values of life expectancy (Figure 4). Belgorod, Voronezh, Volgograd, Astrakhan and Murmansk regions and the Republics of Tatarstan and Bashkiria belong to this type. All these regions, except for Murmansk region, are characterized by a low mortality rate in the centers with a relatively favorable, in general, state of affairs in the periphery. Nevertheless, they clearly show a tendency for the periphery to lag behind the centers in terms of life expectancy.

Regions of type II, with a significant center-peripheral gap but without a statistically significant trend towards divergence or convergence, geographically "complement" regions of type I, being concentrated in the Far East (Primorsky, Khabarovsk Territories, Amur Region),

[4] Hereinafter, we are talking about Russia as a part of the 67 studied regions (excluding the capital regions and the republics of the North Caucasus).

[5] The exception is the Rostov region, where a large center-peripheral gap is a consequence primarily of the low mortality rate in Rostov-on-Don (one of the lowest among regional capitals), together with a state of affairs on the periphery which, while on the whole mediocre, is far from the worst.

in Siberia (Krasnoyarsk Territory, Republic of Khakassia, Kemerovo and Tomsk regions), in the Ural (Republic of Udmurtia, Kurgan, Orenburg and Chelyabinsk regions) and Volgo-Vyatka (Chuvashia, Kirov region in its eastern part) economic regions, in the north of European Russia (the Republic of Karelia) and in the center of the country, Vladimir region. Like the first, the second type too is characterized by a high mortality rate in the periphery, and the e_0 curves for the two types on the graph (Figure 4) are almost identical and lie below the average Russian level. The main difference between the two types is the slower growth rates of e_0 in the centers of type II regions compared to type I, which predetermined the difference between them in the trajectory of the center-peripheral discontinuity.

Figure 3. Types of regions depending on the size of the gap in life expectancy between the regional capital and the rest of the settlements and the dynamics of the gap, on average, 2003-2018

The smallest type, both in composition (6 regions) and in terms of population (6.4 million people), is the third. It is formed by a compact cluster in the north-west of the European part of the country (Pskov, Novgorod, Tver, Smolensk Regions), with the Perm and Kamchatka Territories also included in it. This type is characterized by the lowest e_0 values both in the center and at the periphery. Nevertheless, having shown a significant reduction in the center-peripheral gap in life expectancy, type III also showed the highest rate of decline in mortality in 2003-2018 among all types of regions (Figure 4). So, while in 2003 its lag behind type I regions and Russia as a whole was 1.3 and 2.4 years, in 2018 it decreased to 0.2 and 1.3 years, respectively.

The fifth (small gap; no trend) and sixth (small gap; convergence) types are represented for the most part by regions belonging to Central Russia – the Chernozem, Central, North Caucasian and Volga economic regions, the west of the Volga-Vyatka region (Nizhny Novgorod region, Mordovia). From the Asian part of the country, only two regions belong to it: the Altai Territory

and the Khanty-Mansi Autonomous Okrug. Starting from 2010, the e_0 curves for these two types merge and lie above the average Russian values, while the growth rates of e_0 in type VI, which is characterized by convergence, in 2003-2018 were higher than in type V, and were inferior only to type III, in which center-peripheral convergence was also observed during the indicated period, but with a higher initial level of center-peripheral inequality.

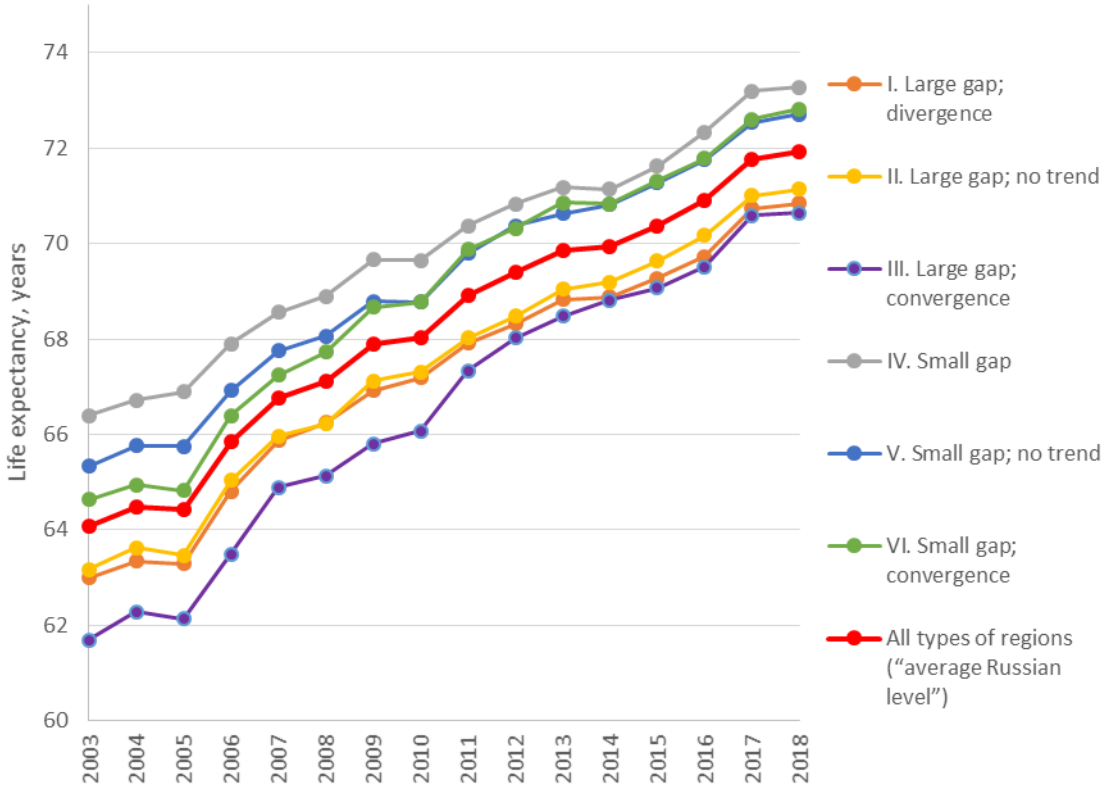

Figure 4. Life expectancy at birth depending on the type of regions, in years, 2003-2018

Inequality in the mortality rate between the types of regions, expressed in terms of the value of the standard deviation, decreased in 2006-2014, but in recent years the convergence has practically stopped. The distance between the top three curves on the graph (Figure 4), uniting the regions with a low gap in e_0, and the three bottom curves, reflecting the regions where, on the contrary, it is high, since 2015 has been about 2 years. This, in turn, is equivalent to the total increase in e_0 in Russia over 5 calendar years[6]. At the same time, the range of inequality in e_0 at the periphery between all six types of regions is significantly higher than between their centers: in 2018, 3.2 and 1.9 years, respectively. Such a situation is to be expected, given that the capitals of the regions are a more homogeneous group of entities, including only cities with a population of over 100 thousand people, while the "periphery", at least in terms of the settlement structure, is highly differentiated depending on the specific region. Thus, interregional inequality in mortality in Russia, including its "southwestern/northeastern gradient", is determined, for the most part, by inequality in mortality on the "periphery" of Russian regions, and not in their centers.

[6] The average annual growth rate of e_0 in Russia at the current stage of mortality reduction fluctuates at the level of 0.4-0.5 years (depending on the year of the beginning of the stage).

So, the value of the gap in e_0 between the center and the rest of the region is determined almost entirely by the mortality rate at the periphery, while the direction of change in the gap depends on the dynamics of e_0 both in the center and at the periphery. In regions where the gap in e_0 is decreasing, this is primarily due to the catching up rate of decrease in the mortality rate outside the center. In contrast, the regions characterized by divergence in the mortality rate between the center and the periphery are distinguished by higher values and growth rates of e_0 in the capitals. In addition, in the IV-VI types of regions, where the center-peripheral gap is lower than the national average, the e_0 values are higher and, conversely, in the I-III types, the e_0 values are lower than the national average and the gap is higher. At the same time, the fastest growth in life expectancy in 2003-2018 at the level of the entire region (without dividing into center and periphery) was shown by types III and VI, where there was a convergence in mortality rates between the center and the periphery.

REGIONS OF RUSSIA WITH A HIGH LEVEL OF CENTER-PERIPHERAL DIFFERENCES IN LIFE EXPECTANCY: THE ROLE OF AGE AND CAUSES OF DEATH

Reducing the life expectancy lag of regions' periphery from their centers would benefit the harmonious spatial development of the country and should be one of the main priorities of the public health system: all residents of Russia, regardless of their place of residence, are guaranteed the "right to health".

The problem of center-peripheral inequality in the mortality rate in Russia is especially acute in the first three types of regions (Appendix table). In 2003-2018, of the 36 regions of the Russian Federation where the gap in e_0 between the center and the rest of the region exceeded the average Russian level, only 6 showed a tendency to its reduction. In 2018, life expectancy at birth for men in the centers of these regions was 3.3 years higher than in other localities, for women - 2.7 years higher (Figure 5). Decomposing the center-periphery gap in mortality by age group and cause of death will help to identify the key "problem points" responsible for the periphery's lag in life expectancy.

As shown in Figure 5, the lag of men in e_0 in the periphery is a consequence of their higher mortality from external causes at younger (15-39 years old) and middle (40-54 years old) working ages, as well as, to a lesser extent, of the higher mortality rate from diseases of the circulatory system, primarily from ischemic heart disease and CVD, in middle (40-64 years old) and elderly (65 years and older) ages.

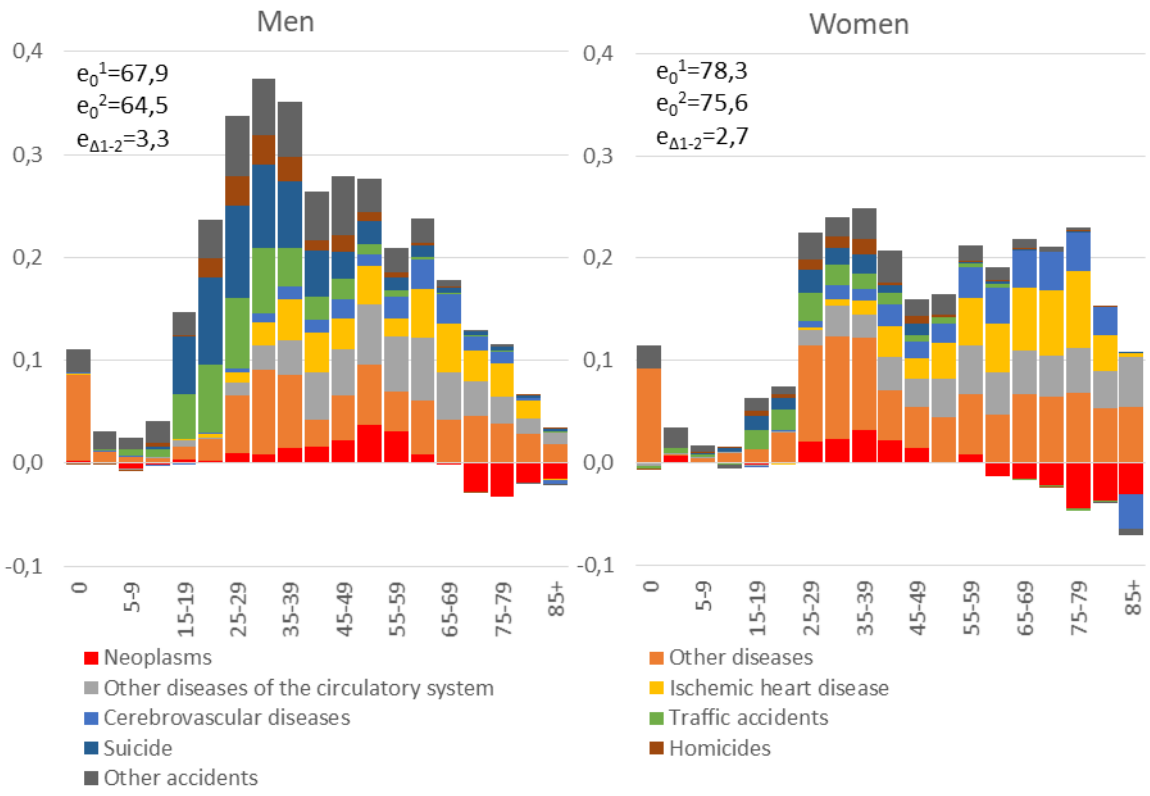

Figure 5. Contribution of age groups and causes of death to differences in life expectancy at birth between regional centers (1) and the periphery (2) for men and women, 2018

The lower mortality rate from diseases of the circulatory system in middle and old ages in regional centers explains about half of their advantage over other settlements in the life expectancy of women. Like the male population, the female population outside the regional capitals is characterized by a more pronounced "excess mortality bump" from external causes of death and other diseases (infections, diseases of the respiratory and digestive systems) at a relatively young age (25-44 years). “Rejuvenation” of mortality from such causes of death as tuberculosis, HIV infection, pneumonia, cirrhosis (including alcoholic) and cardiomyopathy (including alcoholic etiology) may, according to Ivanova et al., speak of “a marginalization of society, a decline in the “quality” of the population, an expanding class of persons who are poorly socially adapted and maladapted” (Ivanova, Mikhailov, Semenova 2009: 41).

It is noteworthy that the registered mortality from neoplasms in the centers of the regions is lower than in the rest of their territory at young and middle ages, but higher in old age, and the older the age group, the higher the mortality gap not in favor of the centers. In our opinion, which coincides with the position of our colleagues (Danilova 2015; Papanova, Shkolnikov, Timonin 2019), this fact not only does not mean a more favorable situation regarding the level of oncological mortality in the periphery, but, on the contrary, may indicate a lack of both pre- and post-mortem cancer diagnosis in older persons far from major cities.

The table shows the ratio of standardized mortality rates (SMRs) in the center and in the periphery from individual classes and causes of death for 36 regions distinguished by a significant center-peripheral gap in e_0. Women living in regional centers, as the population with the lowest mortality rate, were selected as the “reference group”.

Table. Ratios of standardized mortality rates, 2018

Cause of death	Women of the periphery to women of the center	Men of the center to women of the center	Men of the periphery to women of the center	Men of the periphery to men of the center
Some infectious and parasitic diseases	1.24	2.61	2.73	1.05
Malignant neoplasms (MN)	0.93	2.01	1.93	0.96
MN of the digestive system	0.91	2.14	1.92	0.89
MN of the respiratory system	1.01	6.81	7.82	1.15
MN of the genital and urinary organs	1.06	1.74	1.52	0.88
Other MN	0.86	1.06	0.95	0.89
Diseases of the nervous system	1.18	1.40	1.72	1.23
Diseases of the circulatory system (CVD)	1.10	1.94	2.16	1.11
Ischemic heart disease	1.04	2.10	2.20	1.05
Cerebrovascular diseases	1.02	1.60	1.67	1.04
Other CVD	1.54	2.18	3.24	1.48
Diseases of the respiratory system	1.21	3.74	4.75	1.27
Diseases of the digestive system	1.23	1.87	2.19	1.17
Senility	4.24	0.91	4.35	4.81
Unknown causes	1.05	3.74	3.63	0.97
External causes	1.52	4.17	6.19	1.49
Traffic accidents	1.92	2.94	6.14	2.09
Suicide	2.09	5.59	12.42	2.22
Homicide	1.91	3.60	6.63	1.84
Harm with undetermined intent	1.06	4.17	4.44	1.06
Other accidents	1.69	4.32	6.52	1.51
Other diseases	1.26	1.26	1.35	1.07
All causes of death	1.19	2.07	2.41	1.17

The largest gaps in SMR were from external causes of death: the mortality rate from them in the periphery in 2018 was 1.5 times higher than in the centers for both men and women. The mortality rate from traffic accidents in men was 2.1 times higher outside the regional centers, from homicides - 84% higher, and from suicides - 2.2 times higher than in the capitals of the regions, while mortality from suicides of men in the periphery was almost 12.5 times higher than the corresponding indicator for women in the centers.

There are also "other diseases of the circulatory system (CVD)", the SMR from which is higher outside the regional centers than in the centers, by 48 and 54% for men and women, respectively. Differences in mortality from other CVD are primarily due to differences in mortality from cardiomyopathy of explicit and implicit alcoholic etiology (Ivanova, Semenova, Dubrovina 2004). In addition, outside the regional capitals, the mortality rate from "senility" is 4-5 times higher than in the centers, which is usually attributed to the so-called "garbage causes of death", when the real cause of death has not been established (Ivanova et al. 2013). The abuse of "senility" as a cause of death also indirectly testifies to the low quality of pre- and post-mortem diagnosing of diseases in the elderly population (over 80 years old).

WHAT MIGHT DETERMINE THE SPATIAL DIFFERENCES IN MORTALITY RATES?

The current stage of sustainable growth in life expectancy in Russia has embraced not only the centers of the regions, but also their periphery. However, the rate of decrease in the mortality rate in the centers and other settlements, as well as the size of the gap in e_0 between them at the time of the start of the study, differ significantly across the regions. As a result, while in some regions the growth in life expectancy was accompanied by convergence in the mortality rate between the center and the rest, in others the advantage of the centers only increased.

Differences in mortality rates depend both on conditions at the macro level, or the "context" of the territory (in other words, the "environmental effect"), and on differences at the micro level, in the socio-demographic characteristics of specific inhabitants (Cummins et al. 2007). If the "environmental effect" affects the entire population of a territory, then individual characteristics may not be directly related to the place of residence, but the unevenness in their distribution between inhabitants of different territories will certainly affect the aggregate mortality rates in them.

The most important socio-demographic characteristics that affect human life expectancy include education level, income level, professional status, marital status, ethnicity, religion, etc. (Marmot, Shipley, Rose 1984; Valkonen 1992; Mackenbach et al. 2003 ; Von Gaudecker, Scholz 2007). All of them to one degree or another determine the lifestyle and behavior of an individual in relation to his health and exposure to risk factors: smoking, alcohol and drug abuse, unhealthy diet, low physical activity, hypertension, etc.

The environmental effects include spatial differences in socio-economic, political and environmental conditions, in access to infrastructure (primarily to the health care system, including emergency medical care), and in the quality of housing (Diez-Roux 2002). However, the contextual effect is usually reflected in many individual characteristics. Thus, the level of household income is higher where there are highly paid jobs; the educational and professional composition of the population and the direction of migration flows also depend on the level of development of the local economy.

Thus, a higher level of socio-economic development or other factors attractive for migration and residence (climate, a well-developed infrastructure, including leisure and education) form a healthier population with a higher life expectancy. Conversely, in regions with unfavorable social and economic conditions, a culture of anomie can emerge, contributing to the spread of unhealthy lifestyles and high mortality rates (Shaw, Dorling, Mitchell 2002).

IN RUSSIA, THE MIGRATION FLOW IS DIRECTED FROM THE PERIPHERY OF THE REGIONS TO THEIR CENTERS

Despite the depopulation that affected most of the country from 2000 to 2010, many regional capitals not only preserved, but even increased their population. As a result, in 2003-2018 the proportion of the population living in regional centers in the total population steadily increased (Figure A1 of the Appendix). This is partly due to the more favorable ratio of deaths and births in

the centers due to the younger age structure in them, but the main source of growth in such cities is the influx of migrants, both foreign and domestic. Moreover, the main suppliers of internal migrants to regional centers are, as a rule, other settlements of the same region (Karachurina, Mkrtchyan 2016).

Migration flows directed from the periphery of the regions to their centers not only contribute to the concentration of the population in a limited number of cities and the "desertification" of the periphery, but also lead to the "deterioration" of the structure of the population in terms of health in territories losing population. According to the "healthy migrant" theory, migration is associated with positive selection for health, that is, the mortality rate among migrants is lower than among the receiving population, as well as among the sending population (Razum, Zeeb, Rohrmann 2000).

Therefore, it can be assumed that the dynamics of the center's share in the region's population will be directly related to the direction and rate of change in the center-peripheral gap in e_0. Thus, the highest increase (over 7 percentage points) in the share of the center in the population of the entire region between 2003 and 2018 was noted in Tyumen, Kirov and Sakhalin regions, in Yakutia, Karelia, Buryatia and the Krasnoyarsk Territory – regions which are characterized by a significant center-peripheral gap in e_0. In general, the size of the increase in the share of centers in the population of the regions between 2003 and 2018 explains about 40% of the variance in the size of the gap in e_0 between the centers and other settlements in 2018 (Figure A2 of the Appendix).

Since most universities are located in regional centers, educational migration (relocation of school and college graduates in order to obtain higher education) is an important component of the center-peripheral migration flows in Russia. At the same time, educational migration makes a significant contribution to increasing the quality of human capital (the share of people with higher education in the population) in the centers at the expense of the periphery.

THE SHARE OF THE POPULATION WITH HIGHER EDUCATION IN THE CAPITALS OF RUSSIAN REGIONS IS TWICE AS HIGH AS OUTSIDE OF THEM

In the USSR, and then in Russia, the life expectancy of men and women with higher education significantly exceeded the corresponding indicators for less educated groups of the population (Pyankova, Fattakhov 2017). Moreover, the differentiation of e_{30}[7] by level of education grew constantly from estimates for 1979 to estimates for 2015, mainly due to an increase in the gap in life expectancy of the population with higher education (Kharkova, Nikitina, Andreev 2017).

People with higher education are more likely to practice self-preserving behavior (as opposed to risky ones) and also have better skills of social adaptation, especially during crises (Shchur 2019). The burden of death from injuries and so-called alcohol-related causes of death is much less pronounced among Russians with higher education (Shkolnikov et al. 2006). Our analysis of the differences in the mortality rate between regional centers and other settlements

7 Life expectancy at the age of 30 (as a rule, a person's level of education rarely changes after age 30).

showed that in the latter it is higher in young and middle working ages from external causes of death and some diseases, which indicate a low social adaptation of the deceased.

The 2010 census showed that in all surveyed regions, the share of the population with a tertiary level of education was higher in the regional center (Rosstat 2012). Thus, the share of the population with higher education in the centers, on average for 67 regions, is 31.6%, while outside the centers it is 16.5% - a nearly twofold advantage of regional capitals. Taking into account the observed differentiation of longevity by educational groups in Russia, it is fair to assume that the gap in e_0 between the centers and the periphery is largely due to differences in the educational structure of their population.

LIMITATION OF THE WORK

Although some observations made by us regarding the reasons for the presence of a center-peripheral gap in life expectancy within the regions of Russia may be applicable to the analysis of interregional differences in the magnitude and direction of changes in the center-peripheral gap, our work does not contain a detailed analysis of socio-economic and/or physical and geographical determinants of interregional diversity and the spatial picture of the different types of regions we have identified.

CONCLUSION

During the study period (2003-2018), in the overwhelming majority of regions of Russia life expectancy at birth in regional centers was higher than in other settlements. At the same time, in 2003-2011 there was a trend towards an increase in the advantage of centers which was replaced in 2012 by a trend towards convergence in the mortality rate. However, it will be possible to say for sure that life expectancy indicators in the centers and on the periphery of Russian regions are converging only after the next population census. Although in 2011 the principle of registering migration in Russia was changed, leading to a significant increase in the number of registered migrants coming to the attention of domestic statistics, we cannot completely exclude the possibility that the 2021 census, like the 2010 census, will show an overestimation of the current population in the "periphery" and an underestimation in the "centers". In this case, the actual gap in e_0 between the regional centers and other settlements will be higher than the calculated one.

The magnitude of the gap in e_0 between the center and the rest of the region largely depends on the mortality rate at the periphery, while the direction of change in the gap depends on the dynamics of e_0 both in the center and at the periphery. In regions where the gap in e_0 is decreasing, this is primarily due to the catching up rate of the decrease in mortality outside the center. In contrast, the regions which are characterized by divergence in the mortality rate between the center and the periphery are distinguished by higher values and growth rates of e_0 in the capitals. In addition, in the IV-VI types of regions, where the center-peripheral gap is lower than the national average, the e_0 values are higher and, conversely, in the I-III types they are lower than the national average and the gap is higher. At the same time, the fastest growth in life expectancy in 2003-2018 at the level of the entire region (without dividing into the center and the periphery) was

in type III and VI regions, where there was a convergence in mortality rates between the center and the periphery.

The gap in e_0 for men, as well as the change in this indicator over time, is mainly determined by the difference in mortality rates at young and middle (25-54 years) ages. Differentiation in mortality rates of women in this age group between the centers and the periphery is also important, but somewhat less than for men. Among the causes of death that determine the lag of the periphery from the centers in this age group are, above all, external causes of death, but also include diseases such as cardiomyopathy, tuberculosis, cirrhosis and some others indicating a rather marginal lifestyle of the deceased and their dropping out of society. It seems that, due to the more favorable educational structure, as well as the selective effect of migration, the share of the "marginal" population in the regional centers is lower than in the periphery. Thus, the differences in the mortality rate at young and middle ages between the centers and other settlements can be explained by the differences in the socio-demographic characteristics of their inhabitants. At the same time, the lower mortality rate of older people from chronic diseases in the centers is a consequence of the more developed healthcare system in them.

If geographical differences in mortality rates are primarily due to socio-economic differentiation of space, can full convergence be achieved only through measures affecting the development of the healthcare system and/or other public health initiatives? In other words, is it possible to eradicate the center-peripheral gap in e_0 in Russia while maintaining spatial inequality in the level of socio-economic development? Taking Germany as an example, we see how effective public health policies aimed at smoothing spatial differences in mortality rates have minimized the gap in mortality rates between the "old" and "new" federal states, even if a tangible heterogeneity of socio-economic conditions persists (van Raalte et al. 2020).

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APPENDIX

Table. Types of regions (I – VI) depending on the size of the gap in e_0 and the dynamics of its change in 2003-2018

No.	Type	Population, millions, 2018	Gap in e_0, 2018 (in years)	Number of regions	Composition (regions)	Coefficient of regression*	P-value
I.	Large gap, **divergence**	24.79	3.6	15	Arkhangelsk, Buryatia, Zabaikalsky, Irkutsk, Komi, Kursk, Mari El, Novosibirsk, Omsk, Rostov, Sakhalin, Sverdlovsk, Tuva, Tyumen, Yakutia	**0.09 (0.07;0.11)**	**0.00**
II.	Large gap, *no clear trend*	23.50	3.4	5	Amur, Vladimir, Karelia, Kemerovo, Kirov, Krasnoyarsk, Kurgan, Orenburg, Primorsky, Tomsk, Udmurtia, Khabarovsk, Khakassia, Chelyabinsk, Chuvashia	0.00 (-0.03;0.04)	0.81
III.	Large gap, **convergence**	6.39	3.2	6	Kamchatsky, Novgorod, Perm, Pskov, Smolensk, Tverskaya	**-0.14 (-0.18;-0.10)**	**0.00**
IV.	Small gap, **divergence**	16.11	2.0	7	Astrakhan, Bashkiria, Belgorod, Volgograd, Voronezh, Murmansk, Tatarstan	**0.14 (0.10;0.18)**	**0.00**
V.	Small gap, *no clear trend*	19.65	1.3	13	Adygea, Altai, Vologda, Kalmykia, Kostroma, Lipetsk, Mordovia, Samara, Saratov, Stavropol, Tula, Ulyanovsk, Khanty-Mansi Autonomous Okrug	0.00 (-0.03;0.03)	0.96
VI.	Small gap, **convergence**	18.54	0.4	11	Bryansk, Ivanovo, Kaliningrad, Kaluga, Krasnodar, Nizhny Novgorod, Oryol, Penza, Ryazan, Tambov, Yaroslavl	**-0.08 (-0.19;-0.05)**	0.00
	All regions	109.00	2.3	67		0.01 (-0.01;0.03)	0.25

** - The 95% confidence interval is indicated in parentheses; statistically significant coefficients are highlighted in bold.*

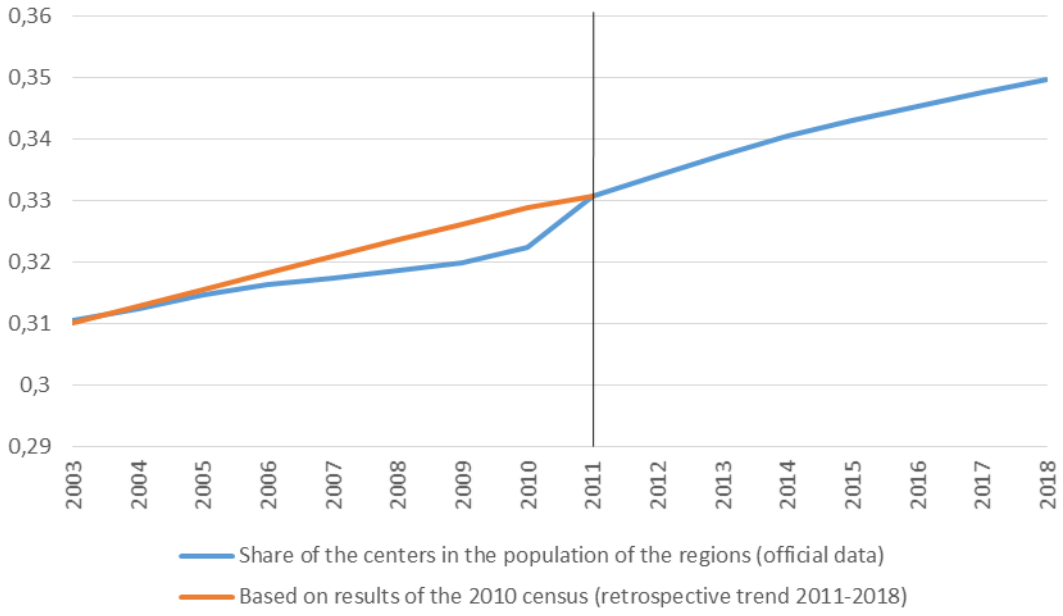

Figure A1. The share of the population in the Russian regions living in the regional center, %, 2003-2018

Figure A2. Impact of the increase in the share of the center in the population of the region between 2003 and 2018 on the size of the gap in e0 between the center and other settlements in 2018

PEDESTRIAN MORTALITY IN RUSSIA: A CONTINUOUS DECLINE OVER THE LAST 25 YEARS?

ANASTASIYA PYANKOVA, TIMUR FATTAKHOV

Using different data sources (HCoD, IRTAD, UNECE statistical database, police data), our research shows that the significant excess of pedestrian mortality over motor vehicle occupant mortality in 1988-1999 in Russia, according to RusFMD, is an abnormal phenomenon that most likely never occurred. Police data is preferable for assessing mortality levels by road user types in Russia. According to Russian police data, pedestrian mortality never exceeded motor vehicle occupant mortality. The steady decline of pedestrian mortality began in 2003, not in 1993, as vital statistics show. In 2008, pedestrian mortality for the first time reached the minimum level of the Soviet period. After significant fluctuations, motor vehicle occupant mortality dropped to the level of the early 1970s only in 2015-2017. The use of vital statistics is possible if it is necessary to differentiate road traffic mortality by sex, age, and type of settlements. Categorisation by road user types should be done with caution, using the following data sources: HCoD data from 1988 and RusFMD data from 1970 to 1988 and after 1999. It is suggested that difficulties in analysing long-term mortality by road user types based on vital statistics may occur in post-Soviet countries, where the Soviet abridged classification of causes of death (SC) was used. The prevalence of deaths coded by unspecified V-codes (V89) should also be considered.

***Key words**: pedestrians, car occupants, road users, road traffic mortality, vital statistics, police data.*

INTRODUCTION

It is necessary to understand the differentiation of road traffic mortality by socio-demographic and other characteristics, including road user types, for developing effective road safety measures. There is a well-known differentiation of the share of pedestrian fatalities of total road traffic fatalities by the economic well-being of countries (World Health Organization 2018; Yasin, Grivna, Abu-Zidan 2020): the lower the GDP per capita, the higher the proportion of pedestrians among all fatalities in road traffic accidents and the higher the pedestrian mortality (Eid, Abu-Zidan 2015; Sengoelge, Laflamme, El-Khatib 2018).

Using the Russian fertility and mortality database (hereinafter RusFMD) for 1965-1998 and depersonalised data of Rosstat for 2000-2017 appears to show that significant progress was made in reducing pedestrian mortality after a sharp rise in the late 1980s and a corresponding peak in the early 1990s (Figure 1). Starting in 1993, pedestrian mortality decreased by 5 times, coming to 3.2 deaths per 100 thousand people in 2017. The mortality of drivers and passengers did not experience such sharp ups and downs until the end of the 1990s.

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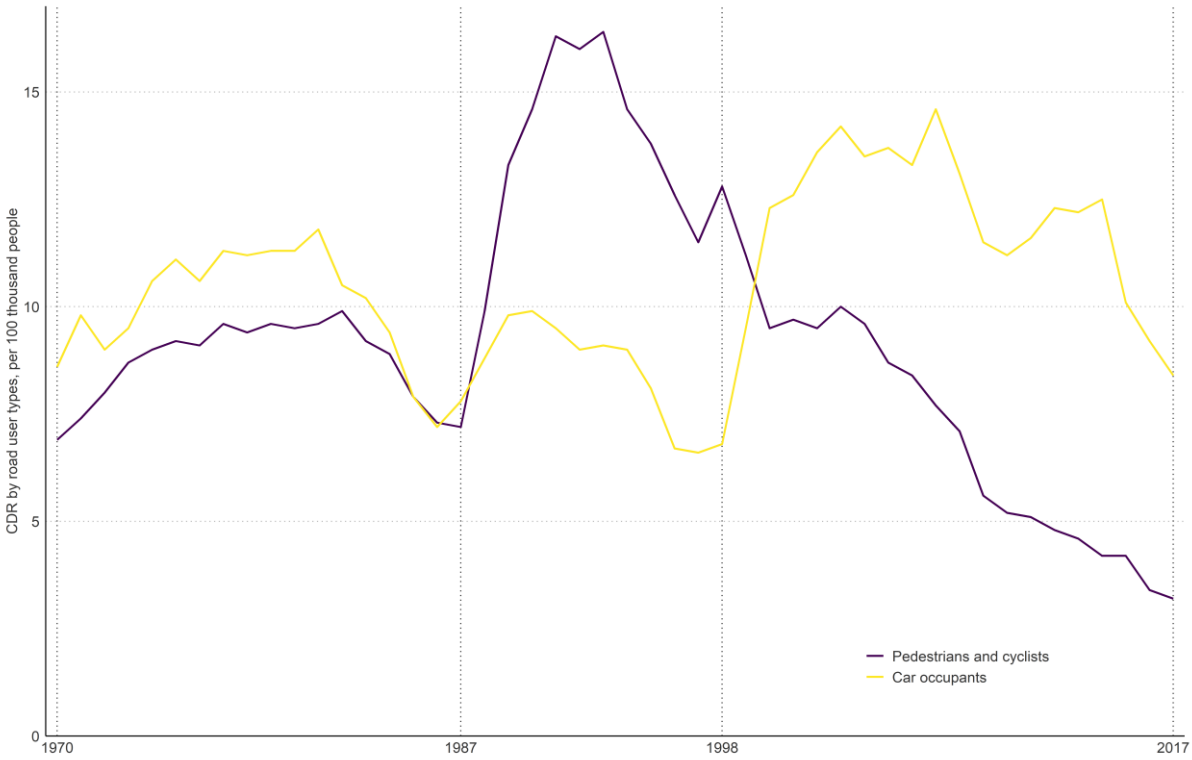

Figure 1. Mortality of main road users in Russia, 1970-2017

Note: CDR is the crude death rate.

Source: RusFMD and Rosstat data.

The dynamics of pedestrian mortality by gender, urban and rural areas show the same trends (Figure 2). The male pedestrian mortality in urban areas decreased 6 times (from 26 to 4 deaths per 100 thousand people in 1993-2017), and in rural areas over the same period - 4 times. For female pedestrians, the corresponding rates decreased 4 and 3 times. The same tendencies are typical for all age groups.

Such a steady and long-term decline in pedestrian mortality, both in general and in more detailed categories of road users, raised a number of questions for us.

In principle, is it possible for pedestrian mortality to exceed the mortality of drivers and passengers for a significantly long time, as was the case in the late 1980s and 1990s in Russia according to RusFMD data (Figures 1 and 2)? This phenomenon contradicts the results of systematic reviews on this issue, which indicate that, while the proportion of pedestrian fatalities varied greatly across WHO regions, it exceeded 50% of all road traffic deaths only in the African region. At the same time, on average for countries with low, medium and high levels of well-being, the proportion of pedestrian deaths was 45, 30 and 20%, respectively (Charters, Gabbe, Mitra 2017; Naci, Chisholm, Baker 2009).

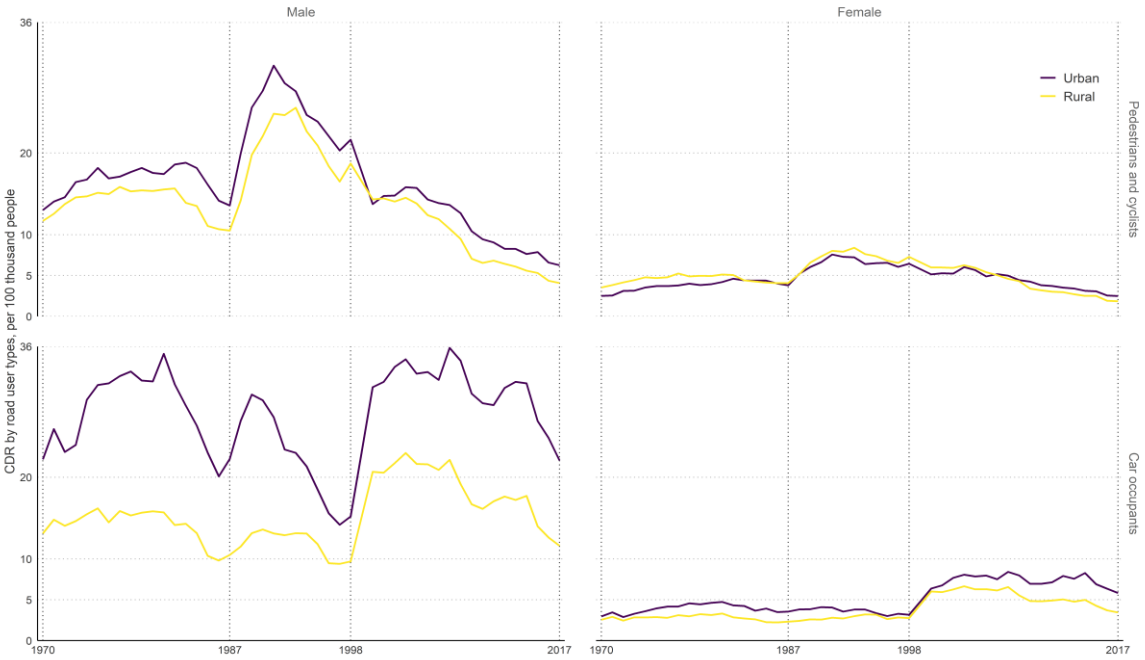

Figure 2. Differentiation of road traffic mortality in Russia, 1970-2017

Source: RusFMD and Rosstat data.

Why isn't there a second peak in pedestrian mortality in the late 1990s and early 2000s? A second peak in mortality was characteristic of drivers and passengers, as well as of most external causes of death (Vishnevsky 2017).

What explains such a slight increase in the mortality of drivers and passengers after the end of the anti-alcohol campaign and such a sharp increase in 1999? On the one hand, this does not correspond to mortality dynamics of external causes of death in Russia during this period. On the other hand, it contradicts the riskier behaviour recorded by the police of drivers than of pedestrians in the late 1980s. In the statistical collections of the Ministry of Internal Affairs, it is noted that in 1989 in the USSR "of all the drivers who caused road traffic accidents, 39.8% did not have the right to drive the corresponding category of vehicle, 22.1% were drunk. One in five pedestrians responsible for road accidents was also drunk" (Crime and Offenses ... 1990).

How possible is the asynchrony of the dynamics of mortality among pedestrians and drivers and passengers observed in the late 1990s and up to the mid-2000s, when the mortality of drivers and passengers grew rapidly, while that of pedestrians continued to decline? The death rates of the main road user types are interconnected, since the behaviour of drivers largely determines the mortality of pedestrians. Therefore, if the mortality of drivers rises sharply, then this should partially affect pedestrian mortality .

These questions determined the goal of our study: to understand what caused the significant excess of pedestrian mortality over driver and passenger mortality in Russia according to the RusFMD in the late 1980s and early 1990s, and to verify this data source, comparing it with other, both accessible and not easily accessible, data sources on road traffic mortality in Russia and other countries. In this regard, the main aim of the study was to reconstruct the number of fatalities in road traffic accidents by road user types according to Soviet and then Russian police data for the same period.

DATA AND METHODS

Within the framework of the reporting system of the Ministry of Internal Affairs, the following categories of road users are distinguished: 1) pedestrians and cyclists; 2) drivers and passengers. Information was obtained on the total number of fatalities in road traffic accidents, including by category of road users, according to the Russian Ministry of Internal Affairs and data from the traffic police in other countries[1]:

- for the USSR, Russia, Latvia and Moldova for 1970-1989, from statistical reports regularly issued by the Scientific Research Center for Road Safety of the USSR Ministry of Internal Affairs (Scientific Research Center for Road Safety… n.d.);
- for Russia for 1990-1991, from the statistical collections "Crime and Offenses";
- for Russia for 1993-2004 and all other post-Soviet countries for 1993-2018, from the UNECE Statistical Database 2020;
- for Russia for 2005-2014, from the collective monograph (Vishnevsky 2017); since 2015, the relevant data of the Ministry of Internal Affairs are available online[2];
- for a number of countries in Europe, the USA and South Korea for 1970-2010, from the International Road Traffic and Accident Database (IRTAD), data was obtained in 2012, when this data source was opened free of charge. Currently, free access to IRTAD data on the number of deaths by road user types is closed.

If in Russia, Latvia and Moldova for any year from 1970 to 1989 there were no data on fatalities by road user types, we assumed it to be similar to the structure of fatalities in the USSR for the same year, which was reconstructed for each year. In this case, the absolute number of fatalities by road user types was obtained based on the absolute number of fatalities in a given country in a given year and the pattern of mortality by road user types in the USSR in the same year. In addition, the lack of age structure of road traffic fatalities reported by the police did not allow us to use standardised death rates, so we analysed the crude death rates by road users.

We used the age-specific death rates for the period from 1970 to 1999 from the RusFMD database, which accumulates Russian mortality statistics. The sum of the deaths under item Nos. 160 and 161 of the Soviet abridged classification of causes of death of the 1988 revision (SC-1988) was considered as deaths in motor vehicle traffic accidents. Deaths under item No. 160 were considered to be of drivers and passengers, and those under No. 161 – of pedestrians and cyclists. From 2000 to 2017 the definition of death in "Motor vehicle traffic accidents" was used, and the corresponding three-digit ICD-10 cause of death codes were aggregated: V02-V04, V09, V12-V14, V20-V79, V82-V87, V89. Pedestrians and cyclists were coded by V02-V04, V09, V12-V14, and drivers and passengers – by V20-V79, V82-V87, V89.

[1] In different historical periods in Russia, the division of the Ministry of Internal Affairs responsible for road safety has had different official names. At the moment, the traffic police of the Ministry of Internal Affairs of the Russian Federation is responsible for the statistics of road accidents. This body, in terms of its functions, corresponds quite well to the generalized concept of "road police" which we use in relation to other countries, without going into the national characteristics of its ministerial hierarchy.
[2] URL: http://stat.gibdd.ru/

To compare Russia with other post-Soviet countries, we used the crude death rates from The Human Cause-of-Death Database (HCoD). For Russia, the sum of the following items of the Russian abridged classification of the 2006 revision (RC-2006) was considered as pedestrian deaths: 1) 239. Pedestrian injured in transport accident; 2) 272. Pedestrian injured in collision with motor vehicle, nontraffic accident. For Estonia, Latvia, Lithuania and Moldova, the corresponding item for pedestrian fatalities was No.196, "Pedestrian injured in collision with motor vehicle" (codes V02-V04, V09), from the abbreviated list of causes of death for these countries, presented in the meta-data on the HCoD website.

The number of fatalities of drivers and passengers in Russia was defined as the sum of deaths under the following items: 1) 240. Car occupant injured in transport accident; 2) 241. Occupant of other transport vehicle in transport accident; 3) 273. Other persons injured in collision with motor vehicle, nontraffic accident. For Estonia, Latvia, Lithuania and Moldova, the corresponding item for driver and passenger fatalities was No. 195, "Transport accident with motor vehicle" (codes V12-V14, V19, V20-V79, V82, V87). Pedestrian fatalities in these countries are quite similar to the sum of two Russian items (Nos. 239 and 272) in terms of the composition of the ICD-10 codes (V02-V04, V09). The non-inclusion of Belarus and Ukraine is explained by a different composition of the item that could be referred to as pedestrians. In these countries, it is wider (V01-V09), and includes the relatively large, in terms of the numbers of deaths, code V05 (Pedestrian injured in collision with a train or other railway vehicle).

The composition of item No. 195, "Transport accident with motor vehicle" (codes V12-V14, V19, V20-V79, V82, V87), is not fully comparable with the sum of Russian item Nos. 240-241 and 273, which can be used to differentiate between the deaths of drivers and passengers. In Russia, these items include the codes V84-86, V88 and, partially, V80-81, V83, and V89. However, this did not significantly affect the mortality of Russian drivers or passengers according to HCoD data, since the number of deaths encoded with these codes is small. In 2014, it came to 614 people or 3.3% of the number of driver and passenger fatalities (of the total number of fatalities under item Nos. 240, 241, 273).

RESULTS

Mortality of road users in Russia according to vital statistics and police data

According to vital statistics and police data, crude death rates due to road traffic accidents did not differ significantly for a long time in Russia (see Figure 3 in (Pyankova, Fattakhov 2020)). The discrepancies in the number of deaths and, correspondingly, the crude death rates according to police data and vital statistics are in line with similar indicators seen in other countries (see Appendix 1 in (Pyankova et al. 2019).

In order to answer the questions posed regarding the dynamics of mortality among pedestrians and drivers and passengers according to vital statistics, we decided first to assess how they are applicable to similar indicators calculated according to police data.

Police data indicate the following (Figure 3). First, the mortality of pedestrians and cyclists has never exceeded the mortality of drivers and passengers, in contrast to similar indicators

calculated based on RusFMD data . Second, the second peak of pedestrian and cyclist mortality in the late 1990s and early 2000s was as high as for drivers and passengers and most external causes of death. Third, the mortality increase of drivers and passengers after the end of the anti-alcohol campaign was sharp: the crude death rate (CDR) for 4 years from 1987 to 1991 almost doubled, reaching the highest value ever recorded in 1991. The second wave of mortality increase of drivers and passengers occurred between 2000 and 2007, and was smoother. Fourth, the changes in the mortality of pedestrians and cyclists and drivers and passengers throughout the observation period are consistent: an increase in the mortality of drivers and passengers corresponds to an increase in the mortality of pedestrians and cyclists, including in 1998-2002. A steady mortality decline of pedestrians and cyclists began in 2003, marking the beginning of a road traffic mortality decline in Russia as a whole. In 2003-2014, declining pedestrian mortality corresponded to a fluctuation in the mortality of drivers and passengers at the fairly high level of from 12 to 14 deaths per 100 thousand people. From 2014 onwards, there began a decline in the deaths rates of drivers and passengers causing a continuing downward trend among pedestrians and cyclists and an overall intensification of road traffic mortality in Russia.

As a result, the mortality dynamics of the main road user types according to police data differ from similar indicators based on RusFMD data. No peculiarities of the road traffic mortality arising in the analysis of Figure 1 and expressed in the research questions are revealed.

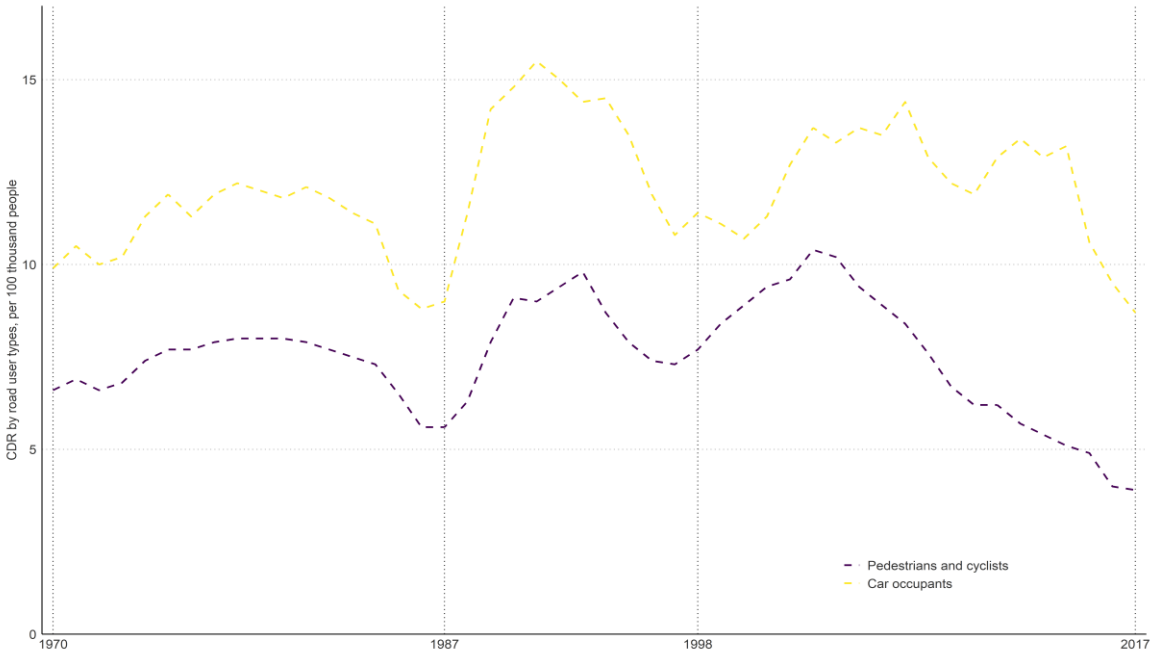

Figure 3. Mortality of the main road user types in Russia, 1970-2017

Source: Ministry of Internal Affairs data.

Comparing the crude death rates based on police data and vital statistics, we can say the following. The mortality of both road user types according to police data, while differing slightly, was consistent with similar indicators based on vital statistics until 1988. Then, an inconsistency of their dynamics begins to be observed. According to RusFMD data, the CDR of pedestrians increased from 7 to 16 deaths per 100 thousand people from 1987 to 1991. According to police data, such a mortality increase among pedestrians and cyclists is not observed (the CDR of

pedestrians and cyclists rose from 5.6 to 9 deaths per 100 thousand persons for the same period). Regarding the mortality of drivers and passengers, the situation is the opposite: a sharp increase according to police data (from 9 to 15.5 deaths per 100 thousand people from 1987 to 1991) and a small one according to vital statistics (from 7.8 to 9.5 deaths, respectively), which did not exceed the maximum value of the Soviet period (11.8 pedestrian fatalities per 100 thousand people in 1981). While the SC-1988 was in use, the CDR of pedestrians exceeded the CDR of drivers and passengers according to vital statistics. This phenomenon persisted until the transition to ICD-10. Since 2000, mortality of drivers and passengers has again exceeded mortality of pedestrians and cyclists according to vital statistics; its changes are now consistent with similar indicators according to police data.

Thus, in Russia, the overall level of road traffic mortality according to the two data sources is concordant, unlike mortality by road user types. The major data discrepancy occurs in the period 1988-1998.

The ratio of pedestrian mortality to car occupant mortality according to vital statistics is even more vivid evidence of the anomalousness of the period 1988-1999 (Figure 4). For both sexes, regardless of the settlement type, pedestrian mortality significantly exceeds the corresponding indicators of drivers and passengers in 1988-1999 (red shading in Figure 4, ratio greater than 1). However, before 1988 and after 1999, pedestrian mortality was generally lower or comparable to that of drivers and passengers (Figure 4, green shading, ratio less than 1). An exception is the period 1970-1988, when female pedestrian mortality in rural areas exceeded the corresponding figure for drivers and passengers by an average factor of 1.6-1.7. However, after 1988, the ratio of the coefficients for this category also increased sharply (by a factor of up to 2.5-3).

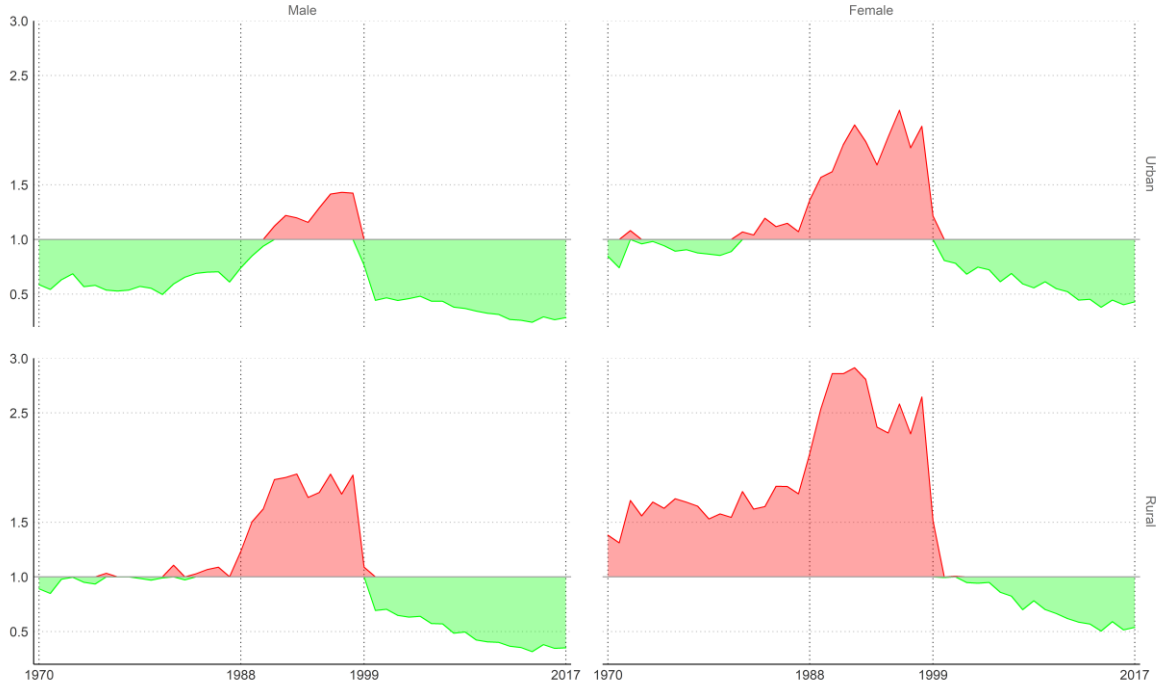

Figure 4. The sex-specific ratio of CDR of pedestrians to CDR of drivers and passengers by type of settlements in Russia in different historical periods according to vital statistics

On the whole, such fluctuations in mortality for the main road user types are unusual, as they are not consistent with the previous and subsequent periods of observation.

Two events marked the period 1988-1999. The first is the introduction in 1988 of a new version of the Soviet abridged classification of causes of death, which abolished the division of accidents, including road traffic accidents, into work-related and non-work-related accidents (Mesle et al. 1996). The Russian item names in SC-1988, which together constitute the entire transport-related block of accidents (block E47 "Transport accidents" in ICD-9), are extremely unusual: 1) Accidents related to motor transport (160); 2) Motor vehicle accident on a public road as a result of a collision with a pedestrian (161); 3) Motor vehicle accident (162). The unusual thing is that only motor vehicles and motorised modes of transport appear in their names, and there are no other modes of transport (for example, rail, air or water). It is impossible to see a difference between item Nos. 160 and 162 in terms of the composition of accidents. The second is the transition to ICD-10 and the introduction of the corresponding Russian abridged classification of causes of death. The transition to ICD-10 came in conjunction with a change in the coding system for causes of death in the medical death certificate, as detailed in other studies (Danilova et al. 2016). It seems reasonable to assume that these two events are responsible for the peculiarity of the significant excess of pedestrian mortality over driver and passenger mortality observed during this period.

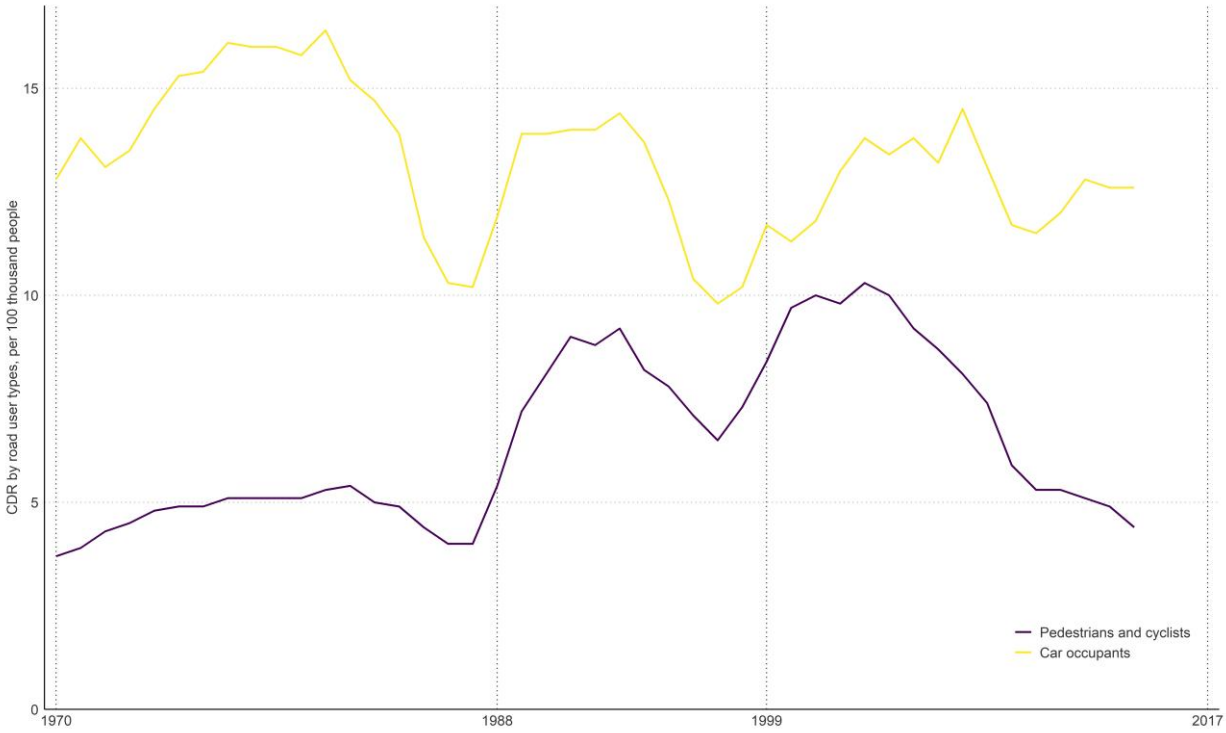

Figure 5. Mortality of the main categories of road users in Russia, 1970-2014

Source: HCoD data.

To eliminate the influence of changes in abridged classifications of causes of death, we used HCoD. For Russia, it allows the construction of long time series on causes of death under the same causes of death classification - the Russian abridged classification of 2006 revision. CDR for pedestrians, just as according to police data, never exceeded the corresponding indicator for drivers

and passengers (Figure 5). There is a second peak in pedestrian mortality in the late 1990s and early 2000s, as for drivers and passengers, although it is higher than the previous peak in the early 1990s. Mortality fluctuations by road user types are synchronous. Some questions are raised by the level of CDR of both road users before 1988, but after this year they are comparable with the police data to a greater extent than the RusFMD data.

Mortality of pedestrians and drivers and passengers in some post-Soviet countries: data from state statistics of mortality and traffic police

For international comparison, a number of post-Soviet countries (Moldova, Estonia, Latvia and Lithuania) were selected from HCoD with comparable headings (according to the composition of the ICD-10 cause of death codes) which can be used to identify road users. The picture of road traffic mortality by road user types in these countries is rather contradictory (Figure 6). On the one hand, in Estonia and Lithuania, the CDR of drivers and passengers is generally higher for pedestrian mortality, as in Russia according to the HCoD and police data. On the other hand, in Latvia, this has been true only since 1996, while before 1996 the pedestrian mortality was higher than mortality among car occupants. The turning point comes in the year of the country's transition from the last Soviet abridged classification of causes of death to ICD-10, which happened without an intermediate and short-term transition to ICD-9, as was the case in Estonia and Lithuania.

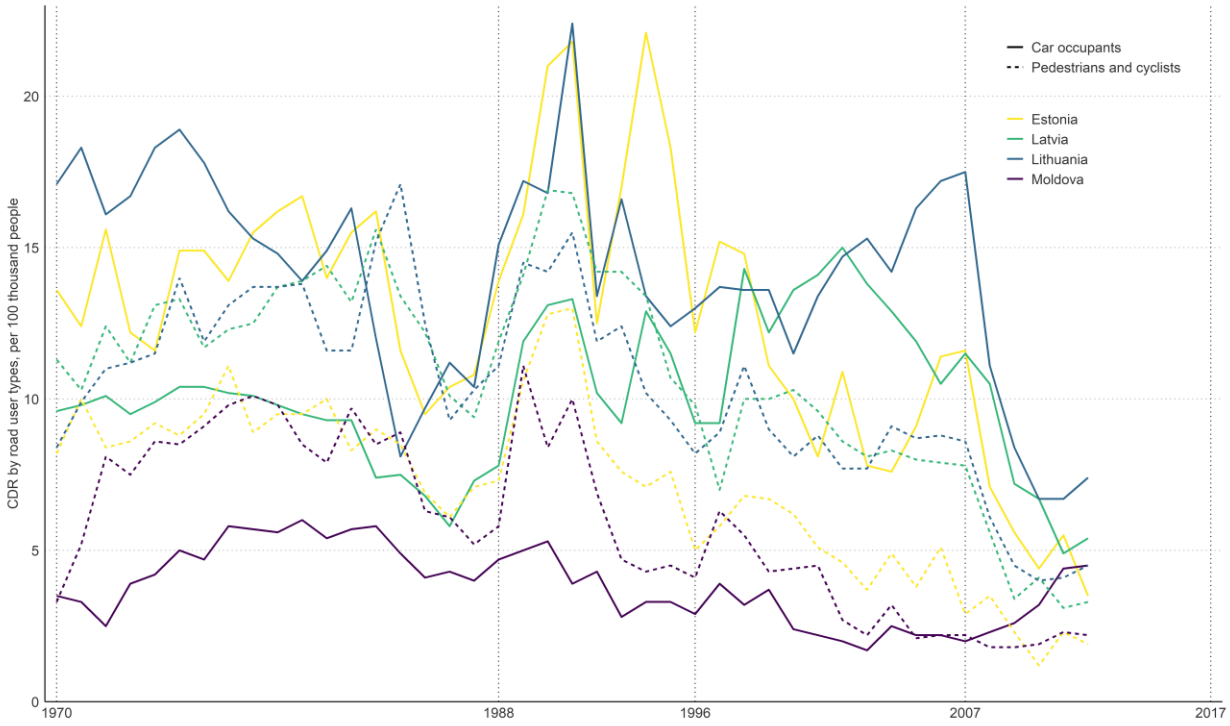

Figure 6. CDR of the main categories of road users in some post-Soviet countries, 1970-2014

Source: HCoD data.

Even more surprising is the situation in Moldova, where mortality of pedestrians up to 2006-2007 is higher than of drivers and passengers. However, the categorisation of road users under vital statistics in Moldova is difficult to trust due to the coding of the majority of road traffic

fatalities with the V89 code "Accident involving a motorised or non-motorised vehicle of unspecified type". In 2015, in Moldova, according to the WHO Mortality DataBase, 58% of road traffic fatalities were encoded with this code (from the set of codes V02-04, V12-14, V19, V20-79, V82-87, V89). In contrast, in the Baltic countries, this code was either not used at all (Latvia, Estonia), or the number of deaths encoded by it is insignificant (Lithuania).

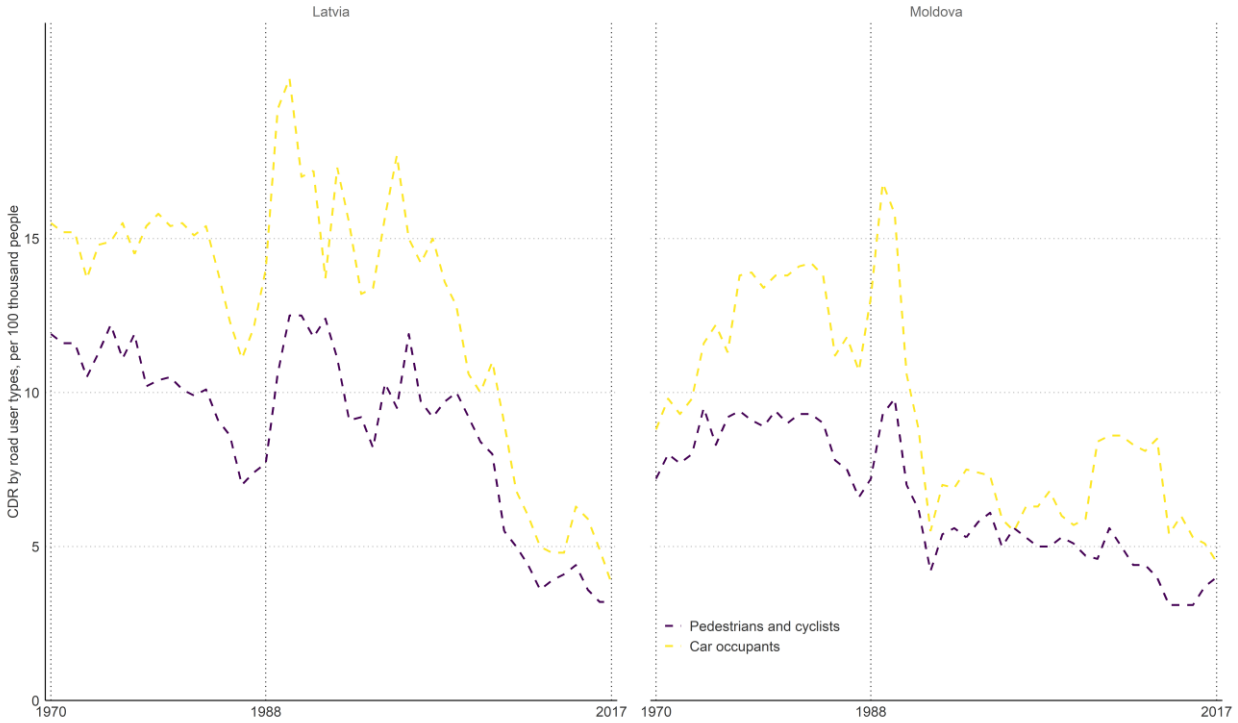

Figure 7. CDR of categories of road users in road accidents in Latvia and Moldova, 1970-2018

Source: police data of the respective countries, up to 1991 - by the soviet police data

Such different behaviour of the main road users in similar (geographically, historically, socio-economically) countries and, moreover, with abrupt reversals in some periods, raises questions. Therefore, as in Russia, we used police data for Latvia and Moldova to assess how the trends obtained on their basis correspond to those based on HcoD data (Figure 7). The results turned out to be the same as in Russia, the main one being that the mortality of pedestrians in these countries did not exceed the mortality of drivers and passengers according to police data. The sharp drop in the CDR of both road users in Moldova in 1994 is explained by the publication of data in the UNECE statistical database without data on Transnistria.

Percentage of pedestrian fatalities in the total number of fatalities in road accidents: Russia compared with other countries

In Russia, the proportion of pedestrian and cyclist fatalities in the total number of deaths in road accidents according to police data in 1993-2018 averaged 38%. To check how their share in the total structure of deaths according to the police data corresponds to the indicators in other countries, we used international databases, where the main data source is traffic police data.

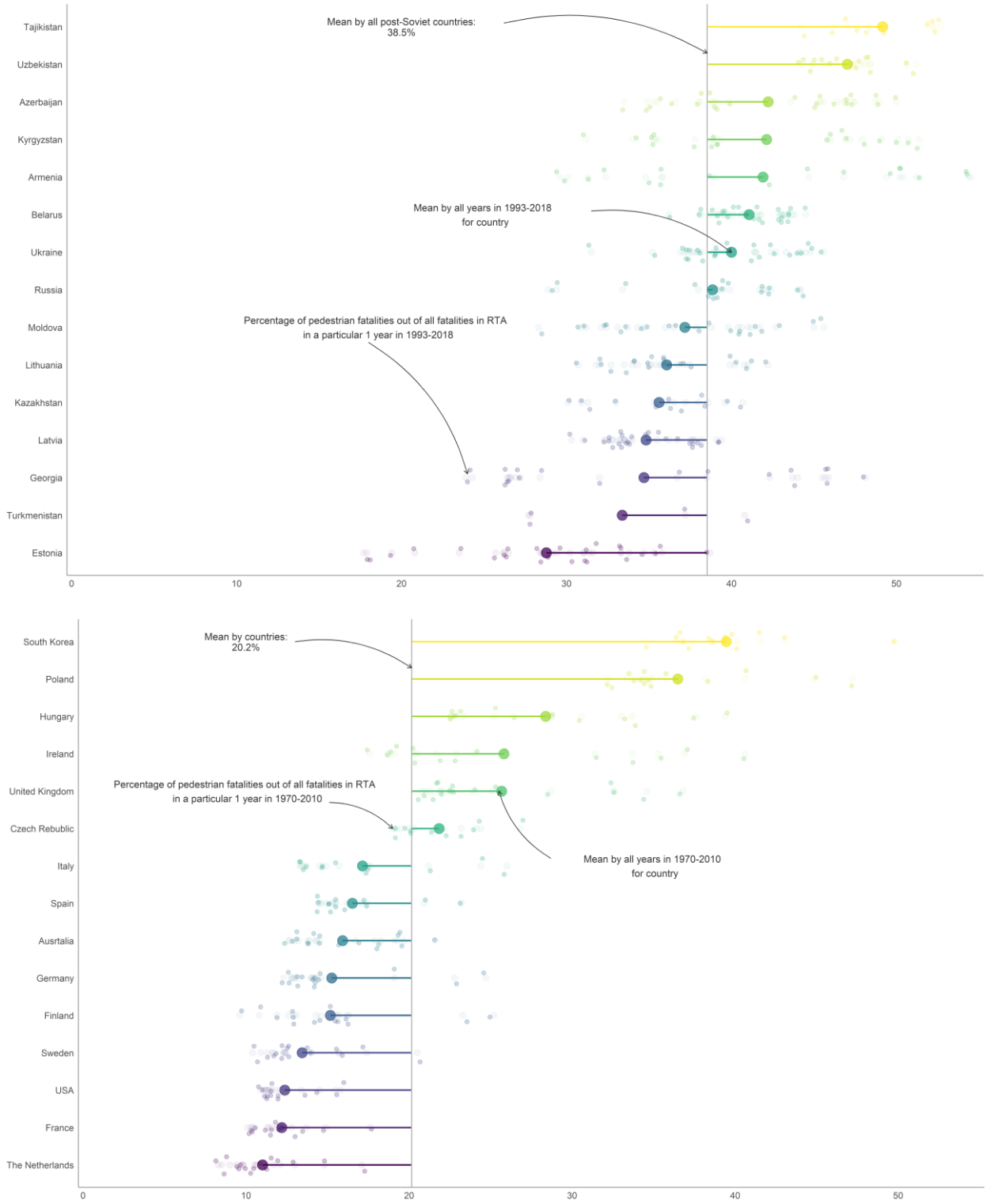

Figure 8. Percentage of pedestrian fatalities out of all fatalities in road traffic accidents in post-Soviet countries in 1993-2018 (A) and in other countries of the world in 1970-2010 (B), traffic police data, %

Source: A - UNECE Statistical Database data, B - IRTAD data.

According to the UNECE statistical database, the proportion of pedestrians among all fatalities in road traffic accidents in the post-Soviet countries varies greatly both between countries and within each country in 1993-2018. Only in some years in a number of Transcaucasian

countries (Azerbaijan, Armenia) and Central Asia (Tajikistan, Turkmenistan, Kyrgyzstan) did the share of pedestrians slightly exceed 50% of all road traffic fatalities (Figure 8a). These countries show the greatest upward deviation of the share of pedestrian fatalities from the average for all post-Soviet countries (38.5%) in 1993-2018. Consequently, the CDR of pedestrians calculated on their basis almost never exceeded the CDR of drivers and passengers in the post-Soviet countries in 1993-2018 according to police data.

A comparison with other countries with a more or less continuous time series presented in the IRTAD statistical database shows that in them the proportion of pedestrians who died in road traffic accidents in the period 1970-2010 is significantly lower (Figure 8b) than in post-Soviet countries in 1993-2018. The closest to the post-Soviet countries is Poland, where the percentage of pedestrian fatalities in road accidents was very high in 1970 (47%) and decreased to only 32% by 2009. A particular exception is the Republic of Korea. In the first half of the 1990s, the proportion of pedestrian fatalities approached 50% out of total road traffic fatalities, then began to decline steadily. However, it decreased only by 1.5 times over 1990-2010, versus 3.2 times in Russia over the same period according to vital statistics (Figure 1). In other countries (Figure 8b), the percentage of pedestrian fatalities out of total road traffic fatalities also decreased in 1990-2010, but the decline did not exceed 1.5 times in any country.

Neither in the post-Soviet countries nor in the European countries, the United States and South Korea did the share of pedestrians consistently exceed 50% of the total number of deaths in road traffic accidents by police data, with the exception of some years in some countries, when this figure was only approaching this mark. Therefore, it could be concluded that the Russian figures based on police data are in line with similar indicators in other countries.

DISCUSSION

The anomalous excess of pedestrian mortality over car occupant mortality according to RusFMD in Russia in 1988-1999 was shown using different data sources, including those based on different reporting systems. Possibly this is due to the peculiarities of the cause of death classifications used, under which the data are presented. We believe that there was no excess of pedestrian mortality over car occupant mortality for 10 years from 1988 to 1999. This is confirmed by the police data of Russia and other countries and by Russian vital statistics presented under a unified cause of death classification in HCoD.

Given that, pedestrian mortality has most likely been steadily decreasing not since 1991-1993, but since 2003, having already dropped significantly below the minimum values of the Soviet period. After ups and downs, the mortality of drivers and passengers decreased to the level of the early 1970s only in 2015-2017.

Unfortunately, we did not find a direct cause of such unusual behaviour of mortality among pedestrians and drivers and passengers according to RusFMD data in 1988-1999. One of the possible, but highly speculative, explanations is the assumption that in the RusFMD data in 1988-1999 the names of item Nos. 160 and 161 were switched ("Accidents related to motor vehicles" and "Motor transport accident on a public road as a result of a pedestrian collision") . Under this assumption, if item 160 is assigned the values of item 161 and vice versa, the CDR for

pedestrians and the CDR for drivers and passengers (pale blue and pale orange lines in Figure 9, respectively) in 1988-1998 will correspond to coefficients according to the police (Figure 4) and HcoD data (Figure 6).

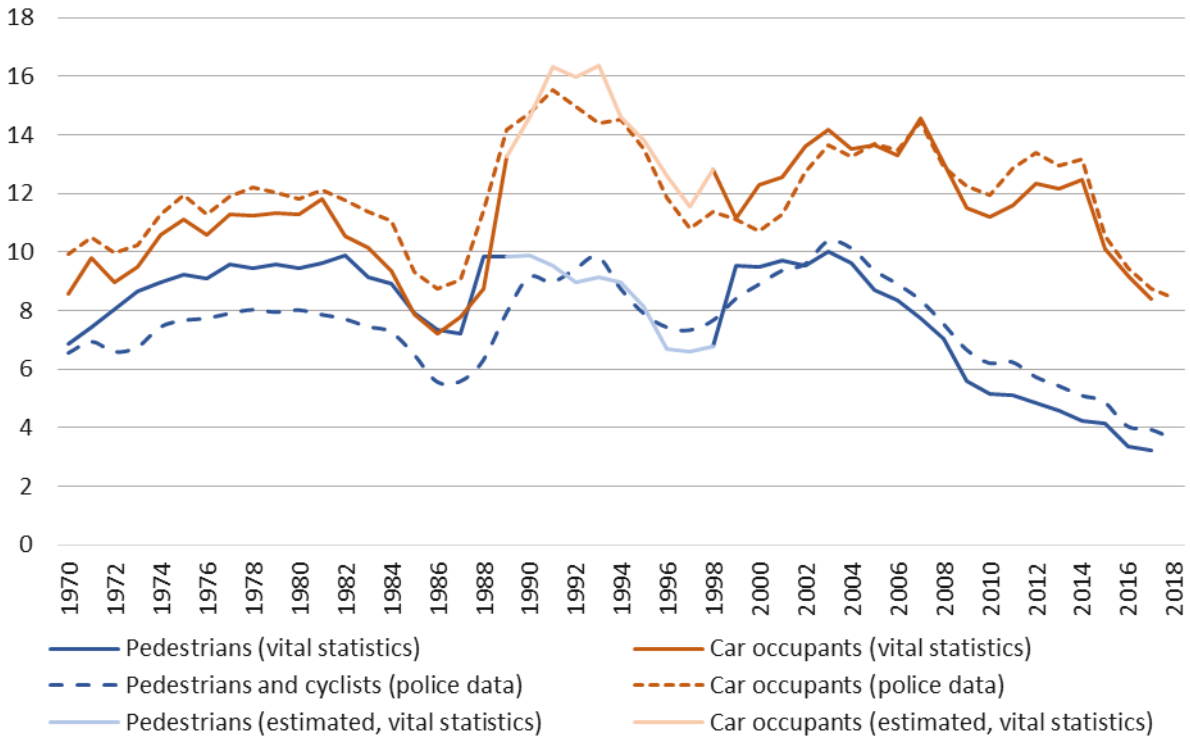

Figure 9. Estimated and actual CDR of road users according to vital statistics (solid lines) in Russia

As a result of such a rearrangement, all the questions posed at the beginning of the study disappear. Pedestrian mortality almost never exceeds mortality of drivers and passengers, having become equal only during the anti-alcohol campaign in 1985. This behaviour generally agrees with world indicators. Changes in the coefficients are synchronous, and the increase in the mortality of drivers and passengers after the abolition of the anti-alcohol campaign in 1985 was sharp and significantly higher than in the late 1990s and early 2000s.

A riskier form of driver behaviour in the USSR in the late 1980s and early 1990s was noted in the statistical bullitens published by the Ministry of Internal Affairs. In line with them, in the USSR in 1989, 49.1 thousand people died due to the fault of drivers, including 11.6 thousand people due to the fault of drunk drivers of vehicles, while 10.8 thousand deaths were due to the fault of pedestrians, including 2.04 thousand through the fault of drunk pedestrians. In 1989 in the USSR, a fifth of road traffic fatalities were due to the fault of drunk road users, but 5 times more to the fault of drunk drivers than to drunk pedestrians (Scientific Research Center for Road Traffic Safety... 1990). In addition to drunk driving, the police noted that "in 1989, persons who do not have the right to drive motor vehicles committed 71.8% of all road traffic accidents in which 72.8% of the corresponding indicators of accidents in individual transport died" (Scientific Research Center for Road Traffic Safety…1990).

The example of Moldova shows that it makes sense to analyse mortality by aggregated categories of road users according to mortality statistics only if there is a small proportion of deaths

coded by an unspecified V-code (V89). Otherwise, the structure of fatalities by road user types will be distorted if this code is not included in any of the specified categories of road users. It is worth noting that a high proportion of road traffic deaths encoded with V89 is typical not only for Moldova, but also for countries such as the United States (according to the WHO Mortality Data Base, the proportion of deaths in road traffic accidents encoded with V89 in 2014 was 32.4%), Portugal (57% in 2014), Romania (69% in 2015) and France (72% in 2014). The number of deaths in road traffic accidents, defined as the sum of the deaths only under the specified items in terms of road user types, may be underestimated (in the case of Moldova, Nos. 195 and 196) due to the following reasons: 1) Data source does not allow for grouping three-digit codes of causes of death; 2) The V89 code is attributed to the aggregated group of other transport codes; 3) The proportion of deaths encoded by it is significant.

In Russia, the problem of using unspecified transport causes of death codes (V-codes), including V89, also occurs (Semenova et al. 2013). Nevertheless, it is not as pronounced as in the countries listed above. In 2000, the share of deaths coded with the V89 code in the total number of deaths in road traffic accidents (codes V02-04, V12-14, V19, V20-79, V82-87, V89) came to 8.1%, and by 2016 had dropped to 4.4%. A study of the US found that the characteristics of unspecified categories of traffic accident fatalities are similar to those of protected road users (drivers and passengers) (Mack et al. 2019). Therefore, in the case of Russia, given the small number of deaths coded by V89, we attributed these deaths to drivers and passengers.

CONCLUSION

In the police reporting system the classification of road users has not changed. Its distinguishing feature is the absence of an unspecified category of road users, that is, the deceased is always assigned to one of the clearly defined categories. In vital statistics, there is no classification of road users as such. It depends on the approach to the aggregation of the codes of the International Classification of Diseases (ICD), its version and, which is essential in the case of Russia, the version of the abridged classification of causes of death in force within a particular revision of the ICD, as well as its Russian translation.

In the case of Russia , it is more reasonable to rely on police data concerning the mortality of road users. Of course, this statement is not true for all countries. For example, in China and India, there is an underestimation of injured pedestrians, including fatalities, according to published police reports (Bhalla et al. 2017; Hu, Ma, Zhou 2012; Li et al. 2016; Singh et al. 2018). The problem of determining the category of road user in the vital statistics exists not only in Russia, but also in the United States, where protected road users are a problem group (Mack et al. 2019). In Russia, the situation is different. Pedestrians are mainly coded as being in an unspecified road or non-road traffic accident. As a result, they do not even fall into the total number of road traffic deaths if the abridged classification is applied for data analysis (Pyankova et al. 2019). This problem vanishes if detailed cause-of-death ICD-10 codes are used and grouped according to one of the international approaches for defining the number of deaths in road traffic accidents, as was done in this study.

The use of vital statistics is appropriate if it is necessary to make a differential analysis of road traffic mortality by sex, age and type of area in Russia. When it is necessary to analyse mortality by road users types, Russian vital statistics have some limitations and should be used with caution. In our opinion, it is reasonable to use the following open data sources: 1) HCoD data since 1988; 2) RusFMD data from 1970 to 1988 and after 1999, excluding 1989-1998.

Comparisons of Russia with Latvia and Moldova have shown that similar difficulties in analysing long-term mortality trends by road users based on mortality statistics can arise in post-Soviet countries where the Soviet abridged classification of causes of death was used. However, this issue requires further study.

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THE RUSSIAN POPULATION OF THE NEAR ABROAD: GEODEMOGRAPHIC DYNAMICS OF THE POST-SOVIET PERIOD

SERGEY SUSHCHIY

This article explores the geodemographic dynamics of the Russian population of the near abroad in the post-Soviet period. It analyzes the quantitative changes and transformation of its geography, the level of urbanization and the gender and age structure. The study shows that in the post-Soviet period there was a sharp decline in the number of Russians in all of the near abroad. This process was most intensive in the 1990s. The maximum demographic losses during this period were suffered by the Russian population of Transcaucasia and a number of countries in Central Asia. At the beginning of the twenty-first century, the rate and absolute scale of decline are decreasing, but the trend itself remains stable. This is associated with the natural decline of the Russian population, its migration to Russia and foreign countries, and assimilation. The relationship of these factors to the quantitative decline has varied across time and across individual countries. In almost all Russian communities a significant preponderance of women is recorded. The median age of Russians in all countries of the near abroad is more than 40 years. The level of urbanization of Russians in most of these countries has decreased. Better preserved are the metropolitan and rural Russian populations. The demographic ratio of the Russian communities of individual countries and macroregions has changed. The numbers of Russians in Kazakhstan and Ukraine (without the people's republics of Donbass) are already comparable, and there are more Russians in the Baltic countries than in Central Asia. Russian communities of unrecognized (or partially recognized) States are characterized by increased demographic stability.

***Key words**: the near abroad, Russian population, geodemographic dynamics, sex and age structure, level of urbanization, migration, assimilation.*

INTRODUCTION AND PROBLEM STATEMENT

According to the last Soviet census (December 1989), the number of Russians in the Union Republics of the USSR was 25.3 million (All-Union census ... 1989). Thus, the breakup of the Soviet Union into 15 States and the emergence of the near abroad led to one of the biggest transformations in the State-political system of the settlement of the Russian people in its history. Almost 20% of the total number of Russians ended up outside their country[1].

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[1] For the overwhelming majority of the Russian population of not only the union republics, but also of the RSFSR, the USSR was “their” country.

From the moment the near abroad appeared, its Russian population began to noticeably influence the quantitative dynamics of the entire Russian people. Russian communities also played a significant role in the ethno-demographic processes of the new post-Soviet States. In Kazakhstan, Latvia and Estonia in the early 1990s, Russians accounted for 37, 33 and 30% of the population, respectively, and in two other countries (Ukraine and Kirgizia) they accounted for more than 1/5 of the population. In all these countries, Russians were essentially the second most numerous people.

In the near abroad one can distinguish several macroregions whose historical, socio-cultural and socio-economic specifics determined many significant geodemographic indicators of the local Russian population (including its total number, geographical distribution and forms of settlement, and level of interethnic marriage). The northwestern macroregion includes the Baltic states, the western region includes Ukraine, Belarus and Moldova. The third region is made up of the states of Transcaucasia, the fourth of Central Asia (Kazakhstan and the countries of Central Asia). But it should be noted that the most general trends in the geodemographic dynamics of the Russian population in the post-Soviet period coincided for all macro-regions of the post-Soviet space.

RESEARCH OVERVIEW AND INFORMATION BASE

The demographic dynamics of the Russian population of the near abroad, its migration activity and involvement in assimilation processes, have attracted the attention of many researchers (Kabuzan 1996; Rybakovsky 1996; Savoskul 2001). Many works are devoted to the Russians of individual countries and macroregions of Ukraine and Moldova (Mitrofanova, Sushi 2017; Ostapenko, Subbotina 2011; Romantsov 2008), the Baltic states (Volkov 2013; Manakov, Chuchenkova 2016; Manakov 2020; Martsinkevichus 2013; Nikifirov, Poleshchuk 2013; Suschiy 2018a; Hallik 2011), Transcaucasia (Mosaki 2018; Tsutsiev 2006; Yunusov[2]), Kazakhstan and Central Asia (Aleinikov, Borovikov 2013; Suschiy 2018b; Tishkov 1993; Fedorko, Kurbanov 2018; Khoperskaya 2012).

However, in most of these works the specifically geodemographic aspects of the life of Russian communities in the post-Soviet space are on the periphery of research interest. Even more important is the fact that there is a noticeable shortage of general works devoted to the quantitative, spatial, and settlement dynamics of the Russian population of the entire near abroad, to shifts in the ratio of its leading communities.

The information sources of the study are materials of the USSR 1989 population census (All-Union census ... 1989) and results of post-Soviet censuses posted on the websites of state statistical committees of countries of the near abroad. Some of these statistical materials are collected on the website "Population statistics of Eastern Europe and the former USSR"[3].

[2] Yunusov A.S. (2003). Ethnic and migration processes in post-Soviet Azerbaijan. URL: http://chairs.stavsu.ru/geo/Conference/c1-67.htm
[3] URL: http://pop-stat.mashke.org

It should be borne in mind that the countries of the post-Soviet space differ in both the number and timing of censuses (Table 1). Expert fine-tuning of this statistical information is required to bring it into the general picture of the geodemographic dynamics of the Russian population within the former USSR. This analysis is complicated by the fact that Ukraine, which at the turn of the 1990s accounted for 46% of Russians in the near abroad, has not conducted a census since 2001, the results of which are now significantly outdated. And Uzbekistan, with the largest Russian community in Central Asia, in the post-Soviet period has done without censuses altogether[4]. Ethno-demographic statistics for Turkmenistan are also extremely limited (the results of the 1995 census are significantly inflated (Zhukov, Reznikova 2001: 31–47), and the 2012 census has not been published).

Table 1. Population censuses in countries of the near abroad, 1990-2010s

Territory	1995	1999-2000	2001-2002	2003	2004	2005	2009	2010	2011	2012	2014	2015	2019
Azerbaijan		*					*						*
Belarus		*					*						*
Georgia			*								*		
Ukraine			*										
Uzbekistan													
Tajikistan		*						*					
Turkmenistan	*									*			
Kazakhstan		*					*						
Kirgizia		*					*						
Armenia			*						*				
Lithuania			*						*				
Latvia		*							*				
Estonia		*							*				
Moldova					*						*		
Unrecognized and partially recognized States of the near abroad													
Abkhazia				*					*				
Nagorno-Karabakh						*						*	
Transnistria					*							*	
South Ossetia												*	
Donetsk People's Republic			*										*
Luhansk People's Republic			*										*

Note: The population census on the territory of the future people's republics of Eastern Donbass (Donetsk and Lugansk) was carried out in 2001, when they were still part of Ukraine.

The remaining countries of the near abroad in the post-Soviet period have conducted two censuses[5], most of which occurred in two time intervals - 1999–2002 and 2009–2011, which makes it possible to trace, as a first approximation, the dynamics of their Russian population in the 1990s and 2000s. Analyzing this process in the 2010s is a much more difficult task. Current demographic data for 2017–2019 are had for only four countries (Estonia, Latvia, Kazakhstan, Kirgizia). In another three (Lithuania, Georgia, Moldova), the corresponding information on the Russian population is available for the mid-2010s. For four countries (Armenia, Azerbaijan, Belarus,

[4] For it, there are data from current demographic records which, however, presuppose a serious expert study.
[5] With the exception of Azerbaijan and Belarus, in which three censuses have already taken place, but the results of the last (2019) have not yet been published.

Tajikistan), an expert assessment of the dynamics of their Russian communities is, by necessity, based on the geodemographic trends of the 1990s – 2000s.

An additional circumstance that had to be taken into account was the political fragmentation of the post-Soviet space, the emergence in the near abroad of a number of unrecognized (partially recognized) states that also conducted censuses of their population. Currently, this group has six "polities", two of which (the People's Republics of Donbass) arose only a few years ago and until the mid 2010s were regional communities of Ukraine. Finally, the inclusion of the Crimean Peninsula in the Russian Federation (March 2014), which reduced the Russian community of Ukraine by 1.5 million people, affected the overall demographic potential of the Russian near abroad and the relative proportions of its large macroregions.

It should be noted that the limited format of journal publication assumes concentration only on the central trends and aspects of the processes and phenomena analyzed.

GENERAL GEODEMOGRAPHIC DYNAMICS

Despite the significant socio-political, economic and socio-cultural differences between the countries of the near abroad, the dynamics of their Russian population reveal many similarities. First of all, the central geodemographic trend coincides: all Russian communities have declined quantitatively, and the decline has persisted throughout the post-Soviet period. It has also been ubiquitous geographically, extending to all regions and all levels of the settlement system from the capitals to the deep rural periphery.

Another common feature is that natural decrease has almost always played a subordinate role in this process. The central place, differing in time periods, macroregions and countries, belongs to migration, assimilation and various forms of change in ethnic self-identification among a part of the local Russian population - primarily among people of "mixed" origin (biethnophores), one of whose parents was Russian and the other a representative of the titular ethnic group[6].

The 1990s. In general, in the 1990s the number of Russians in the near abroad decreased by almost 30% (from 25.3 to 17.8 million people). The smallest in terms of share were the quantitative losses of the Russian population of Belarus (14.9%), as well as of Latvia and Estonia (22-26%). The largest Russian communities in Ukraine and Kazakhstan lost a little more (27–28%). But in absolute terms, it was these last two countries that accounted for the main quantitative decline of Russians in the near abroad (3.0 and 1.75 million people, respectively; Table 2).

[6] In part, such a change could represent social mimicry, the choice of a variant of national belonging that is better suited to the new conditions. But often, over time, a real transformation of the biethnophore's identity also took place.

Table 2. The size of the Russian population in the near abroad, thous.

Country \ Years	1989	1999–2002	2003–2005	2009–2011	2014–2015	2018–2019
Ukraine**	11360	8330		6500–7500*		3300–3800*
Belarus	1342	1142		785		590–650*
Uzbekistan	1653	1000–1050*		600–650*		500–550*
Tajikistan	388	68		35		25–30*
Turkmenia	334	190–200*		90–100*		60–75*
Kazakhstan	6228	4480		3794		3553
Kirgizia	917	603		408		353
Georgia***	262	67.6		35–38*	26,4	20–21*
Azerbaijan****	390	142		119		75–90*
Armenia	52	15		12		9–10*
Lithuania	344	220		175	138	120–130*
Latvia	906	703		556		487
Estonia	475	351		341		329
Moldova*****	351	215–220*	201	155–165*	112	90–100*
Unrecognized (and partially recognized) States						
Abkhazia	75	25–27*	23.4	22–23*	22.3	21–22*
South Ossetia	2.1	0.7–0.8*		0.5*	0.6	0,6*
Nagorno-Karabakh	1.9	0.2*	0.17	0.2*	0.24	0.23–0.24*
Transnistria Moldavian Republic	211	187–190*	185	165-170*	160	158–160*
Donetsk and Lugansk People's Republics						1100–1300
All the near abroad, million persons	25.29	17.74–17.81*		13.85–14.93*		110.79–11.64*

Source: Compiled from (All-Union census ... 1989); Population statistics of Eastern Europe and the former USSR. URL: http://pop-stat.mashke.org (date of access March 17, 2020); data from national censuses and the author's calculations.

*Notes: * - Author's estimate; ** - for 2018-2019 without Crimea and the people's republics of Donbass;*** - without Abkhazia and South Ossetia; **** - without Nagorno-Karabakh; ***** - without Transnistria.*

Accelerated rates of decline were experienced by the countries of Transcaucasia, where the Russian communities decreased by a factor of 2.8-3.5 in the first post-Soviet decade. But the greatest decrease in percentage terms of the Russian population in the post-Soviet space was in Tajikistan (by a factor of 5.7), although in the rest of the Central Asian countries too the decline turned out to be quite noticeable (30-50%).

The structure of the demographic losses of Russian communities varied significantly across macroregions and time intervals. Only in the first half of the 1990s did the entire near abroad show a certain uniformity, with the central role played by the outflow to Russia of its most "Russian-centric" part of the population, those little adapted to local life. But already by the mid-1990s the structure of attrition in individual countries was acquiring more and more particular characteristics.

In the western macroregion (Ukraine, Belarus, Moldova), a central role begins to be played by the change in self-identification of the large ethnic Russian population, which in the Soviet period self-defined as Russian and in the new socio-political and sociocultural conditions chose the identity of the titular ethnic group. In the mid-1990s, 20% of Russians in Ukraine had a Ukrainian mother and 10% a Ukrainian father (Savoskul 2001: 89), that is, about 30% of the Russian population of the country were ethnic "semi-Ukrainians". In general, Russian-Ukrainian

biethnophores at this time made up about 20% of the population of Ukraine. The change in the identity of some representatives of this large group mainly determined the dynamics of the Russian population of Ukraine: its loss in the 1990s of 2 million people was associated with this factor (another 1 million were due to natural losses and migration outflow) (Mitrofanova, Suschiy 2017: 48).

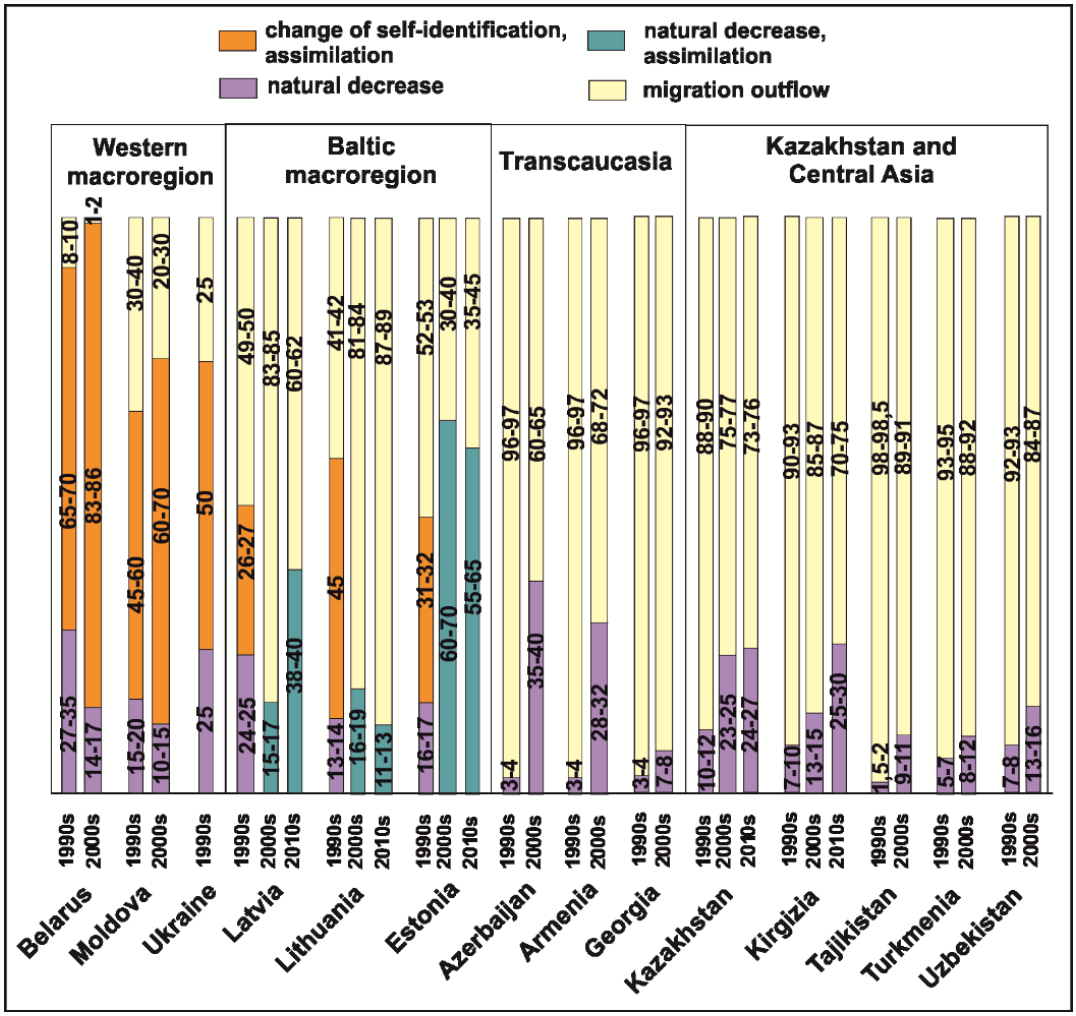

Figure 1. Components of the demographic decline of Russians in the near abroad, 1990–2010, %[7]

Source: Compiled from (All-Union census ... 1989); Population statistics of Eastern Europe and the former USSR. URL: http://pop-stat.mashke.org (date of access March 17, 2020); data from national censuses and the author's calculations.

The situation was similar in the other two countries of the western macroregion. In the last Soviet decades, 70–75% of Russians in the Belorussian Soviet Socialist Republic (BSSR) entered into interethnic marriages; for the Moldavian SSR, this figure was 57–62% (Population of the USSR 1989: 230–231, 282–283). As a result, already in the 1990s, 7 out of 10 children of Russian women in Moldova were born to a father of a different nationality (Ostapenko, Subbotina 2011:

[7] For Figures 1-3, data on Moldova are given without the regions that became part of the Pridnestrovian Moldavian Republic; in Georgia - without the territory of Abkhazia and South Ossetia; and in Azerbaijan - without the territory of Nagorno-Karabakh.

63–65). At the same time, the main marriage partners of Russians in these countries were representatives of the titular peoples, which significantly accelerated the assimilation of mixed offspring of interethnic families. In general, in all three countries of the western macroregion about 2/3 of the decline in the Russian population recorded in the 1990s was associated with a change in identity and the assimilation of the younger generation of mixed families (Figure 1).

On a less significant scale, a change in self-identification of Russian-titular biethnophores is recorded in the second half of the 1990s in the Baltic countries (Suschiy 2018a). In the 1970s – 1980s, interethnic marriages were also widespread among the Russian population of the Baltic republics of the USSR (25–29% of Estonian Russians chose a spouse of another nationality, while 35–38% of Latvian Russians and 47–57% of Lithuanian Russians also did so) (Population of the USSR 1989: 276-277, 286-287, 318-319). But, in contrast to the western macroregion, the main marriage partners of Russians in the Baltics were representatives of Russian-speaking communities (primarily Ukrainians and Belarusians). The share of Russian-titular marriages remained limited, although it gradually increased. But in the new socio-political conditions, not only titular, but also other European identities (Polish, German, etc.) turned out to be more attractive, in which a part of the mixed population, who had previously identified themselves as Russian, also preferred to self-determine. Altogether, in the 1990s a change of identity could account for about 30–46% of the quantitative loss of Russians recorded in the Baltic countries (Suschiy 2018a: 24).

About 40-50% of the decline in the Russian population of the northwestern macroregion recorded in the 1990s was associated with migration. However, outflow to Russia as a significant factor in the demographic dynamics of Russians in the Baltic states was limited only to 1992–1994 (respectively 64.6, 36.0 and 20.1 thousand people per year) (Savoskul 2001: 285). Already in the second half of the 1990s, the average annual net outflow fell to 12-13 thousand people. The same number, on the whole, was accounted for by the natural loss that had increased by this time, which in Estonia rose to 6 ‰ per year, and in Latvia was 7.5 ‰ (Buzaev 2016). In the two southern macroregions of the near abroad in the first post-Soviet decade the decline of the Russian population was associated almost exclusively with its outflow: in some countries, 88–97% of the decline was due to migration[8].

The assimilation component of the demographic dynamics of Russians in the states of Transcaucasia was minimal due to the small number of Russian-titular biethnophores. In addition, this group was absolutely dominated by the offspring of interethnic families represented by a "titular" father and a Russian mother. And already in Soviet times a significant majority of such biethnophores had chosen the titular identity.

The situation was different in Central Asia, in a number of whose countries the assimilation dynamics more likely contributed to the replenishment of Russian communities in connection with the Russification of a part of the representatives of large Russian-speaking diasporas, primarily Ukrainian, Belarusian and German. This process was recorded already in the 1960s-1970s, but it accelerated noticeably in the post-Soviet period after the most nationally oriented representatives

[8] Net migration of Russians from the CIS and Baltic countries, 1992-2001 URL: http://allrefs.net/c4/4e7nk/p11/ (date of access 03/17/2020).

of these communities returned to their historical homeland and their Russified part was preserved in the countries of the macroregion, significantly compressed in size. For this, among the mass of the Russian-speaking and "Russian-cultural" population, the most common (and quite psychologically and socio-culturally acceptable) option was the choice of a Russian spouse with the subsequent Russification of their offspring (Existing 2018b: 26–27).

Thus, in those countries of the macroregion in which Russians constituted a significant part of the population (primarily in Kazakhstan and Kirgizia, partly in Uzbekistan), Russian communities, in fact, turned into the second (along with the titular peoples) pole of ethnic consolidation, attracting representatives of the Russian-speaking diasporas ethnogenetically and socio-culturally unrelated to Central Asia.

The 2000s. The trends in the demographic dynamics of Russians in the near abroad that were formed in the 1990s have continued into the 21st century. All Russian communities are characterized by quite significant natural losses, supplemented by migration losses. But the socio-economic stabilization of the post-Soviet space and the growth of incomes and living standards of a significant part of the population have affected the scale of the outflow of Russians, which has fallen significantly. Also working to reduce migration is the fact that the bulk of Russians determined to leave had already left the near abroad by this time, leaving mainly those who had somehow managed to adapt to post-Soviet realities, including the well-known losses of status and the obvious dominance of the titular groups in all prestigious social hierarchies. As a result, the rate of decline of the Russian population in the 2000s decreased in 9 out of 12 neighboring countries for which a fairly reliable analysis was possible[9].

The total number of Russians in this group of countries decreased in this decade by 2.8-2.9 million people. As in the 1990s, the main loss occurred in the two largest communities: Russians in Ukraine and Kazakhstan (1.0–1.8 and 0.65 million people, respectively)[10]. The Russian population of Uzbekistan could have suffered significant quantitative losses (about 400–450 thousand people), decreasing by 2010 to 500–700 thousand (Arefiev 2012: 121; Khoperskaya 2012: 2). In Belarus, the number of Russians decreased by more than 350 thousand, while the Russian communities of Latvia and Kirgizia lost between 150 and 200 thousand[11].

Also transformed to some extent was the composition of the group of countries with the highest rates of Russian losses. Georgia and Tajikistan remained, while Turkmenistan and Uzbekistan appeared (Table 3). In all these countries, the Russian communities lost about 40-50% of their number in the 2000s. The minimum rate of losses in the first decade of the 21st century was had by the Russian populations of Estonia (2.8%) and Kazakhstan (15.3%).

[9] However, even after slowing down, these rates remained quite high, in most countries of the near abroad coming to 1.6-2.2% per year.
[10] Recall that the data for Ukraine is a calculated estimate, since after 2001 there were no population censuses in the country.
[11] Calculated according to Population statistics of Eastern Europe and the former USSR.
URL: http://pop-stat.mashke.org (date of access March 17, 2020).

Table 3. Reduction of the Russian population in the countries of the near abroad, 1989–2019, %

Country	1989–1999/2002	1999/2002–2009/2011	2009/2011–2018/2019
Ukraine	26.7	10–22*	49-50* (14-20)**
Belarus	14.9	31.3	17.2-24.8*
Uzbekistan	36.5–39.5*	38–40*	15.4-16.7*
Tajikistan	82.5	48.5	14.3–28.6*
Turkmenia	40–43*	50-52.5*	25–33*
Kazakhstan	28.1	15.3	6.4
Kirgizia	34.2	32.3	13.5
Georgia	74.2	44–48*	43–45*
Azerbaijan	63.6	16.2	24.5–37*
Armenia	71.2	20.0	17–25*
Lithuania	36.0	20.5	26–31*
Latvia	22.4	20.9	12.4
Estonia	26.1	2.8	3.5
Moldova	37.3–38.7	25-28*	39.4-42*
Unrecognized (and partially recognized) States			
Abkhazia	64–66.7	12.0–14.8	4.3–8.7
South Ossetia	61.9–66.7	28.6–37.5	20.0
Nagorno-Karabakh	89.5	0.0	15–20
Transnistria Moldovan Republic	11.4	10.5–11.8	4.2–5.9
All the near abroad	29.6–29.9*	17.4–22.0*	20.8–22* (10.5–11)**

Source: Compiled from (All-Union census ... 1989); Population statistics of Eastern Europe and the former USSR. URL: http://pop-stat.mashke.org (date of access March 17, 2020); data from national censuses and the author's calculations.

*Notes: * - Author's estimate; ** - the indicator of loss is given in brackets, excluding Crimea and Sevastopol.*

Altogether, the decline in the population of Russians living in the near abroad in the 2000s was 17.4–22%. This was well below the level of the first post-Soviet decade. By the beginning of the second decade of the 21st century, the total number of Russians in this group of countries was about 13.8-14.9 million.

The structure of the demographic losses of Russian communities, as in the 1990s, was distinguished by a noticeable diversity among various macroregions and countries.

The decline in the Russian population of the Baltic countries (primarily Lithuania and Latvia) was determined by high natural loss (7–8 ‰ per year) and migration, the main destination of which, however, was no longer Russia, but other EU countries (Present 2018a: 25).

In the western macroregion, the scale of the outflow of the Russian population in the 2000s was insignificant. And its demographic losses were determined mainly by natural loss and assimilation of more and more numerous offspring of mixed families. By this time, already 3/4 of the marriages concluded by the Russians of Moldova were interethnic (Ostapenko, Subbotina 2011: 65). Among the Russians of Belarus, the Russian-titular biethnophores could be about 45-50%, and among the Russian population of Ukraine - 43-45% (Mitrofanova, Suschiy 2017: 52). As a result, about 65–85% of the losses of the Russian population of the western macroregion could be attributed to assimilation. Moreover, in Belarus, the rate of demographic decline more than doubled compared to the 1990s.

In the two southern macroregions, migration remained the main reason for the decline in Russian communities in the first decade of the 21st century. Calculations show that about 60-70% of the loss of the Russian population of Armenia and Azerbaijan was associated with it, and more than 90% of the losses of the Russian community of Georgia. In Central Asia, the outflow could account for 75–77% of the decline in the Russian population of Kazakhstan, with corresponding figures of 84–88% for Kirgizia and Uzbekistan and about 90% for Tajikistan.

The 2010s. The analysis of geodemographic trends in the 2010s, as already noted, is seriously hampered by the fragmented nature of the available information. An expert assessment of the current Russian population in Ukraine is extremely difficult. The size of the loss associated with the transition of the Crimean Peninsula to the Russian Federation is known. But only a first rough approximation can be made of the ethno-demographic consequences of a protracted military conflict in the east of the country, of the emergence of the People's Republics of Donbass, of the multidirectional migration and of the dramatic increase in assimilation processes on both sides of the border dividing the DPR-LPR and the rest of Ukraine.

In this first approximation, it seems possible to estimate the number of Russians in modern Ukraine (excluding the People's Republics of Donbass) at 3.3–3.8 million people, which is slightly less than the results of the calculation previously made (Mitrofanova, Sushi 2017: 55). This value is already comparable to the size of the Russian population of Kazakhstan, which, according to current records, at the beginning of 2019 was 3.53 million. It should be noted that although the absolute scale of the demographic decline of Russians in Kazakhstan in the 2010s was very significant (241 thousand people for 2009–2019), in percentage terms (6.4%) this decline was almost minimal among the countries of the near abroad. Only the Russian community in Estonia lost less (3.5%). In two other countries (Latvia and Kirgizia), the relative losses of the Russian population in the 2010s amounted to 12.4% and 13.5%, respectively, and in 6 others they were in the range of 17-30%. The maximum losses were in the Russian communities of Georgia and Moldova (between 39 and 45%).

Considering that the natural decline of Russians in the near abroad over this ten-year period, depending on the country, ranged from 1.5% (Kazakhstan) to 7-8% (Lithuania, Latvia), the demographic losses of Russian communities in almost the entire post-Soviet space in the 2010s were still largely determined by other causes. For the Baltic states, as in the 2000s, this was an outflow to the more developed and successful countries of the European Union, although in Lithuania and Latvia there was also an increase in the importance of assimilation of mixed offspring of Russian-titular families, the total number of which increased noticeably at the beginning of the 21st century. Thus, out of almost 5 thousand children born in 2015 in Latvia to Russian mothers, only 60% had a Russian father. 26% of these newborns had a Latvian father (Buzaev 2016: 26).

For the countries of the western macroregion, the central factor in the demographic decline of the Russian population was also the increasing rate of its mixing with the titular peoples through interethnic marriage, with the subsequent assimilation of a significant part of their offspring (Ostapenko, Subbotina 2011: 65; Mitrofanova, Suschiy 2017: 49-50).

In Transcaucasia and Central Asia, among the factors of the decline in the number of Russians migration outflow continued to dominate, accounting for 70–90% of the decline in most

countries of these two macroregions. In the last 5–10 years, though, in Russian communities with the maximum demographic "contraction" in the post-Soviet period due to serious gender and age disproportions, the natural reproductive factor is beginning to play an increasing role in the overall decline.

Here, one should take into account the overall curve of the natural dynamics of Russians in the post-Soviet period, which coincided for Russia and the near abroad. After an abrupt period of decline (1990s), the entire Russian population showed a gradual improvement in fertility and mortality rates, which made it possible in the first half of the 2010s to significantly reduce natural losses throughout the post-Soviet space. But starting from the middle of this decade, Russians in all countries of this group have recorded a new drop in fertility associated with the entry into adulthood of the small generations of the 1990s. Accordingly, in 2016–2019 the scale of natural decrease also "grew".

Between 2018 and 2019 the total number of Russians in the near abroad could have been on the order of 10.7–11.6 million, i.e., 3.1–3.3 million fewer than at the end of the 2000s. But almost half of this reduction (about 1.5 million people) was associated with the transfer of Crimea to the Russian Federation. That is, demographic processes directly caused a loss of 1.6-1.8 million members of Russian communities, a reduction of 2-2.5 times the level in the 2000s.

The main reason for the slowdown in the decline of Russians in the near abroad is their serious demographic "contraction" that has already occurred. On the whole, over the post-Soviet period the number of Russians in the near abroad has decreased by a factor of 2.2-2.4 (from 25.3 to 10.7-11.6 million people). While, in 1989, 17.4% of the Russian population of the USSR lived in union republics, by the end of the 2010s the near abroad of Russia accounted for only 8.5–9% of Russians living within the former Soviet Union.

At present, 6–8% of the number of Russians in Georgia and Tajikistan at the end of the 1980s and start of the 1990s remains there, with a corresponding number of about 14–20% in Armenia, Azerbaijan, and Turkmenistan. Only in three neighboring countries (Latvia, Estonia, Kazakhstan) have Russian communities managed to retain more than half of their "Soviet" size. Estonia is the obvious leader here (69%) (excluding unrecognized and partially recognized states, which will be discussed below; Figure 2).

The share of Russians in the population of the near abroad has also been declining. However, the rate of this decline has been determined not only by the scale of the demographic losses of the Russian communities themselves, but also by the dynamics of the entire population of each of the post-Soviet States. The general depopulation of the Baltic states and the western macroregion, as well as of Armenia and Georgia, has reduced the percentage losses of local Russians, while the accelerated growth of the populations of Azerbaijan, Kazakhstan and Central Asia has markedly increased them. Tajikistan is the "record holder" in this regard, with the share of Russians in the 1990s – 2010s declining by a factor of about 25. But this indicator also fell severalfold in the rest of the countries of the two southern macroregions. The percentage losses of Estonia and Latvia turned out to be minimal, with Russians continuing to make up about a quarter of the population.

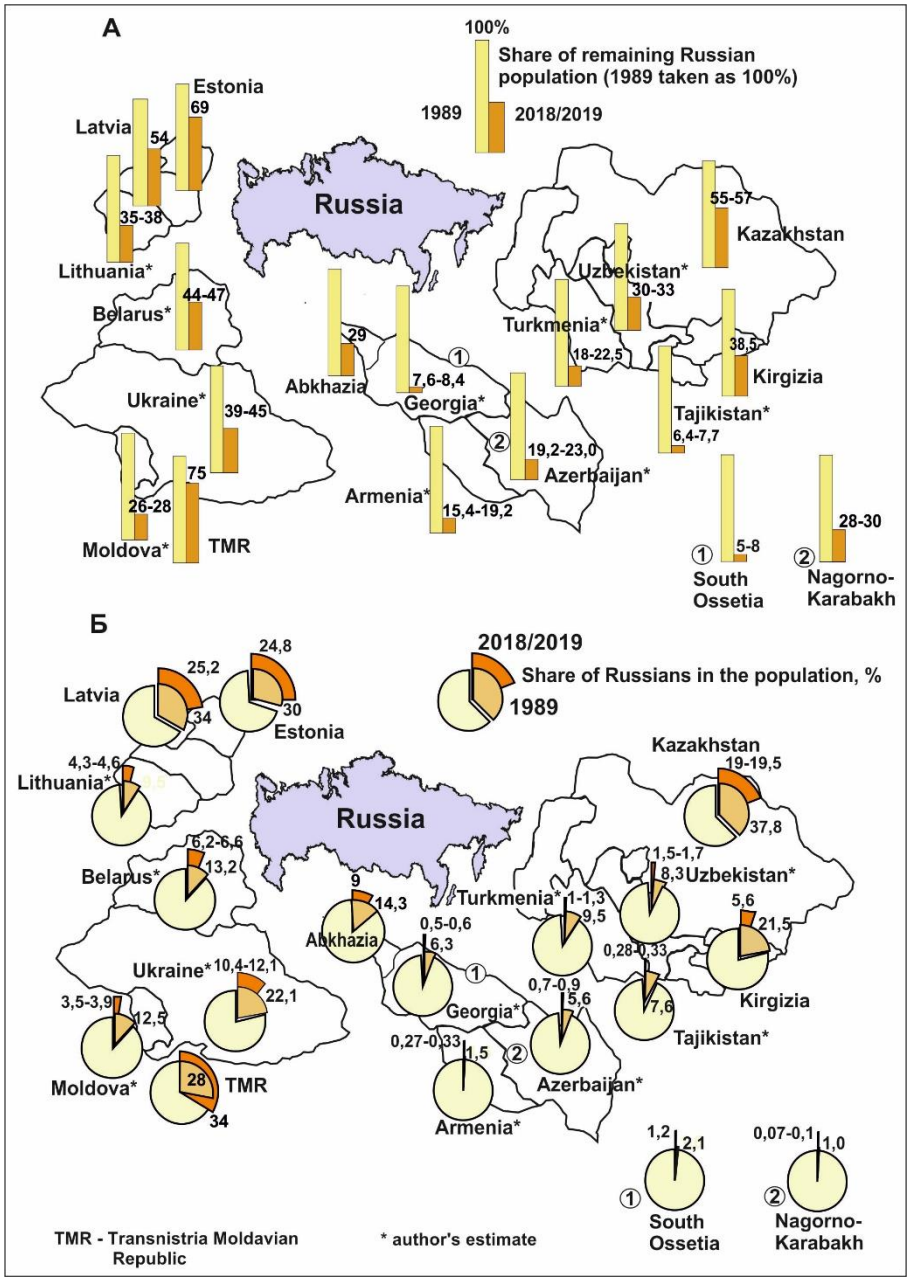

Figure 2. Dynamics of Russian communities in the near abroad, 1989-2018/2019

Source: Compiled from (All-Union census ... 1989); Population statistics of Eastern Europe and the former USSR. URL: http://pop-stat.mashke.org (date of access March 17, 2020); data from national censuses and the author's calculations.

UNRECOGNIZED (PARTIALLY RECOGNIZED) STATES

The geodemographic dynamics of the Russian population of new States arising as a result of the secession of a part of the territory of a country of the near abroad were distinguished by significant peculiarities. In the first half of the 1990s, four such States emerged in the post-Soviet space - Nagorno-Karabakh, Abkhazia, South Ossetia and Transnistria. In 2014, the socio-political crisis in Ukraine led to the emergence of two self-proclaimed republics, Donetsk and Luhansk. For all these entities, with the exception of Nagorno-Karabakh, comprehensive support from Russia was

vital. The transformation of Russia into essentially the main guarantor of the existence of these polities significantly reduced the rate and absolute scale of the decline of the Russian population.

The main quantitative losses of Russians in Transnistria, Abkhazia and South Ossetia occurred during a period of active hostilities and deep socio-economic crisis associated with war (the first half of the 1990s). Subsequently, the scale of the demographic decline of Russians decreased significantly and was mainly associated with negative natural dynamics, which ensured a significantly greater stability of Russian communities than in the countries from which these polities emerged. For example, for 2002–2014, the number of Russians in Georgia decreased by a factor of 2.6 (from 67.6 to 26.4 thousand people), and in Abkhazia in 2003–2016 - only 4.7%[12].

In Moldova, between 2004 and 2014 the number of Russians decreased by 44.3%, and in the Transnistrian Republic between 2004 and 2012 - by 13.6%. As a result, while at the end of the 1980s the number of Russians in Transnistria was only 60% of the Russian population of the rest of the Moldavian SSR (211 and 351 thousand people, respectively), by the mid-2010s the ratio had already been reversed (160 thousand Russians in Transnistria and only 112 thousand in Moldova)[13].

The ethnopolitical and sociocultural dynamics of Ukraine and the Donbass republics in the second half of the 2010s indicate that their Russian population could change in a similar way in the long term (an accelerated reduction in the territories controlled by Kiev and the preservation of their numbers within the DPR and LPR). Should such a scenario unfold, by 2040–2050 the number of Russians in the people's republics and in the rest of Ukraine could become comparable, despite the fact that at present Ukraine's Russian population is approximately 3 times larger (3.3–3.8 and 1.1–1.3 million people, respectively) (Suschiy 2016: 256-263).

Thus, it was the socio-political orientation of the post-Soviet states and the level of their systemic "pro-Russianness" that were one of the central factors determining the quantitative dynamics of the local Russian population.

The total number of Russians in unrecognized (partially recognized) States of the near abroad remained insignificant until the mid-2010s (about 200 thousand people). The emergence of the People's Republics of Donbass increased this number to 1.3-1.5 million. At present, this group of countries already accounts for 12-13% of the total Russian population of the near abroad. And the ethno-demographic trends that have developed in the post-Soviet space give reason to believe that their percentage will continue to grow in the future.

PERCENTAGE DYNAMICS OF RUSSIANS BY COUNTRY AND LARGE MACROREGIONS

Ukraine has continued to have the largest concentration of the Russian population in the near abroad throughout the post-Soviet period. Its share of the total number of Russians continued to

[12] Population statistics of Eastern Europe and the former USSR. URL: http://pop-stat.mashke.org (date of access March 17, 2020).
[13] Calculated according to: (All-Union Census 1989); Population statistics of Eastern Europe and the former USSR. URL: http://pop-stat.mashke.org (date of access March 17, 2020).

grow during the 1990s and 2000s, gradually approaching 50%. But by the end of the 2010s, already without Crimea, it could account for only about 41.2–43.8% of all Russians in this group of countries (4.4–5.1 million people). However, it should be borne in mind that of this number about 1.1-1.3 million were the Russian population of the People's Republics of Donbass, without whom the share of Ukraine decreases to 31-32.5%, making it, as noted above, comparable to the percentage indicator of the Russian population of Kazakhstan.

Within the limits of modern Ukraine there remain several regions in which Russians are not only numerous but constitute a significant part of the local population. In the "Ukrainian" part of the Donetsk region, they account for 30-33% of the population, in Kharkov and Zaporozhye - about a quarter, in Odessa - up to 20%, and in Dnepropetrovsk - between 16.5 and 17% (Mitrofanova, Suschiy 2017: 52). Half of the ten largest urban centers - the centers of the Russian population of the near abroad - are still in Ukraine (in addition to Donetsk, these are Kharkov, Odessa, Kiev and Dnepropetrovsk).

The share of the Russian community of Belarus in the structure of the entire Russian population in the 1990s-2010s could have grown somewhat (from 5.3 to 5.5-5.6%), while Moldova, taken together with Transnistria, remained unchanged (2, 2%; Figure 3). As a result, in the post-Soviet period the share of the entire western macroregion, which still accounts for about half (49–51.7%) of the Russian population of the near abroad, has hardly changed in the post-Soviet period.

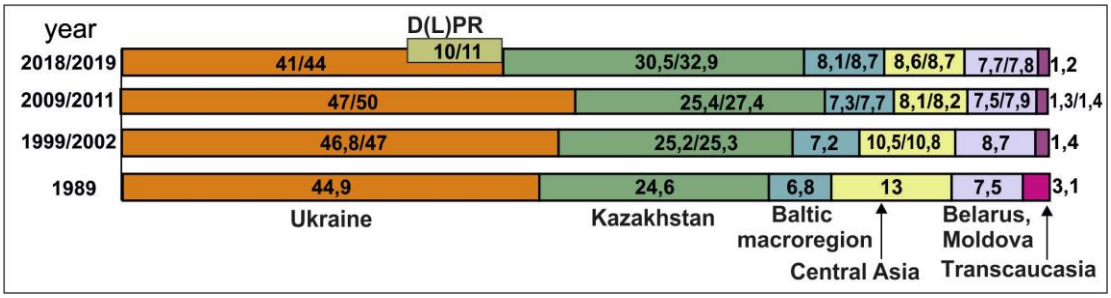

Figure 3. The share of individual countries and macroregions in the total Russian population of the near abroad (former union republics of the USSR), 1989–2018/2019, %

Source: Compiled from (All-Union census ... 1989); Population statistics of Eastern Europe and the former USSR. URL: http://pop-stat.mashke.org (date of access March 17, 2020); data from national censuses and the author's calculations.

Note: For Moldova, data for 1999–2019 take into account the Russians of Transnistria.

Over the three post-Soviet decades, it is the Russian population of Transcaucasia that has declined the most, and the main part of this process had already been “completed” in the 1990s. By the beginning of the 21st century, 250 thousand Russians remained in the macroregion - 3.1 times fewer than in 1989 (785 thousand). But the accelerating depopulation of the majority of local Russian communities continued in the 2000s and 2010s. By now, about 120-130 thousand Russians may remain in Transcaucasia. About half of them are concentrated in Baku. Other major

Russian territorial centers include Tbilisi (10-12 thousand) and Abkhazia (20-21 thousand)[14]. Thus, at present, the most significant number of Russians in the macroregion are residents of two capital centers and one partially recognized State bordering Russia.

In Central Asia, Tajikistan was the first of the post-Soviet states to almost completely lose its Russian population: in 1989–2000 its Russian community fell from 388 to 68 thousand people. About 1/5 and 1/3 of Russians from the level of the late 1980s remain, respectively, in Turkmenistan and Uzbekistan. The Russian community of Kirgizia has been better preserved, but it also shrank by a factor of 2.6 in the 1990s – 2010s. In the late 2010s, the total number of Russians in Central Asia was about 0.94-1.0 million people, about half of whom were in two capitals - Tashkent (300-350 thousand) and Bishkek (about 170 thousand) (Fedorko, Kurbanov 2018: 44).

The number of Russians in Kazakhstan has decreased in the post-Soviet period by more than 2.5 million people. But in percentage terms, this decline was only 43–44%, which was one of the lowest rates in the entire post-Soviet space. This circumstance allowed the Russian community of the country to significantly increase its share in the structure of the Russian population of the entire near abroad (in the 1990s – 2010s it grew from 24.6 to 30.5–32.9%). The second capital of Kazakhstan, Alma-Ata, is the largest center of the Russian population in the near abroad (468 thousand in 2019). Karaganda (203 thousand) and Ust-Kamenogorsk (183 thousand) are also in the top ten cities of Kazakhstan.

Compared to other macro-regions of the near abroad, the Russian population of the Baltic has also survived quite well, despite the fact that its dynamics vary significantly in individual countries. The rate of decline of Russians in Lithuania was comparable to that of the Central Asian states (by the end of the 2010s, 35–38% of the Russian population remained in Lithuania from the 1989 level), and the Russian community in Estonia demonstrated the greatest stability in the entire group of post-Soviet countries[15]. Currently, about 940-950 thousand Russians remain in the Baltic countries, 82-83% fewer than at the end of the Soviet period.

Significant differences in the rate of decline have affected the overall ratio of the Russian population in various macroregions. While the significant scale of the Russian communities in Ukraine and Kazakhstan allows these countries to remain the main centers of Russians within the near abroad of Russia, the ratio of communities in other macroregions has changed. The Russian population of the Baltic states, which in the late 1980s lagged behind that of Central Asia by almost 2 times (6.8 and 13%, respectively), by the end of the 2010s had practically caught up with it (8.1–8.7 and 8.6–8.7%), at the same time overtaking the size of the Russian communities in Belarus and Moldova. The share of Russians in Transcaucasia, who currently account for only 1.2% of the

[14] All other centers/territories had significantly lower numbers than those listed. Among the urban communities, one can single out the Russians of Yerevan (4-4.5 thousand), Sumgait (1.5-1.7 thousand) and Rustavi (1.0-1.2 thousand). Population statistics of Eastern Europe and the former USSR. URL: http://pop-stat.mashke.org (date of access March 17, 2020).

[15] Except for the unrecognized republic of Transnistria.

Russian population of the near abroad, has significantly decreased. At the end of the 1980s and start of the 1990s this figure was about 3%[16].

AGE AND SEX STRUCTURE OF THE RUSSIAN POPULATION

Along with a decline in numbers, Russians of the near abroad in the post-Soviet period have undergone an appreciable transformation of their gender balance and age structure. The active migration outflow not only reduced Russian communities, but, above all, "leached out" young people and people of middle working age. As a result, the "oldest" communities, as a rule, have turned out to be those suffering the greatest migration losses in the post-Soviet period. But the shift in the age structure towards the older generations has had a negative effect on natural reproduction indices. Moreover, a central role in growing natural decrease was played by low fertility (mortality, as a rule, corresponded to the Russian indicator).

The median age of Russians in most countries of the near abroad was 40–42 years by the beginning of the 21st century, and by now it is likely to have grown by another 2–3 years. In a number of post-Soviet States (including Latvia, Lithuania and Moldova) in the mid and late 2010s it was in the range of 46–49 years. Persistence of this trend could, in the medium term, lead to an increase in the median age of Russians in these countries to 50–55 years, as a result of which the rates of natural and general demographic decline of Russians will begin to noticeably accelerate. However, it should be borne in mind that an increase in the median age of Russians has also taken place in Russia itself, where it is now also close to 40 years, slightly differing from this indicator for the Russian populations of Kazakhstan, Kirgizia, Ukraine and Belarus.

The gender structure of Russian communities in the near abroad has also been upset in the post-Soviet period. Its perceptible imbalance is associated with the growing preponderance of women, largely due to the more active outflow of the male population. It should also be taken into account that in almost all countries of the post-Soviet space Russian women were much more often than men married to representatives of the titular peoples, which also increased the gender disproportion in the migration outflow of Russians.

In the Russian community of Azerbaijan, already in 1999 there were 59 men per 100 women[17]. The situation was similar in other countries of the Caucasus. In the first two decades of the 21st century, this gender imbalance increased even more. In other macro-regions of the near abroad, this imbalance is not so significant. Nevertheless, in 2009–2015, in the Russian communities of Kirgizia and Moldova there were 77–79 men per 100 women, in Kazakhstan and Estonia - 81–82[18].

The growing feminization of a significant number of Russian communities in the near abroad has had a negative impact on their natural dynamics. The shortage of men has resulted in

[16] It should be noted that in 1959 Transcaucasia accounted for 5.9% of the Russian population of the union republics of the USSR. Thus, the process of the outflow of Russians from this macroregion began long before the collapse of the Soviet Union.
[17] Yunusov A.S. (2003). Ethnic and migration processes in post-Soviet Azerbaijan. URL: http://chairs.stavsu.ru/geo/Conference/c1-67.htm
[18] According to the national censuses of these countries.

an increase in interethnic marriage of Russian women (including with representatives of the titular nations) and an intensification of the assimilation process (Buzaev 2016; Ostapenko, Subbotina 2011: 65).

SETTLEMENT FORM

As already noted, the decline of Russians within the near abroad has been widespread. But there have been certain shifts in the ratio of various forms of settlement. During the Soviet period, the Russian population of most of the union republics was distinguished by an increased level of urbanization. In 1989, in five of them, the share of city dwellers among local Russians was 92–97%, in seven - 85–90%. Only in Kazakhstan and Kirgizia was this level significantly lower (77 and 69.9%, respectively) (All-Union census ... 1989).

In the post-Soviet period, out of 11 countries for which there was relevant information, the proportion of urban dwellers among the Russian population increased only in Azerbaijan, did not change in Tajikistan and Ukraine, and decreased in 8 countries - in three quite significantly (in Armenia, Latvia, Moldova; Figure 4). In general, the rural Russian population of the near abroad has shown a higher degree of rootedness than the urban population.

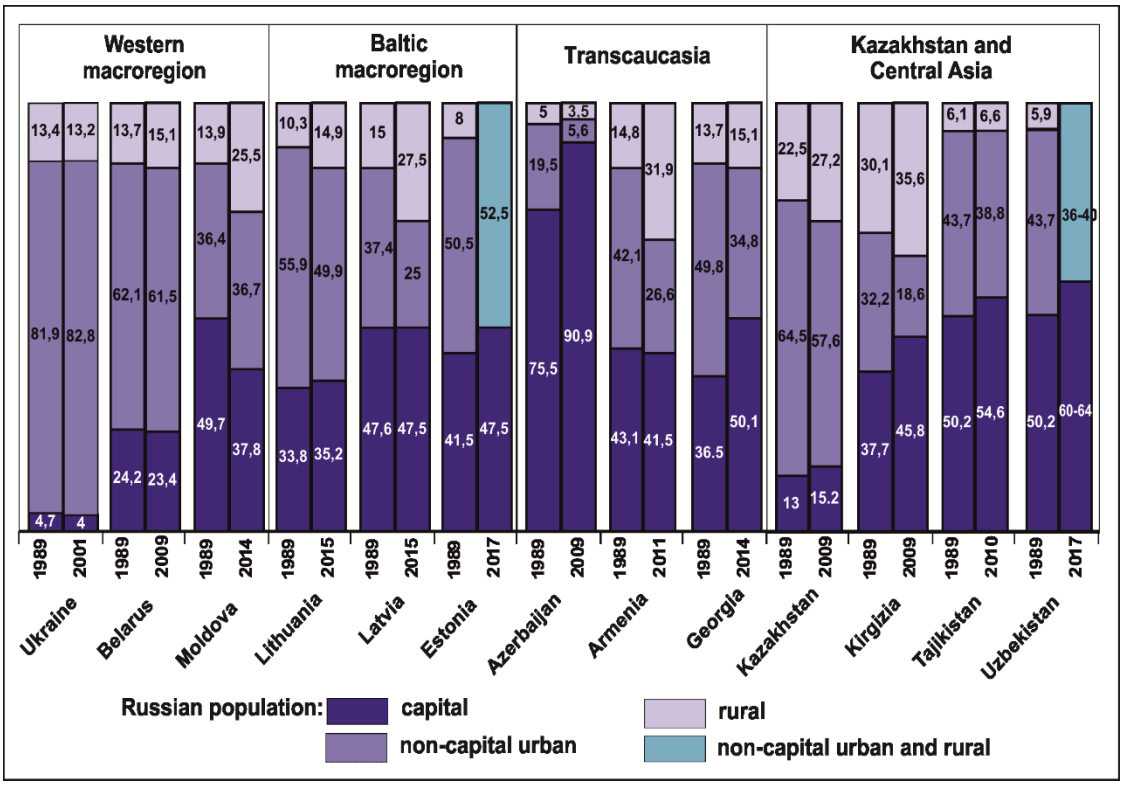

Figure 4. The share of different levels of the settlement system in the distribution of the Russian population of the near abroad (union republics of the USSR), %

Source: Compiled from (All-Union census ... 1989); Population statistics of Eastern Europe and the former USSR. URL: http://pop-stat.mashke.org (date of access March 17, 2020); data from national censuses and the author's calculations.

But among the Russian city dwellers, the ratio between the capital and the rest of the population has noticeably changed. In six of the thirteen countries of the near abroad, the share of Russians concentrated in the capitals has increased (especially noticeably in Georgia, Azerbaijan, and Uzbekistan), while in four it has hardly changed. At the same time, the proportion of "non-capital" Russian city dwellers has decreased in eight out of eleven countries. In other words, regional urban networks have been losing their Russian population at an accelerated rate, since, in addition to the outflow to Russia and the far abroad, some of their Russian residents have moved to the capital centers. Thus, there is a certain "polarization" of the Russian settlement system, concentrated in the capitals and in the countryside. But it should not be forgotten that these shifts occurred at different rates of decline, and in any case were associated with the growing fragmentation of the settlement system and the gradual territorial enclavation of the Russian population.

In Central Asia, Russians have left the countryside almost entirely. Even in Kirgizia, which has preserved more than 120 thousand people of the rural Russian population, it is almost entirely concentrated in the vicinity of the capital Bishkek (Chui oblast) and partly in the Issyk-Kul oblast. In Uzbekistan, it is largely limited to the rural environs of Tashkent and a number of regional centers.

The smallest number of rural Russians remains in the Transcaucasus, while their share in the structure of Russian communities has changed in different directions (decreasing in Georgia, not changing in Azerbaijan, increasing in Armenia). But in all three States the number of settlements without Russian residents has increased many times over. And the epicenters of the Russian ethnic presence in the rural areas of the Transcaucasus remain rare Old Believer villages (the province of Lori in Armenia, Ismaily in Azerbaijan).

The geography of rural Russians has also significantly decreased in two other macroregions of the near abroad, although here their settlement system remains, as a rule, wider (with the exception of Moldova and Lithuania). However, the largest Russian rural population is in Kazakhstan, which accounts for up to half of its population in the entire near abroad (940-950 thousand out of 1.94-1.95 million people). About 500-570 thousand rural Russians live in Ukraine (including 100-120 thousand in the republics of Donbass), more than 130 thousand in Latvia and 90-95 thousand in Belarus.

CONCLUSIONS

In the 1990-2010s the Russian population of the near abroad decreased from 25.3 to 10.7-11.7 million people. This process was most intensive in the first post-Soviet decade. The decline was widespread, covering all levels of the settlement system (from the capitals to the rural periphery). The Russians almost completely left the States of post-Soviet Transcaucasia, as well as Tajikistan. Their demographic losses also turned out to be significant in other countries of the post-Soviet space. Only in three States (Estonia, Latvia and Kazakhstan) is the number of Russians now more than 50% of the 1989 figure.

The age and sex structure of Russian communities has been significantly deformed. Almost all of them have a noticeable preponderance of women, which in some countries is already almost

double (55-60 men per 100 women). The median age of the Russian population in all countries of the near abroad exceeds 40 years, and in almost half it is in the range of 45–50 years, which is becoming one of the reasons for the increased level of natural decrease (8–10 ‰ per year or more).

The ratio of various factors of quantitative decline have varied across the periods and macroregions of the post-Soviet space. For the early to mid-1990s, the greatest losses of almost all Russian communities are associated with migration outflow to Russia. Later, the general trend is replaced by many trends typical for different countries. In the western macroregion (Ukraine, Belarus, Moldova), the change of identity by part of the Russian-titular biethnophores, assimilation processes associated with the growth of interethnic marriage of the Russian population and the choice of the titular nationality by the mixed offspring of such families begin to play a central role. The Baltic region (for Lithuania and Latvia) is also characterized by a certain intensification of assimilation, but the main reason for the quantitative reduction since the beginning of the 21st century is the outflow of Russians to the far abroad. In Transcaucasia and Central Asia, throughout the post-Soviet period migration to Russia has played a leading role in the demographic decline of Russians.

The level of urbanization of the Russian population in most countries of the near abroad in the 1990s-2010s decreased due to the rapid loss of non-capital city dwellers. The metropolitan and the rural Russian populations were the best preserved, which contributed to a certain spatial polarization of the settlement system, with a concentration of Russians on its upper and lower floors. However, a significant number of Russians who had remained in rural areas were also drawn towards capitals and other large centers.

The proportion of Russians in individual countries and macroregions has changed. Currently, the numbers of Russians in Ukraine (excluding the People's Republics of Donbass) and Kazakhstan are already comparable. In the medium term (2030–2035), it is Kazakhstan that is likely to become the largest concentration of the Russian population in the near abroad, and the Baltic countries will overtake Central Asia in terms of this indicator.

Russian communities of unrecognized (partially recognized) States that emerged in the post-Soviet space are distinguished by a higher demographic stability in the 2000s and 2010s. After they acquired de facto independence, the rate of decline in the local Russian population decreased significantly and was linked above all to natural decrease. At present, this group of "polities" already accounts for about 12-13% of Russians in the entire near abroad. And this number is likely to continue to grow in the future.

In general, the share of post-Soviet Russians concentrated in Russia itself is steadily growing, while the share of Russian communities in the entire near abroad is decreasing. In the 1990s and 2010s it was halved (from 17.4 to 8.5–9%), which is the result of a whole complex of processes: the natural decrease of the Russian population, its migration to Russia and the far abroad and assimilation into the titular peoples. The rates and absolute scale of the absolute and relative reduction of Russian communities are gradually decreasing. But the trend itself remains stable throughout the post-Soviet period.

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THE RESULTS OF THE 1939 SOVIET CENSUS: TWO PROBLEMS OF ADEQUACY

MARK TOLTS

The article examines the adequacy of contemporary estimates of the total population of the Soviet Union based on the 1939 census. To do so, it analyzes the instructions for filling in the census form. Comparison of the better worded 1959 census instructions with the poorly worded instructions of the 1939 census shows that the latter created possibilities for double counting of the population. These findings confirm the validity of the lowest estimate of the total population of the USSR based on the 1939 census, given by the famous Russian demographer Andrei G. Volkov, which stood at only 167.6 million people. The impact of the inter-republic reallocation of prisoners' census forms was also estimated. For the entire population of Russia these estimates do not, for most indicators, change the picture previously known from the official census results. On the other hand, for Ukraine and especially Kazakhstan, the recalculations produced noticeable changes, in some cases resulting in significant corrections of the composition of the pre-war population.

***Key words**: population, census, Soviet Union, Russia, Ukraine, Kazakhstan.*

Three decades have passed since the complete declassification of the materials of the 1939 Soviet census, yet attention to its results remains unabated. After all, only fragmentary results of the 1937 census that preceded it, rejected by the country's leadership, have survived. The results of this census have not been fully processed, and its scanty materials can only serve as an auxiliary tool for analysis. Thus, the 1939 census remains the only detailed source showing the size and structure of the population of the USSR and its parts on the eve of World War II after the gigantic upheavals of the 1930s. It is its data that are used in estimating losses as a result of the 1932-1933 famine and of the war in 1941-1945. And yet, they continue to be the subject of controversy. The most controversial question remains that of the total population of the country and its regions. This issue is the main focus of researchers. In contrast, the complex problem of the adequacy of structural indicators based on the census is still very poorly understood. This article is devoted to some important aspects of both of these problems. In the first section, when analyzing the general results of the 1939 census, special attention will be paid to the problematic provisions of the instructions for filling in the census form, which, as their analysis shows, created, in particular, the possibility of double counting. The main objective of the second section is to assess the impact of the inter-republican reallocation of census forms of prisoners on the indicators of the structure of the populations of Russia, Ukraine and Kazakhstan.

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1.

The 1939 census, as a result of direct falsification of its results, estimated the total population of the country at 170.6 million people[1]. This was achieved in several successive steps. In the official results of the census, in addition to the actually enumerated population, data from special forms for checking the correctness of the count in the census ("control forms") were included, probably often unjustifiably. The resulting total figure of the population of the USSR was once again increased by one percent, allegedly due to a possible undercounting of the census population. Distortions had their own peculiarities for certain territories, including with the aim of concealing the number of servicemen and prisoners, enumerated using a special procedure. The original materials of the 1939 census and the methods of its falsification became known only after the declassification of the Soviet archives (Bogoyavlensky 2013).

The controversy over the results of this census has a long history. Probably the first specialist to question the results of the 1939 census was the former head of one of the regional statistical offices, who ended up in the West after the end of World War II, under a pseudonym ("P. Galin"). This was done in a work specially devoted to Soviet censuses, which appeared as one of the first publications of the Munich Institute for the Study of the History and Culture of the USSR, founded in July 1950 by a group of émigré scholars from the Soviet Union. Judging by the text of this work, its author was directly related to the 1937 and 1939 population censuses in his region (Galin 1951). The most interesting places in his work are full of personal memories of a well-informed witness about the peculiarities of the functioning of Soviet demographic statistics in the 1930s. This is the only and undoubtedly valuable addition to the well-known memoirs of Mikhail V. Kurman (1993), one of the repressed leaders of Soviet statistics of that period. Galin in his publication was the first to point out, in particular, that manipulations of the data of the control forms introduced in the census were aimed at inflating the population size in the 1939 census.

Galin soon received a forceful objection from Basilius Martschenko (Vasily P. Marchenko) in a work prepared in the same institute, but published in the USA, which relied on the official data of the 1939 census. Here is what was written by its author, a former senior researcher of the Ukrainian Academy of Sciences who, while himself not taking part in conducting this census, as an economist-planner was a consumer of it official results, including those not published in the open press: "Any falsification of the basic absolute results of the census is, in general, an operation so complicated and risky that even the Soviet statistical apparatus, in other cases ready to falsify all kinds of statistical data for the needs of Soviet propaganda, had to abstain from it" (Martschenko 1953: 2). However, the seemingly impossible, as we now know, was done - the results of the 1939 census were distorted in accordance with a special top-secret algorithm developed by the organizers of this census. Note that Martschenko's point of view on the results of the 1939 census remained dominant even among specialists until the opening of the Soviet archives.

However, even after all the archival materials of the 1939 census became available to researchers, attitudes towards them differed greatly. Let's note two extreme positions. According to one of them, a longtime researcher of the problem continues to believe that "the 1939 census

[1] Initially, a slightly lower figure was published - 170.5 million.

was carried out with great care and is probably the most accurate" (Maksudov 2014: 308). In contrast, an internationally renowned scholar of the history of the Soviet period only reinforced his former opinion that the materials of this census were "totally worthless" (Conquest 2000: 145).

In any statistical work, especially one as complex as a population census, instructions on the collection of primary material are of paramount importance. In the case of a census, these are the instructions for filling in the census form. It is with them that any analysis of the problems of the adequacy of the results of the 1939 census should begin, yet this, unfortunately, is usually not done. After all, it is known that it is at the stage of collecting material that a very serious distortion of statistical information can occur; an example of this is the crop yield statistics of the Stalinist period (Wheatcroft, Davies 1994).

Therefore, it makes sense to compare the content of the instructions for the censuses of 1939 and 1959 (TsUNKhU SSSR 1938; TsSU SSSR 1958). The first post-war census was prepared in a calm atmosphere. Its instructional materials were reviewed in detail well in advance, in 1957 at the All-Union conference of statisticians, in which a very wide circle of specialists took part (Vsesoyuznoye soveshchaniye ... 1959). In contrast, the compilation of instructional materials for the 1939 census was strictly controlled by the top leadership of the USSR and was not discussed openly, which could not but affect their quality. This was the most difficult time for Soviet demography (Vishnevsky 1996).

A comparison shows that the two instructions for filling in the census form were far from identical. The instructions for the 1959 census are much more extensive and precise. In particular, they included a new category, important for the accuracy of the census results, of temporary residents, which was completely absent in 1939. Another drawback of the instructions for the 1939 census, noted by one of its active participants, who was to lead the two subsequent Soviet censuses, was that that in it "the question of cases in which it is necessary to draw up a control form was not sufficiently clear and detailed" (Podyachikh 1957: 151-152). During the 1959 census, this part of the instructions was expanded and concretized. The already noted imperfection of the instructions does not allow us to consider the number of control forms received in 1939 as adequate.

The most important changes in the instructions for the 1959 census were corrections of those provisions that might have led to double counting in the 1939 census. Above all, this was the clear indication in paragraph 5 of the instructions for the 1959 census that "the present population [*nalichnoye naseniye*] includes … everyone who spent the night from 14 to 15 January in this building, regardless of whether they live here or not (except for those specified in paragraph 5i)". The above-mentioned paragraph 5i specifies that "all those who were not at home, but on the territory of the same city, settlement or village council (for example, visiting relatives and friends)", should not fill in the census form for the place where they spent the night (TsSU SSSR 1958: 33-34). However, the exception stipulated in 1959 ("except for those specified in paragraph 5i") was absent in the corresponding place of the instruction for the 1939 census. On the contrary, the instruction indicated that "the present population includes all those who spent the night from January 16 to January 17 in this building and all those living in it who that night were on the territory of the same city, settlement or village council" (TsUNKhU SSSR 1938: 250-251). This created a real possibility of double counting for the relevant population group. In 1959,

paragraph 5z of the instructions was also clarified, which indicated that the present population included “those who had gone to the bazaar (fair) and were not staying where they could be enumerated (in kolkhoz guest houses, in hotels, with relatives, acquaintances" (TsSU SSSR 1958: 34). In 1939, those “not staying there where they could be enumerated” were not mentioned in the same paragraph of the instructions (TsUNKhU SSSR 1938: 251), which again could have led to double counting.

All these omissions and problematic provisions of the instructions for the 1939 census do not allow us to consider it “the most accurate”. A worse written instruction cannot give a better result. This is an axiom of statistical practice. But there were other factors that negatively influenced the adequacy of its primary materials – above all, the pursuit of higher numbers when collecting them. “The efforts of the organizers of the [1939] census more likely led to overcounting than undercounting of the population,” correctly wrote Evgeny M. Andreev, Leonid E. Darsky and Tatyana L. Kharkova (1993: 33). However, these authors did not take into account the possibility of double counting when preparing their most famous estimates of the population of the USSR based on the materials of this census. Then again, I myself do not know how to numerically express the influence of this factor.

Table 1. Corrections of the total population of the USSR based on the results of the censuses of 1937 and 1939 proposed by some authors

Authors	1937 census		1939 census	
	Estimated population, millions	Upward correction, %	Estimated population, millions	Downward correction, %
Andreev, Darsky, Kharkova	162.7	0.4	168.9*	1.0
Volkov			167.6	1.7
Maksudov	162.8	0.5	168.6	1.2
Official census result	162.0		170.6	

*Note: * - Main variant; according to the lower variant - 168.3 million people.*

Sources: (Andreev, Darsky, Kharkova 1993: 29; Volkov 1997: 18; Maksudov 2019: 244, 265).

Now, having an idea of the problematic nature of the guidelines for counting the population in the 1939 census, let us consider post-Soviet estimates of the total population of the USSR based on it (Table 1). Their differences remain significant, and the range of proposed corrections is much larger than in the case of the 1937 census. The downward corrections for the 1939 census range from 1.7 to almost 3 million (1.0-1.7%), while upward corrections to the 1937 census are concentrated in a very narrow interval between 0.7 and 0.8 million (0.4-0.5%). While the methods of calculating estimates for 1939 used by the just named three authors and Sergei Maksudov are well known and described in detail in their works (Andreev, Darsky, Kharkova 1993; Maksudov 2014), the estimate of the results of this census given by Andrei G. Volkov requires special consideration, especially since it remains undeservedly forgotten to this day.

Volkov (1997: 18) expressed his opinion clearly in the following words: “The census of 1939, despite the strictest control and even direct calls to inflate the population size, gave only 167.6 million. Knowing that they would be in trouble, the new heads of TsSU and Gosplan artificially exaggerated the results of the census by almost 3 million people in order to "reach" the

population size announced by [Joseph Stalin at the XVIII Party Congress]." Volkov was certainly firmly committed to this view, since he had expressed it earlier (Volkov, Gozulov, Grigoryants 1994: 312). A similar numerical estimate is given by such well-known researchers of the 1939 census as Dmitry D. Bogoyavlensky (2013) and Valentina B. Zhiromskaya (2001).

Today, the stages of getting the approval of the country's top authorities for the total population size based on the results of the 1939 census are well known (Davies et al. 2018). Volkov may not have known about all of them, but the artificial inflation of its results was clear even then. When considering the significance of his assessment of the results of the 1939 census, it is important to take into account that Volkov was undoubtedly the best informed expert when he expressed his opinion, and his knowledge went far beyond the boundaries of formal sources[2]. Volkov's position in the system of Soviet state statistics was uniquely significant, despite the fact that he did not hold any high administrative position there, but was only the head of the Demography Department of the Research Institute of Statistics (Vishnevsky 2014).

The assessment given by Volkov means that he not only did not agree with the one-percent correction for underestimation, but he also did not accept the data from the processing of control forms, which were partially taken into account in their assessment by Andreev, Darsky and Kharkova, who worked in his department. For this it was necessary to look at the problem differently and have solid evidence. But did Volkov know the results of the processing of control forms? Absolutely. Maksudov (2014: 332), their great enthusiast, reports that he received a copy of the results of their processing from Darsky "25 years ago". Consequently, Volkov, under whose leadership Darsky and his co-authors then worked, could not but know about them. There are two possible explanations for Volkov's position. Either he believed that the refusal to take into account the results of the processing of control forms counterbalanced the double counting, or he believed, based on some information known to him, that these results were completely inaccurate and should not be taken into account. It is worth recalling that it has been mathematically proven that the country lacked the large mobility of the population which would correspond to the official results of the processing of control forms for the 1939 census; moreover, to the researchers who performed the corresponding calculations, their very number seems to be doubtful (Andreev, Darsky, Kharkova 1998: 36).

It is now natural to apply Volkov's figure of 167.6 million people based on the 1939 census to assess the reliability of the results of the previous 1937 census. To do this, we will also use the results of two alternative calculations by Andreev, Darsky and Kharkova on the value of natural increase in 1937 and 1938 - 5.4 and 6.0 million, respectively (Andreev, Darsky, Kharkova 1993: 48). An approximate calculation based on them gives figures that differ from the result of this census, equal to 162.0 million people - 161.6 and 162.2 million. The resulting large figure is not much higher than the census result, while the estimates of other authors significantly exceed it, reaching 162.8 million (Table 1). The lower estimate is even less than the official census figure. As my previous analysis of the 1937 census instructions showed, some of their provisions also led to double counting (Tolts 1991). It can be assumed that this factor seriously counterbalanced the

[2] As a confirmation, I can tell that it was from Volkov that I was fortunate enough to first find out the population of the USSR from the 1937 census, although the Goskomstat leadership persistently denied then the very fact that something had survived from this census.

undercounting in this census, of which it was always suspected. However, if the real population size according to the 1939 census is less than the estimate based on it given by Volkov, then the estimates for 1937 will be even lower.

Table 2. Correction of the official results of the censuses of 1937, 1939 and 1959 for early childhood ages proposed by Andreev, Darsky and Kharkova for the population of the USSR, %

Age, years	1937 census	1939 census	1959 census
0	+2.1	-0.8	+4.0
1	+0.5	-0.8	+2.7

Sources: (Andreev, Darsky, Kharkova 1993: 62; Kharkova 1995: 8).

There is another classic way of evaluating the accuracy of censuses - by analyzing the correction values for younger children. This is possible according to the results of calculations by Andreev, Darsky and Kharkova for the censuses of 1937, 1939 and 1959 (Table 2). The comparison shows that the magnitude of the corrections is noticeably smaller for the 1937 census than for the 1959 census, the accuracy of which has never been seriously questioned. These three authors, in the course of their study of the dynamics of the population of the USSR, corrected upward the overall results of the 1959 census by only 0.1% (Andreev, Darsky, Kharkova 1993: 63). The unusual negative correction of the 1939 census data for both the youngest ages (-0.8%) cannot be explained solely by an unjustified total 1% upward adjustment. Even after its removal, the underestimation, especially in the first year of life, remains unusually low, which can be interpreted as confirmation of the hypothesis about the role of double counting in this census. However, it is possible, looking just at these figures, to continue to assert that the 1939 census was "the most accurate."

The technical side of the mechanized processing of data from the 1939 census has been described in sufficient detail (Zhak 1958). Today, supposedly, all of its surviving materials are open to researchers, yet they too do not contain a specific algorithm for inflating the population size and concealing classified contingents, primarily the army, in the results. In general, there is data on it, but it is not known how the structural characteristics of the army contingents were included in the materials of individual regions.

2.

The main purpose of every census is to capture the composition of the population. However, the 1939 census marked the beginning of the practice of territorial reallocation of a part of the recorded population in the census results, a practice which existed until the end of the Soviet period (Tolts 2001). After the declassification of the 1939 census materials, it became known that during the processing of its results, census forms for 758.7 thousand people were sent to Ukraine and Kazakhstan (Simchenko 1990: 18-19, 24-25). This was done in order to conceal the decrease in the population of these two union republics as a result of the catastrophic events of the first half of the 1930s. A quarter of a century ago, when analyzing the results of the 1939 census, I hypothesized that the census forms sent there belonged to a part of prisoners in forced labor camps located in the northern and eastern regions of Russia (Tolts 1995). The organizers' purpose

in manipulating the census materials was not only to make it possible to inflate the population of Ukraine and Kazakhstan, but at the same time to conceal the very high concentration of prisoners in their places of detention (Simchenko 1990: 2770). The hypothesis of the inter-republican reallocation of prisoners' census forms has been accepted by specialists (Bogoyavlensky 2013; Rudnytskyi et al. 2015).

The number of prisoners from Russia added to the population of Ukraine was only 8.4 thousand more than the number added to the population of Kazakhstan (Table 3). However, the large difference in the number of people living in the two republics led to a noticeable difference in the impact of this manipulation on their population. The prisoners included in the census results totaled 1.2% of the official population of Ukraine, while in Kazakhstan it came to 6.1%. Although all of the prisoners' census forms attached to the population of these two republics were removed from the population of Russia, this had a lesser impact on Russia, due to its much larger size. The number of prisoners excluded from the Russian census results totaled only 0.7% of the entire official population.

Table 3. The number of prisoners in forced labor camps whose census forms were reallocated from Russia to Ukraine and Kazakhstan during processing of the 1939 census materials

Reallocated prisoners	Removed from the population of Russia	Added to the population of:	
		Ukraine	Kazakhstan
Total	758 743	383 563	375 180
of these:			
men	700 238	383 563	316 675
women	58 505	–	58 505
As % of officially recorded in the census:			
Entire population	0.7	1.2	6.1
of which among:			
men	1.4	2.6	9.9
women	0.1	–	2.0
Rural population	1.0*	1.9	8.4
of which among:			
men	2.1	4.1	13.7
women	0.2	–	2.7

*Note: * - When attributing to this population group all prisoners of forced labor camps whose census forms during processing of the 1939 census materials were reallocated outside of Russia.*

Source: (Simchenko 1990: 18-19, 24-25).

All prisoners' census forms sent to Ukraine and Kazakhstan were added to the rural population. Therefore, their share was even greater than the official size of this part of the population of the two republics: 1.9% in Ukraine and 8.4% in Kazakhstan. Census forms for all 58.5 thousand female prisoners removed from the population of Russia were added to the rural population of Kazakhstan. If we conditionally attribute all prisoners of forced labor camps whose census forms were reallocated outside Russia during the processing of census materials to the official number of its rural population, even then their share in it will be only 1.0%. This figure gives an idea of the maximum possible impact of the inter-republican reallocation of prisoner census forms on the size of this part of the population there. After all, if part of these census forms belonged to the urban population - something we cannot know - then they should not be fully

attributed to the rural population of Russia, although it was precisely to this particular part of the population of Ukraine and Kazakhstan that all were added.

Table 4. Characteristics of prisoners in forced labor camps according to Gulag statistics as of January 1, 1939

Indicator	%	Indicator	%
Age		Ethnic group	
under 16	0.1	Russians	62.9
16-17	1.1	Ukrainians	14.2
18-21	9.7	Belarusians	3.4
22-25	16.7	Tatars	1.9
26-30	20.2	Uzbeks	1.8
31-40	28.5	Jews	1.5
41-50	15.8	Germans	1.4
51-60	6.3	Kazakhs	1.3
61 and older	1.3	Poles	1.3
unknown	0.3	Azerbaijanis*	1.1
Sex		Education	
men	91.7	higher	1.9
women	8.3	illiterate	8.5

*Note: * - In the source they are designated as "Türks".*

Source: (Yakovlev 2000: 416-417).

Unfortunately, the declassified census materials do not contain information about the composition of prisoners in forced labor camps whose census forms were reallocated from Russia to Ukraine and Kazakhstan during processing, since they were processed not separately, but in the general data set of the census. At the same time, the statistics of the Gulag have been published, which give the main characteristics of 1,289,491 prisoners of forced labor camps as of January 1, 1939 (Yakovlev 2000: 416-417). Prisoners whose census forms fell into the inter-republican redistribution during the processing of the census results accounted for 59% of the corresponding Gulag statistics. Comparison of the only data that are available from both sources - on sex composition - shows their greater similarity. Among the prisoners whose census forms underwent inter-republican reallocation, there were 92.3% of men and 7.7% of women, and among all the inhabitants of forced labor camps, according to Gulag statistics, - 91.7% of men and 8.3% of women (Tables 3 and 4).

Of course, the structure of prisoners in forced labor camps had its own pronounced features that distinguished it from the entire population, as has already been shown by the data cited on sex composition. Among the prisoners of the Gulag camps, there were almost no people of pre-working age. Their ethnic composition also had its own special features. There was a higher level of education (Table 4). These indicators of the structure of prisoners in the Gulag camps, known to us from its statistics, have been used by me to roughly assess the possible impact of the inter-republican reallocation of prisoner census forms on the official results of the census in Russia, Kazakhstan and Ukraine. When making the recalculation, the structural indicators corresponding to the data of the Gulag statistics were superimposed on a known number of census forms removed from the population of Russia. To obtain indicators for Ukraine and Kazakhstan, the results of the computation were divided in proportion to the share of prisoners whose forms went to each of these republics. The exception was the indicators of sex composition, which were known and were taken from declassified census materials (Table 3). On the basis of all these data, correction of the

official figures gave absolute numbers according to which, taking into account the change in the total size of the corresponding population, recalculated structural indicators were obtained for the entire and rural population of the three republics (Tables 5-7).

Table 5. Characteristics of the composition of the population of Russia according to the official data of the 1939 census and according to a recalculation eliminating the effect of the removal of prisoners' census forms sent to Kazakhstan and Ukraine during processing of the census materials, %

Indicator	According to official data		According to results of recalculation		Discrepancy between official and estimated indicators	
	Entire population	Rural population	Entire population	Rural population	Entire population	Rural population*
Age						
under 16	38.8	42.6	38.5	42.1	-0.3	-0.5
16-17	3.5	3.3	3.5	3.2	0.0	-0.1
18-21	5.9	5.2	5.9	5.3	0.0	+0.1
22-25	7.2	6.3	7.3	6.4	+0.1	+0.1
26-30	9.5	8.3	9.6	8.5	+0.1	+0.2
31-40	14.2	13.0	14.3	13.2	+0.1	+0.2
41-50	8.6	8.2	8.6	8.3	0.0	+0.1
51-60	6.3	6.4	6.3	6.4	0.0	0.0
61 and older	6.0	6.7	6.0	6.6	0.0	-0.1
Sex						
men	47.2	47.0	47.5	47.5	+0.3	+0.5
women	52.8	53.0	52.5	52.5	-0.3	-0.5
Ethnic group						
Russians	82.5	80.1	82.4	79.9	-0.1	-0.2
Ukrainians	3.1	3.0	3.1	3.2	0.0	+0.2
Belarusians	0.4	0.3	0.4	0.4	0.0	+0.1
Tatars	3.6	4.2	3.6	4.2	0.0	0.0
Jews	0.9	0.1	0.9	0.2	0.0	+0.1
Germans	0.8	1.0	0.8	1.0	0.0	0.0
Kazakhs	0.3	0.4	0.3	0.4	0.0	0.0
Poles	0.1	0.1	0.1	0.1	0.0	0.0
Education						
higher**	1.3	0.3	1.3	0.4	0.0	+0.1
illiterate***	21.9	28.4	21.8	28.1	-0.1	-0.3

*Notes: * - Highest estimate (see text); ** - per 100 people aged 22 and over; *** - at the age of 15 years and older.*

Sources: (Demoscope Weekly 2020; Zhiromskaya 1999: 105; Simchenko 1990: 18-19, 24-25; Yakovlev 2000: 416-417).

The results of the recalculations show that for the entire population of Russia the removal of census forms should not have affected the value of most of the indicators - 13 out of 21 figures remain completely unchanged (Table 5). In another five cases, the difference obtained for the entire population are within the rounding accuracy, which means that they should not be considered as significant discrepancies. Only for the largest age group under 16 is its share in the total population adjusted by 0.3 percentage points. The proportion of women in the entire population decreases by the same amount and, accordingly, the proportion of men increases. For the rural population of Russia, the impact of the removal of census forms could, of course, be higher, but even for them, the calculation gives smaller maximum possible discrepancies, with one exception, than for the entire population of Ukraine.

The discrepancies of the indicators for Ukraine are not just larger in numbers compared to Russia. The results of recalculations in some cases reverse our idea of the ratio of the indicators themselves in the two republics. Thus, the inter-republican reallocation of census forms led to the fact that in the official results of the census, the prevalence of women was more pronounced in Russia (52.8%) than in Ukraine (52.3%). The recalculation results show the opposite picture: in Ukraine there was a higher proportion of women (53.0%) compared with Russia (52.5%).

Table 6. Characteristics of the composition of the population of Ukraine according to the official data of the 1939 census and a recalculation eliminating the influence of the inclusion of prisoners' census forms from Russia during processing of the census materials, %

Indicator	According to official data		According to results of recalculation		Discrepancy between official and estimated indicators	
	Entire population	Rural population	Entire population	Rural population	Entire population	Rural population
Age						
under 16	35.2	38.0	35.6	38.8	+0.4	+0.8
16-17	3.9	3.9	4.0	4.0	+0.1	+0.1
18-21	6.6	6.1	6.6	6.0	0.0	-0.1
22-25	7.9	7.2	7.8	7.0	-0.1	-0.2
26-30	10.3	9.4	10.2	9.2	-0.1	-0.2
31-40	15.4	14.8	15.2	14.5	-0.2	-0.3
41-50	9.5	9.3	9.4	9.1	-0.1	-0.2
51-60	6.1	6.1	6.1	6.1	0.0	0.0
61 and older	5.1	5.2	5.1	5.3	0.0	+0.1
Sex						
men	47.7	47.7	47.0	46.6	-0.7	-1.1
women	52.3	52.3	53.0	53.4	+0.7	+1.1
Ethnic group						
Russians	13.5	7.6	12.9	6.5	-0.6	-1.1
Ukrainians	76.5	85.7	77.3	87.1	+0.8	+1.4
Belarusians	0.5	0.3	0.5	0.3	0.0	0.0
Tatars	0.2	0.1	0.2	0.1	0.0	0.0
Jews	4.9	1.1	5.0	1.1	+0.1	0.0
Germans	1.3	1.6	1.3	1.6	0.0	0.0
Poles	1.2	1.3	1.2	1.3	0.0	0.0
Education						
higher*	1.3	0.5	1.3	0.4	0.0	-0.1
illiterate**	17.6	21.7	17.8	22.2	+0.2	+0.5

*Notes: * - Per 100 people aged 22 and over; ** - at the age of 15 years and older.*

Sources: (Demoscope Weekly 2020; RGAE. F. 1562. Op. 336. D. 604. L. 19, 24; Simchenko 1990: 24-25; Yakovlev 2000: 416-417); The archival materials used in the calculations for this and the following table were kindly provided by Dmitry D. Bogoyavlensky, for which the author is deeply grateful to him.

For Ukraine, the recalculation gives the maximum difference for the share of the titular ethnic group (Table 6). According to the official census data, Ukrainians accounted for 76.5% of the total and 85.7% of the rural population, while according to the recalculation, their share increases to 77.3% of the whole and 87.1% of the rural population. At the same time, the share of Russians decreases: from 13.5 to 12.9% in the entire population and, even more noticeably, from 7.6 to 6.5% in the rural population. According to the recalculation, the proportion of Jews in the entire population of Ukraine increases to 5.0% or 0.1 percentage point, i.e., within the rounding accuracy.

Since the relative number of Russia's prisoners whose data are included in the population of Kazakhstan was much higher than for Ukraine (Table 3), the influence of this factor was significantly greater in Kazakhstan. Moreover, the results of recalculations in some cases reverse our understanding of the order of some of the most important indicators in this republic (Table 7). Thus, the official and recalculated indicators paint a diametrically opposite picture of the pre-war ethnic structure of the population of Kazakhstan. According to the official results of the 1939 census, in the entire population of Kazakhstan, Russians (40.0%) numerically prevailed over Kazakhs (37.8%). The recalculation shows the opposite was true: Kazakhs (40.2%) definitely outnumbered Russians (38.5%)[3].

Table 7. Characteristics of the composition of the population of Kazakhstan according to the official data of the 1939 census and according to a recalculation eliminating the influence of the inclusion of prisoners' census forms from Russia during processing of the census materials, %

Indicator	According to official data		According to results of recalculation		Discrepancy between official and estimated indicators	
	Entire population	Rural population	Entire population	Rural population	Entire population	Rural population
Age						
under 16	36.0	37.0	38.3	40.5	+2.3	+3.5
16-17	3.2	3.1	3.4	3.3	+0.2	+0.2
18-21	7.1	6.7	7.0	6.4	-0.1	-0.3
22-25	8.9	8.2	8.4	7.4	-0.5	-0.8
26-30	10.0	9.7	9.4	8.7	-0.6	-1.0
31-40	15.6	15.6	14.8	14.4	-0.8	-1.2
41-50	9.1	9.2	8.6	8.6	-0.5	-0.6
51-60	5.7	5.9	5.6	5.8	-0.1	-0.1
61 and older	4.4	4.6	4.5	4.9	+0.1	+0.3
Sex						
men	52.1	52.1	50.0	49.1	-2.1	-3.0
women	47.9	47.9	50.0	50.9	+2.1	+3.0
Ethnic group						
Russians	40.0	33.1	38.5	30.4	-1.5	-2.7
Ukrainians	10.7	11.7	10.5	11.5	-0.2	-0.2
Belarusians	0.5	0.5	0.3	0.2	-0.2	-0.3
Tatars	1.7	1.1	1.7	1.0	0.0	-0.1
Uzbeks	2.0	1.9	2.0	1.9	0.0	0.0
Jews	0.3	0.2	0.2	0.1	-0.1	-0.1
Germans	1.5	1.8	1.5	1.8	0.0	0.0
Kazakhs	37.8	44.0	40.2	47.9	+2.4	+3.9
Poles	0.9	1.1	0.9	1.1	0.0	0.0
Azerbaijanis	0.2	0.2	0.2	0.2	0.0	0.0
Education						
higher*	0.7	0.5	0.6	0.3	-0.1	-0.2
illiterate**	27.8	30.8	29.7	34.1	+1.9	+3.3

*Notes: * - Per 100 people aged 22 and over; ** - at the age of 15 years and older.*

Sources: (Demoscope Weekly 2020; RGAE. F. 1562. Op. 336. D. 604. L. 91, 95; Simchenko 1990: 18-19; Yakovlev 2000: 416-417).

[3] Earlier, on the basis of an alternative source of information on the ethnic composition of prisoners in forced labor camps, I obtained very close estimates: 40.4% for Kazakhs and 38.4% for Russians (Tolts 1995).

The addition of census forms of prisoners from Russia, in which men were sharply predominant, to the population of Kazakhstan, led to the fact that in the official results of the census of this republic women were in the minority in the entire population and in the rural population equally (47.9%). The recalculated results give a different picture: in the entire population, the proportions of men and women were equal (50.0%), and in the rural population there were more women (50.9%) than men (49.1%). In Kazakhstan, the level of education was also significantly overestimated. This is especially noticeable for the rural population. According to the official data of the census, the share of illiterates in it at the age of 15 years and older was 30.8%, while the recalculation increases it to 34.1%. The recalculated results show that half of the persons with higher education officially shown in the results of the census in the rural areas of Kazakhstan did not live there, but were imprisoned in Russia.

The recalculation makes it possible to see some important general consequences for the proper understanding of the age structure of the population of the republics where the removed census forms were sent. In Ukraine and Kazakhstan, the share of younger ages was undercounted and, accordingly, the share of prime working ages, which prevailed among prisoners, was overcounted. On the contrary, in Russia this manipulation of the census materials led, as already noted, to a certain inflation of the share of younger ages.

* * *

The materials of the processing of the 1939 census are not indisputable, but the extreme points of view - their total denial or the assessment of this census as "the most accurate" - cannot be considered justified. Our analysis shows that the instructions for filling in the census form in 1939 were imperfect. This could not but affect the numerical results of the census, leading to double counting of part of the population. However, there are simply no other materials describing in such detail the population of the USSR on the eve of World War II. The recalculations of the structure of the population of the three union republics, which eliminate the influence of the inter-republican reallocation of prisoners' census forms, give a concrete idea of the possible influence of this manipulation of the materials of the 1939 census. For the entire population of Russia, by most indicators these recalculations either do not change the picture previously given by official census data or, more rarely, only slightly refine it. In contrast, for Ukraine, and especially for Kazakhstan, the recalculations give noticeable changes, which in some cases significantly clarify our understanding of the composition of their pre-war population.

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