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THE MODEST DEMOGRAPHIC RESULTS OF PRONATALIST POLICY AGAINST THE BACKGROUND OF THE LONG-TERM EVOLUTION OF FERTILITY IN RUSSIA*

SERGEI ZAKHAROV

The idea of an extraordinary growth in fertility in Russia is widespread in the Russian expert community and media space. This increase is believed to be indicative of the positive results of the special financial measures taken by the government after 2006 to stimulate fertility.

The author's viewpoint is more reserved. There are some positive developments, but their significance is quite insufficient to view the future of Russian fertility through rose-colored glasses.

With this paper, we continue our previous long-term research in the field of in-depth demographic analysis of Russian fertility, incorporating the latest official statistical data for 2014. The paper provides an overview of the trends of key fertility indicators over a few decades, as well as developing some approaches to cohort fertility analysis in order to obtain more reliable projections.

In the first part, we examine period fertility indicators (for calendar years), taking into account the latest changes in the structural characteristics of the Russian model of fertility that have occurred over the past several decades.

In the second part of the article, we analyse cohort fertility indicators of generations of women whose actual and expected reproductive activity has been occurring in the second half of the twentieth and the first decades of the twenty-first centuries.

***Key words**: fertility, birth order, period fertility, cohort fertility, fertility projections, demographic policy, pronatalist family policy in Russia*

INTRODUCTION

In Russian society, there is a common opinion, supported by a number of experts, that there has been a significant increase in fertility in Russia, which is testimony to the positive results of measures taken to improve it. The starting point of active demographic policy was Putin's message to the Federal Assembly on 10 May 2006, announcing a programme of material stimulation of fertility. In 2007, Russia significantly increased benefits for child-care leave to one and a half years, introduced such benefits for unemployed women, expanded benefits, reduced fees in kindergartens, and introduced an innovative measure, widely known as the "maternity capital", for women giving birth to a second child (or a third or subsequent one, if the second child was born before 2007).

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THE RESULTS OF THE PROJECT "DEMOGRAPHIC DEVELOPMENT IN RUSSIA IN 2005-2015 IN THE CONTEXT OF LONG-TERM TRENDS", CARRIED OUT WITHIN THE FRAMEWORK OF THE BASIC RESEARCH PROGRAMME AT THE NATIONAL RESEARCH UNIVERSITY HIGHER SCHOOL OF ECONOMICS (HSE) IN 2016, ARE PRESENTED IN THIS PAPER.

It is precisely this measure which many experts and politicians consider especially important in stimulating people to have children[1]. After its introduction, all financial measures would be indexed annually for inflation, which is unprecedented in Russian history, and the range of benefits and incentives would be expanded and adapted to each region (See: [The Population of Russia... 2010; 2011; 2014; 2015]).

The Minister of Labour and Social Protection of the Russian Federation, M. Topilin, announced in February 2016 that, at the start of the demographic programme in 2006, the total fertility rate was equal to 1.3, while "in 2015 the figure was 1.8, which is higher than most European countries. We are close to ensuring the normal reproduction of the population"[2]. Do demographers have sufficient grounds to support the increased optimism characteristic of today's politicians and officials?

My previous works systematically set out the results of: 1) a descriptive analysis of sociological data showing changes of intentions and the degree of their implementation in relation to the birth of children according to the results of three waves of the Russian Generations and Gender Survey (RusGGS)[3], conducted in 2004, 2007 and 2011 [The population of Russia ... 2013: 309-317]; and 2) an analysis of various statistical indicators designed to assess the level of period total fertility from the perspective of the expected level of ultimate fertility of generations at an active reproductive age, as well as an analysis of the actual changes in the total fertility rates for cohorts of women by year of birth [population of Russia 2013: 318-324; The population of Russia ... 2014: 131-153; Frejka, Zakharov, 2014].

The main conclusion from the above analysis is that neither the intentions nor the behaviours of most Russians have changed significantly under the influence of pronatalist policies. There have been some positive developments in reproductive attitudes, but their significance is quite insufficient for an optimistic view of Russia's future fertility. The use of better statistical indicators of fertility than the period total fertility rate for calendar years (for synthetic cohorts), which is often groundlessly used to measure the effect of the policy, has also dampened the excitement over the apparent "growth in fertility".

[1] Message to the Federal Assembly of the Russian Federation // Rossiyskaya Gazeta – Federal Issue №4063.11.05.2006. URL: http://rg.ru/2006/05/11/poslanie-dok.html (reference date 04/04/2016).

[2] The Ministry of Labour and Social Protection of the Russian Federation. URL: http://www.rosmintrud.ru/social/290 (reference date 20/02/2016).

[3] The Russian title of the survey, translated, is "Parents and children, men and women in family and society"; it is part of the international research project of comparative studies "Generations and Gender Programme", coordinated by the United Nations Economic Commission for Europe with the support of an international consortium of research centres (See: http://www.unece.org/ead/pau/ggp/Welcome.html). Altogether, three waves of the survey were conducted in Russia – in 2004, 2007 and 2011 – each of which interviewed more than 11,000 respondents of both sexes aged 18 years and older (the panel component of those surveyed again in 2007 and 2011 was more than 7,000), representing the urban and rural populations of 32 subjects of the Russian Federation, including Moscow and St. Petersburg. In Russia, the study PCMW / RusGGS was coordinated by the Independent Institute for Social Policy (IISP, Moscow), with O.V. Sinyavskaya as the programme director and S.V. Zakharov as its research leader. The field part of the study was conducted by the independent research group "Demoscope" (led by Polina Kozyreva and Mikhail Kosolapov) with the financial support of the Russian Federation Pension Fund, The Max Planck Society (Germany), Sberbank and others. For more information about the project and publications, see: http://www.socpol.ru/research_projects/proj12.shtml.

Our findings, based on an analysis of "macro-demographic" and "macro-sociological" data, have received support from researchers who analyse current trends in fertility in Russia using econometric methods based on microdata of surveys [Chirkova 2013; Slonimczyk, Yurko 2015; Biryukova, Sinyavskaya, Nurimanova 2016]. These and certain other studies have shown that the effect of the maternity capital programme and other measures enacted in 2007 on the reproductive behaviour of Russians, although positive, is quite weak[4]. And, perhaps more importantly, the effects obtained are difficult to separate, on the one hand, from the so-called timing effects caused by a short-term change in the timing of successive births and not leading to a change in the lifetime fertility rates of cohorts and, on the other hand, from the effects associated with a long-term transformation of the age-fertility pattern, which in turn may or may not be linked to the change in total cohort fertility.

In this work, I continue the demographic analysis of Russian fertility on the basis of official data from Rosstat, including the final data for 2014 – the most recent at the time of writing. The article provides an overview of trends in the main characteristics of fertility over the past few decades, and discusses the effects that can be interpreted as a possible result of pronatalist family policy. In addition, it discusses the development of a methodological apparatus for analysing cohort fertility indicators in order to obtain more reliable projections of fertility.

The article first focuses on changes in the numbers of births in Russia under the influence of changes in the population structure by age, marital status and citizenship status. It then analyses the transformation of period and cohort fertility patterns in Russia in the context of women's age and birth order. The final part of the study evaluates the prospects of the completed cohort fertility for generations which are now at the peak of their procreative activities, and shows to what extent the observed total fertility rate provides the replacement of generations and the reproduction of the Russian population.

1. CHANGES IN THE NUMBER OF BIRTHS UNDER THE INFLUENCE OF STRUCTURAL CHARACTERISTICS OF THE POPULATION: THE COMPOSITION OF THE POPULATION BY AGE, CITIZENSHIP STATUS AND MARITAL STATUS[5]

In 1999, the number of births in Russia reached an historic low: 1,214,700 (excluding births in the Chechen Republic, in which the demographic events of those years were not registered in the

[4] Thus, F. Slonimchik and A. Yurko estimate the expected long-term effect from the policy of the maternity capital at a level of 0.15 births per woman of a conditional generation. This result was obtained using various dynamic structural models of fertility applied to the panel data of the Russian Monitoring of the Economic Situation and Public Health (carried out by the Higher School of Economics and ZAO "Demoscope" in Russia with the participation of the Population Center of the University of North Carolina in Chapel Hill, USA) [Slonimchik, Yurko 2015]. Based on the same data, S. Chirkova draws the conclusion that the contribution of the new policy measures to the increased probability of a second child's birth is 2.2 percentage points [Chirkova 2013]. A similar result with respect to the increase in the proportion of women giving birth to a second child was obtained on the basis of data from the RusGGS [Biryukova, Sinyavskaya, Nurimanova 2016: 11-12].

[5] Hereinafter, unless otherwise specified, official Rosstat statistics for the Russian Federation without Crimea are analysed.

prescribed manner[6]). In 2000-2014, the number of births increased (except for the years 2005 and 2013), and in 2014 the number of live births – 1,880,500 (that is, not including births in the Chechen Republic) – was much larger than in 1999, increasing by 665,800, or 54.8%.

The annual increase in births was highest in 2007 at 8.7%. After that, from 2008 to 2011, growth rates fell rapidly to 6.4%, 2.8%, 1.5%, and 0.4%, respectively. However, 2012 again brought a very significant increase in newborns – 105,500 (5.9%). In 2013, for the first time over a long period, the number of births decreased by 6,300, or 0.3%; in 2014, it once again significantly increased by 17,7000 (0.9%) and reached 1,913,500, which practically meant a return to the 1990 level.

The increase in the number of births over the past two decades has contributed to the favourable age structure of the population: from the beginning of the 2000s, the total number of women in their main childbearing years (20 to 35 years) was in a growth phase, which had a positive influence on the number of marriages and births. True, the sizes of individual reproductive age groups in recent years have been moving in opposite directions: the number of young women under 25 is declining rapidly, thus reducing the potential number of births, while the number of women over 25 years continues to grow, exerting a positive influence. The increase in the number of women in later reproductive ages in modern Russia is more important for the growth of births than that of women under the age of 25 years, as the average age of mothers in the last 15 years has had a tendency to increase after the average age of marriage, exceeding 28 years in 2014. The accompanying increase in the number of potential mothers aged 25 years or older, and the intensity of childbearing at these ages, ensured the increase of births from 2000 to 2014, which was achieved mainly due to later births to women aged 25 years and over. The contribution of younger women in this period was negative.

But now the increase in the number of women with growing fertility has come to an end: the size of the key group of women aged 25-29 peaked in 2012, then began to decline, and by 2017 will have decreased by more than 1 million, i.e. will be less than it was in 2000. For 30-34-year-olds the turning point will come in 2018. In 2012, the total number of women 20-39 years old began to decline, and maintaining the current number of births given the rapid reduction in the number of potential mothers seems unlikely.

A change in the number of births is usually rightly associated with a change in the number of newly married couples and with changes in the marital structure of the population. Moreover, this is based on the fact that persons who are married are traditionally more inclined to have children. In recent decades, due to the mass diffusion of marital unions that are not based on official

[6] In 1993-2002, registrations of births (as well as of other demographic events) in Chechnya were either absent altogether or were sketchy. For the years 1993-1994, there are also no data on Ingushetia, which are again included in the general set of data for the country starting in 1995. As of 2003, Rosstat has been able to publish data on Russia with the inclusion of births registered in Chechnya. True, in 2003 the total number of births in the Chechen Republic was not distributed by age of the mother, and when calculating more detailed indicators (rates by maternal age, total fertility rate), data on Chechnya were not taken into account (excluded, accordingly, both from the numerator, i.e. the number of births, and from the denominator, i.e. the average annual number of women). Data on fertility in Chechnya have been fully present in official demographic calculations only since 2004. True, the completeness and quality of these data remain in question today. Thus, in calculations of demographic indicators relative to the size of different population age groups (e.g. age-specific fertility, mortality, marriage and divorce rates) Chechnya and Ingushetia are completely excluded in 1993-1994, and Chechnya in 1993-2003.

marriage (i.e. cohabitation), the close connection between fertility and registered marriage can be called into doubt, as shown by the dynamics of the proportion of extramarital births.

The decrease and increase in the total number of births in Russia in the postwar period were accompanied by both an increase and a decrease in the proportion of extramarital births. In some periods, changes in these indicators were synchronous, and in others asynchronous, such as in the second half of the 1990s, when the number of extramarital births increased rapidly, while the total number of births decreased.

In the last decade, alongside an overall growth in the number of births, Russia has seen a decline in the proportion of children born outside of a registered marriage (e.g. 30.0% in 2005 and 22.7% in 2014), with a relative stabilisation of the annual number of births out of wedlock at 430-450 thousand (Figure 1), and a reduction in the share of those births registered at the request of the mother alone (e.g. 56.5% in 2007 and 49.7% in 2014). Accordingly, among the total number of births there is an increasing proportion of marital births and of children with a recognised paternity (Table 1). In 2013-2014, for the first time in the history of Russia, the proportion of extramarital births registered on the basis of a joint declaration by parents not bound by marriage exceeded the proportion of births registered on the basis of a declaration by a single mother. Compared with 1970, when Russia registered approximately the same total annual number of births as in 2012-2014 (1.9 million), the structure of births according to relations between the parents has changed significantly (Table 1). The proportion of extramarital births is 2 times higher, and dominant among extramarital births are those registered on the basis of a declaration of paternity – a joint declaration by both mother and father (this same category, however, includes births for which paternity was established by a court decision).

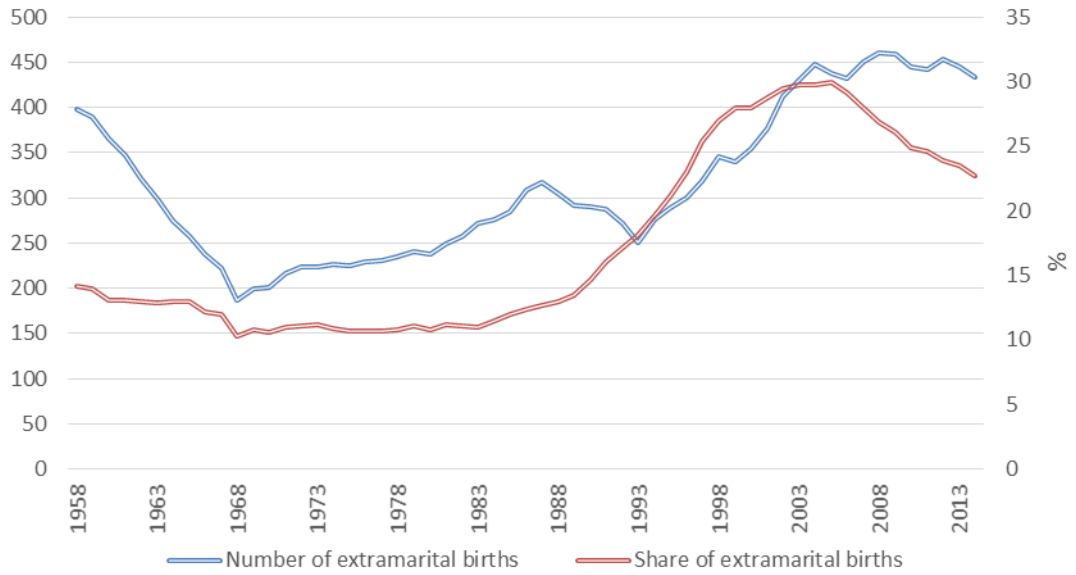

Figure 1. Number of births out of wedlock, thousands (left axis) and their share in the total number of births, % (right axis), Russia, 1958-2014

Sources: [Demographic Yearbook of Russia 2015]; unpublished data from Rosstat, and the author's calculations based on them.

As the sample studies show, the vast majority of children with recognised paternity in fact live in a family with both parents, while the reasons why parents do not register the marriage are quite diverse, being due to the diversity of the nature of relations between parents, their formal and *de facto* marital status (parents may, for example, be officially married to other people), specific living conditions and circumstances of the pregnancy and the birth of the child. Whatever the reason, judging from the above data the proportion of young children who are cared for by both their biological parents is not decreasing, but rather may be increasing, which, correspondingly, has a positive effect on the conditions of their socialisation in terms of gender balance.

Table 1. Marital and extramarital births, including by type of document used as the basis for registration, Russia[7], 1980, 1990, 1995, 2000, 2005-2014

Year	Total, thous.	Including those born in and outside a registered marriage:		Share of births outside a registered marriage, %	Extramarital births registered on the basis of…, thous.:		Share of births registered by declaration of only the mother in the total number of extramarital births, %
		In a registered marriage	Outside a registered marriage**		Joint declaration of mother and father	Declaration of only the mother **	
1970	1903.7	1702.5	201.2	10.6	82.5	118.8	59.0
1980	2202.8	1965.2	237.6	10.8	90.7	146.9	61.8
1990	1988.9	1698.3	290.6	14.6	124.2	166.4	57.2
1995*	1363.8	1075.5	288.3	21.1	124.2	164.1	56.9
2000*	1266.8	912.5	354.3	28.0	167.3	187.0	52.8
2005	1457.4	1020.3	437.1	30.0	200.4	236.6	54.1
2006	1479.6	1048.1	431.5	29.2	189.9	241.6	56.0
2007	1610.1	1159.3	450.8	28.0	195.9	254.9	56.5
2008	1713.9	1253.5	460.4	26.9	202.8	257.6	55.9
2009	1761.7	1302.3	459.3	26.1	200.6	258.8	56.3
2010	1788.9	1344.1	444.9	24.9	199.2	245.7	55.2
2011	1796.6	1355.1	441.5	24.6	205.8	235.7	53.4
2012	1902.1	1448.6	453.5	23.8	215.5	238.0	52.5
2013***	1895.8	1451.0	444.9	23.5	218.8	226.1	50.8
2014	1913.5	1479.6	433.9	22.7	218.2	215.7	49.7
2014/2013	1.009	1.020	0.975	-	0.997	0.954	-

Source: [Demographic Yearbook of Russia 2015], unpublished data from Rosstat, and the author's calculations based on them.

Notes:

**Without data on Chechnya.*

***Including births with unknown legal status of the parents (abandoned children, foundlings and so forth). These newborns are registered by the declaration of government agencies (Ministry of Health, Ministry of Internal Affairs).*

****Including those born in Chechnya, not distributed by marital status of the mother. See: [Russia Demographic Yearbook 2015: Note to Table. 4.5]. For detailed annual dynamics for 1958-2011, see: [Zakharov, Churilova 2013: 113-114].*

[7] Hereinafter, all statistical data are given for the territory of Russia without Crimea.

In Russia, a change in the structure of births in favour of marital or extramarital births is still mainly determined by trends in the intensity of marriages, especially first marriages, the number of which has been on the rise since the beginning of the 2000s. At the same time, the ratio of fertility rates for married and unmarried persons – marital and extramarital fertility – has been changing in recent years, apparently also in favour of couples in registered marriages[8]. However, the role of the second factor in the change in the structure of births by marital status of the mother is much less significant compared to the increasing number of married couples. If in the 1990s in Russia there was a rapid decline in marriage rates, mainly due to men and women postponing their first marriages, since the beginning of the 2000s the number of marriages, despite fluctuations in some years, has experienced a compensatory rise (Figure 2); this indicates the mass realisation of postponed marriages at a later age. Younger generations are also seeking to start families later than before, usually after age 25. It is important to note that the absolute number of men and women aged 25-39 years in Russia is, as already mentioned, in a growth phase. As a result, over the past decade and a half the number of marriages has increased significantly (both in absolute and in relative terms), and the marital structure of the population has improved considerably, which is bound to have a positive impact on the number of marital births and on Russian fertility as a whole. However, it is clear that the potential for an increase in births contained in the age and marital structure of the population is almost exhausted (the number of marriages has already begun to decrease), and in the next decade the impact of these factors will be negative.

Judging by the available data for the years 2011-2014 (Rosstat does not have detailed information for earlier years), the contribution of families in which both parents are Russian citizens to the total number of births in Russia remains stable – about 85% (Table 2). However, it is possible that this stability is temporary. Of note is the steady and rapid growth in the number of births (more than 20% annually in 2012-2014) to foreign parents, as well as the increase in births in a fairly large category of families in which the mother of a newborn is a citizen of Russia, and the father a citizen of another country (an increase of 21% in 2012, 12% in 2013, and 13% in 2014). Not far behind is the annual increase in newborns whose father is a Russian citizen and whose mother is a foreigner: the increase in births in this category was 27% in 2012, 11% in 2013 and 9% in 2014 (Table 3). And in rural areas there is a higher proportion than in urban areas of newborns with one or both parents who are not citizens of Russia: in 2014, 14.4% of urban births and 16.2% of rural births were to foreign citizens.

Let us consider in more detail the structural changes in births by citizenship status of the parents for all years for which data are available. The considerable total increase of births in 2012 had a uniform structure and included all categories of citizenship of parents, without exception. In terms of absolute growth, the dominant category was, as might have been expected, families in which both parents have Russian citizenship – 79.6 thousand, or 75.5% of the total annual increase of 105,500 newborns. At the same time, the highest growth rates were shown by parents of mixed nationality (where only the father or only the mother is a citizen of the Russian Federation), as

[8] See the estimation of the age-specific rates of marital and extramarital fertility, which in Russia can be correctly calculated only on the basis of population censuses and large sample surveys: [Population of Russia ... 2014: 121-130].

well as by parents who are both citizens of other countries (Table 3). The contribution of foreign citizens (up to 25% of the total increase in 2012), should be recognised as very significant.

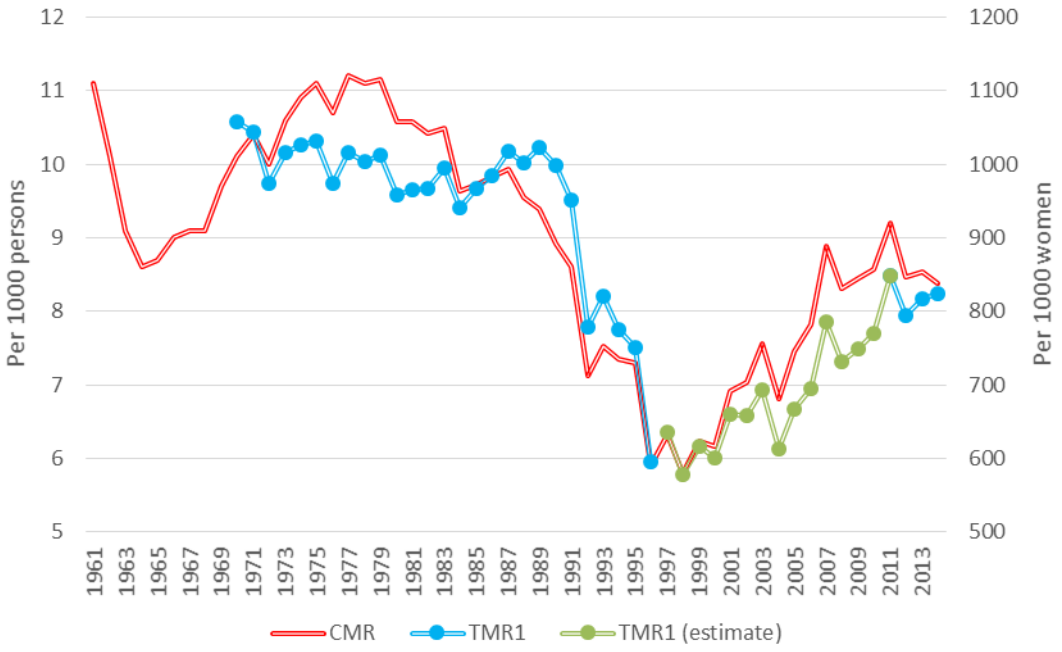

Figure 2. Crude marriage rate (left axis) and the total first marriage rate for women (right axis), Russia, 1961-2014

Source: [Demographic Yearbook of Russia 2000; 2015]; author's calculations based on unpublished data from Rosstat.

Note: CMR – the crude marriage rate per 1,000 population; TMR1 – total first marriage rate per 1,000 women by the age of 50. For the period 1997-2010, TMR1 is the author's interpolated estimate, based on age-specific marriage rates for aggregated age groups taken by Rosstat for the annual processing of data on the number of persons getting married in this period. See: [The population of Russia ... 2006: 207-210; The population of Russia ... 2013: 231-234].

Noteworthy is the fact that the decline in the number of births in 2013 occurred primarily among mothers with Russian citizenship who did not indicate any the nationality of the child's father (the number of births in this group of mothers decreased by 9,400). Also significant was the reduction in births in families where both parents have Russian citizenship (by 3,000). The change in the number of newborns in other categories according to their Russian citizenship status in 2013 showed a mosaic pattern: some categories increased their contribution to the total number of registered births, while others reduced theirs (Table 2). Generally speaking, however, foreign nationals considerably slowed down the decline in the total number of births in the country in 2013, and if not for their growing contribution, the number of births in Russia would have shrunk further.

The contribution of foreign citizens to the increase in the number of births in 2014 was even more significant – 29% of the total growth, with a continued rapid increase in the number of births precisely in families in which either one or both parents are foreign nationals. At the same time, births to parents with undetermined citizenship status diminished.

Table 2. Number of births to parents with varying statuses of Russian citizenship, Russia, 2011-2014

Status	2011		2012		2013		2014	
	Number of births	%	Number of births	%	Number of births	%	Number of births	%
Both parents citizens of RF	1531076	85.22	1610632	84.68	1607665	84.80	162852	85.08
Mother citizen of RF, father citizen of another country	16929	0.94	20425	1.07	22831	1.20	25823	1.35
Mother citizen of RF, father a stateless person	187	0.01	251	0.01	262	0.01	166	0.01
Mother citizen of RF, father's citizenship not indicated	212672	11.84	224547	11.81	215188	11.35	204812	10.7
Father citizen of RF, mother citizen of another country	15689	0.87	19874	1.04	22036	1.16	24080	1.26
Father citizen of RF, mother a stateless person	138	0.01	279	0.01	196	0.01	126	0.01
Father citizen of RF, mother's citizenship not indicated	746	0.04	1770	0.09	1185	0.06	1084	0.06
Both parents citizens of another country	9784	0.54	12609	0.66	15438	0.81	18647	0.97
Others	9408	0.52	11697	0.61	11021	0.58	1084	0.56
Total registered in Russia:	1796629	100.0	1902084	100.0	1895822	100.0	1913472	100.0

Source: unpublished data from Rosstat; author's calculations.

One cannot help but notice a certain strangeness in the dynamics of the number of births based on the citizenship status of parents, which apparently are a consequence of features unknown to us in the registration practice both of children born in families of migrants and of the migration status of their parents. This applies, above all, to the trend of births to parents with an undetermined citizenship status. For example, in 2014 the number of children born in Russia to mothers where the citizenship status of the father was unknown decreased by 10,000 (Table 3). In 2013, this category of parents also showed a decrease of more than 9,000, while in 2012, in contrast, there was a significant increase of almost 12,000 (Table 3). In 2013, this category of newborns essentially caused the large dip in the total number of births in the country, while in 2012 it was responsible for 15% of its growth.

As a rule, a child, for whom registration forms show only the nationality of the mother, is born outside of marriage, in most cases to a "single mother" who, for one reason or another, does not register the child on the basis of a joint declaration of the parents attesting to the father's recognition of his child. In fact, we do not know whether his or her biological father is a Russian citizen or not. Nevertheless, we can say that migrants today are making a significant and growing contribution to total fertility in the country and to the change in the number of illegitimate births in particular. However, changing legislation on the naturalisation of migrants, together with changing registration practices for migrants and their children, mean that any changes detected on the basis of official statistics must be approached with great caution.

An indicator not dependent on the age and sex structure of the population – the period total fertility rate (the total number of births per woman of a synthetic cohort) – indicates that in Russia in 1999-2014 (except for 2005), there was an increase in the intensity of childbirths both in urban

and in rural areas, but up to 2006 the indicator's growth in urban areas outpaced that of rural areas (Table 4).

Table 3. Absolute and relative annual increase in births to parents with varying statuses of Russian citizenship, Russia, 2011-2012, 2012-2013, 2013-2014

	Increase in 2011-2012		Increase in 2012-2013		Increase in 2013-2014	
	Abs.	Relative 2012/2011	Abs.	Relative 2013/2012	Abs.	Relative 2013/2012
Both parents citizens of RF	79556	1.052	-2967	0.998	20387	1.013
Mother citizen of RF, father citizen of another country	3496	1.207	2406	1.118	2992	1.131
Mother citizen of RF, father a stateless person	64	1.342	11	1.044	-96	0.634
Mother citizen of RF, father's citizenship not indicated	11875	1.056	-9359	0.958	-10376	0.952
Father citizen of RF, mother citizen of another country	4185	1.267	2162	1.109	2044	1.093
Father citizen of RF, mother a stateless person	141	2.022	-83	0.703	-70	0.643
Father citizen of RF, mother's citizenship not indicated	1024	2.373	-585	0.669	-101	0.915
Both parents citizens of another country	2825	1.289	2829	1.224	3209	1.208
Others	2289	1.243	-676	0.942	-339	0.969
Total	105455	1,059	-6262	0,997	17650	1,009

Source: unpublished data from Rosstat; author's calculations.

In 2007, the TFR in rural areas (0.2 children per woman) for the first time exceeded fertility growth in the urban population (0.08), by over twice as much. In 2008-2009, the pace of growth of the total fertility rate declined in both urban and rural areas, but it declined in rural areas more intensively. In 2010-2014, the TFR growth in urban areas was barely noticeable (in 2011 there was no increase in fertility in urban areas at all), whereas in rural areas, in contrast, there was a significant growth in the indicator (Table 4). Altogether, for the whole period from 1999 (the lowest point of the TFR) through 2014, the TFR in urban areas increased by 0.55, and in rural areas by 0.81, children per woman.

If, in the early 1990s, period total fertility of rural residents was higher than that of urban residents by approximately 0.9 births per woman, by 2005 the gap between rural and urban areas had dropped to 0.39, that is, by a factor of more than 2. In 2006-2014, differences in the TFR between urban and rural areas increased due to faster growth rates in rural areas, and in 2014 the gap reached 0.75 children per woman, indicating a gradual return to the situation that had remained stable for decades, from the mid-1960s to the first half of the 1990s, when the differences in the values of the index between urban and rural populations were about 0.8-0.9 (the author's assessment after the elimination of inaccuracies in the TFR estimates for urban and rural populations, arising from errors in the calculation of urban and rural population sizes in the intercensal periods [Zakharov, Ivanov, 1996]).

Table 4. Period total fertility rate per woman, Russia, 1980, 1985, 1990, 1995-2014

Year	Whole population	Urban population	Rural population
1980	1.89	1.70	2.51
1985	2.05	1.86	2.67
1990	1.89	1.70	2.60
1995	1.34	1.19	1.81
1996	1.27	1.14	1.70
1997	1.22	1.10	1.62
1998	1,23	1,11	1,64
1999	1,16	1,04	1,53
2000	1,19	1,09	1,55
2001	1.22	1.12	1.56
2002	1.28	1.19	1.63
2003	1.32	1.22	1.66
2004	1.34	1.25	1.65
2005	1.29	1.21	1.58
2006	1.30	1.21	1.60
2007	1.42	1.29	1.80
2008	1.50	1.37	1.91
2009	1.54	1.41	1.94
2010	1.57	1.44	1.98
2011	1.58	1.44	2.06
2012	1.69	1.54	2.21
2013	1.71	1.55	2.27
2014	1.75	1.59	2.34

Source: Author's calculations using unpublished raw data of Rosstat.

Note: Calculation based on one-year age-specific fertility rates, taking into account the recalculation of the population size after the censuses of 1989, 2002 and 2010. In 1995-2003 – without the Chechen Republic.

2. SLOWING DOWN THE PROCESS OF THE AGEING OF MOTHERHOOD IN RUSSIA

Both the growth and the decline in the number of births are not always proportional to the growth and decline in the number of women, as there might be a simultaneous change in the intensity of fertility at different ages. For more than two decades, Russia has seen changes in the age profile of fertility in the direction of "ageing", which corresponds to the worldwide trend that emerged in the late 1960s and early 1970s in Northern and Western Europe, and which Russia and its neighbours in Eastern and Central Europe joined with a delay of more than two decades [Bosveld 1996; Sobotka 2004; 2011; Frejka et al. 2008]. Throughout its long history, Russia's fertility was highest among women aged 20-24 years. But in the 1990s, when the number of women in this age group increased, their fertility quickly fell. At the same time, fertility rates among mothers younger than 20 years decreased even more significantly (Table 5). Then the decline in the fertility of mothers under 25 years slowed down, but the fertility of women aged 30-34 years began steadily increasing, as did that of women aged 25-29 years in 2000. In 2008, the latter age group of women for the first time exceeded the fertility level of the 20-24-year-old group, and the gap between them began to grow. Fertility in the group aged 30-34 years, having increased more than two-fold from the late 1990s, not only exceeded the previous peak level of 1980, but almost equaled the fertility of 20-24-year-olds. Even more rapid was the increase in fertility in women over 35 years – an increase over one and a half decades of more than 3.5 times (Table 5).

Table 5. Age-specific fertility rates, 1980, 1985, 1990, 1995, 1999-2014, Russia, per 1,000 women of corresponding age

Year	Age group						
	15-19*	20-24	25-29	30-34	35-39	40-44	45-49**
1980	43.8	157.8	100.8	52.1	17.4	4.9	0.4
1985	47.2	165.0	112.9	59.7	23.3	3.6	0.3
1990	55.0	156.5	93.1	48.2	19.4	4.2	0.2
1995	44.8	112.7	66.5	29.5	10.6	2.2	0.1
1999	28.9	91.8	63.7	32.2	11.1	2.2	0.1
2000	27.4	93.6	67.3	35.2	11.8	2.4	0.1
2001	27.3	93.1	70.2	38.0	12.9	2.4	0.1
2002	27.3	95.3	74.8	41.6	14.6	2.6	0.1
2003	27.6	95.1	78.3	44.1	16.0	2.7	0.1
2004	28.2	94.2	80.1	45.8	17.6	2.9	0.1
2005	27.4	88.4	77.8	45.3	17.8	3.0	0.2
2006	28,2	87,8	78,4	46,6	18,6	3.1	0.2
2007	28.3	89.5	86.9	54.1	22.7	3.9	0.2
2008	29.3	91.2	92.4	60.0	25.8	4.6	0.2
2009	28.7	90.5	95.9	63.6	27.6	5.2	0.2
2010	27.0	87.5	99.2	67.3	30.0	5.9	0.3
2011	27.4	88.0	99.5	67.8	31.1	6.2	0.3
2012	27.4	91.2	106.6	74.3	34.9	7.0	0.3
2013	26.7	89.9	107.5	76.2	36.8	7.4	0.4
2014	26.1	89.6	110.1	79.9	39.0	8.1	0.4
2014/1999***	0.905	0.976	1.728	2.480	3.507	3.609	3.606
2014/2013***	0.980	0.997	1.024	1.049	1.060	1.082	1.211

Source: author's calculations based on unpublished data from Rosstat.

Remarks:

**Includes births to mothers younger than 15 years.*

***Includes births to women older than 49 years.*

****In the calculation of growth rates, more accurate baseline values are used than those given in the table, rounded to one decimal place.*

Such a series of changes in age-specific fertility rates indicates that in the 1990s – difficult years for Russian society – there was an intensive postponement of births in cohorts, and that in the 2000s these generations made up for lost time by intensively realising the births they had delayed [Frejka, Zakharov 2014]. A more fundamental and, from an historical point of view, completely new trend for Russia was added to this process: an unforced, intentional formation of families at an increasingly later age among generations of Russians who were born in the second half of the 1960s and later. The trend of women giving birth over age 25 is increasingly becoming a social norm. As a result of strong and sustained changes in the timing of births of the cohorts of mothers born in the 1960s, 1970s and 1980s, we are witnessing not only an increase in fertility among women in older age groups, but a fifteen-year growth in period total fertility rates. At the same time, the cohort completed fertility of Russians is changing quite less significantly, as will be discussed below, which gives a mainly "timing nature" to the increase in the TFR.

If we look at a detailed picture of the changes in fertility rates for one-year age groups of women (Figure 3), it becomes apparent that the well-known public policies to stimulate the birth rate made in 2006-2007, along with their further development, had no effect on fertility in women under 24 years of age: either it continued to decline in the youngest women, or, as among women

of ages 22 and 23, stagnated at the same level[9]. If not for the relative drop in fertility rates in 2005-2006, one would hardly suspect any acceleration in the growth of rates for women over 25 years under the influence of the new population policy measures enacted in 2007. An almost linear trend of a harmonious increase in rates for women of all ages above 24 years was observed in 2000, and for 30-year-old women the growth began even earlier, in the mid-1990s (Figure 3).

The evolutionary component of the transformation of the age pattern of fertility in Russia has clearly prevailed over conjunctural ones, and in the latest trends pronatalist policy plays a secondary role, giving additional signals for the continuation and acceleration of the same processes as in all developed countries without exception: the transformation of an age (timing) model of fertility towards later motherhood.

The transformation of the age profile of mass reproductive behaviour has gone hand in hand with the transformation of the institution of marriage: young people are getting married later than they were two decades ago, and it is natural that they should also begin having children later. The similarity of the trends in different countries suggests that people respond to changes in the economic conditions of running a household, in health care, in how long it takes to get an education, in getting a job, etc., by searching for that portion of the life path which, in the new conditions, is the most suitable for having and raising children. For the modern woman, entry into adult life and self-identification are no longer as clearly associated with marriage and motherhood as before [Zakharov 2010]. The socio-demographic events of her life are arranged in a different sequence and focus on other areas of the life path. Indeed, the life paths themselves are becoming more diverse [Mitrofanova 2015].

At first, the decision to have fewer children naturally led to the rejuvenation of fertility. But then, when having few children became widespread, parents seemed to have become aware that in order to bear and raise one, two or even three children, there is no need to start having children before age 25, often before or during the completion of their education and first job search, as so often happened before. In addition, the structure of education in Russia over the past two or three decades has shifted dramatically in favour of higher degrees: if, among the generations of women born in the 1950s-1960s, the proportion of persons with higher education was 20%, then among the generations of the 1970s it was closer to 40%, and among the generations of the 1980s and later it is expected to exceed one half[10].

In the first stage, when fertility was growing younger, Russia was moving in the same direction as most developed countries. In the early 1980s, probably following other countries, there were signs of a turn in the opposite direction. However, the stepping-up of family policy in those years caused people to have children at a younger age and at shorter intervals. The average age of mothers went up again only in the mid-1990s. At that time, earlier motherhood could be seen only in Bulgaria, Ukraine and Moldova. Today, these same countries, as well as Belarus, still lag

[9] True, the apologists of the policy of stimulating fertility, seeking to find the positive results of such a policy everywhere, always have one more argument: the policy allegedly "prevented or slowed down further decline in fertility, which would certainly have continued (happened more quickly) in the absence of incentives." This argument in practice is extremely difficult to prove or disprove.

[10] According to the projections provided by the staff of the Centre for Labour Market Studies of the Higher School of Economics, among the youth cohorts that completed secondary school education in the mid-2000s, the expected share with university diplomas will be more than 60% [The Russian worker ... 2011: 42-43].

slightly behind Russia in the process of restructuring the age-of-fertility profile, and all of them – including Russia – in turn lag behind the Baltic countries and Eastern and Central Europe, where the ageing of motherhood began approximately at the same time [Basten, Frejka et al. 2015]. Apparently, the depth and consistency of political and economic reforms in the former socialist countries play a significant role in terms of the speed and solidity of the changes in the life trajectories of an overwhelming majority of young people.

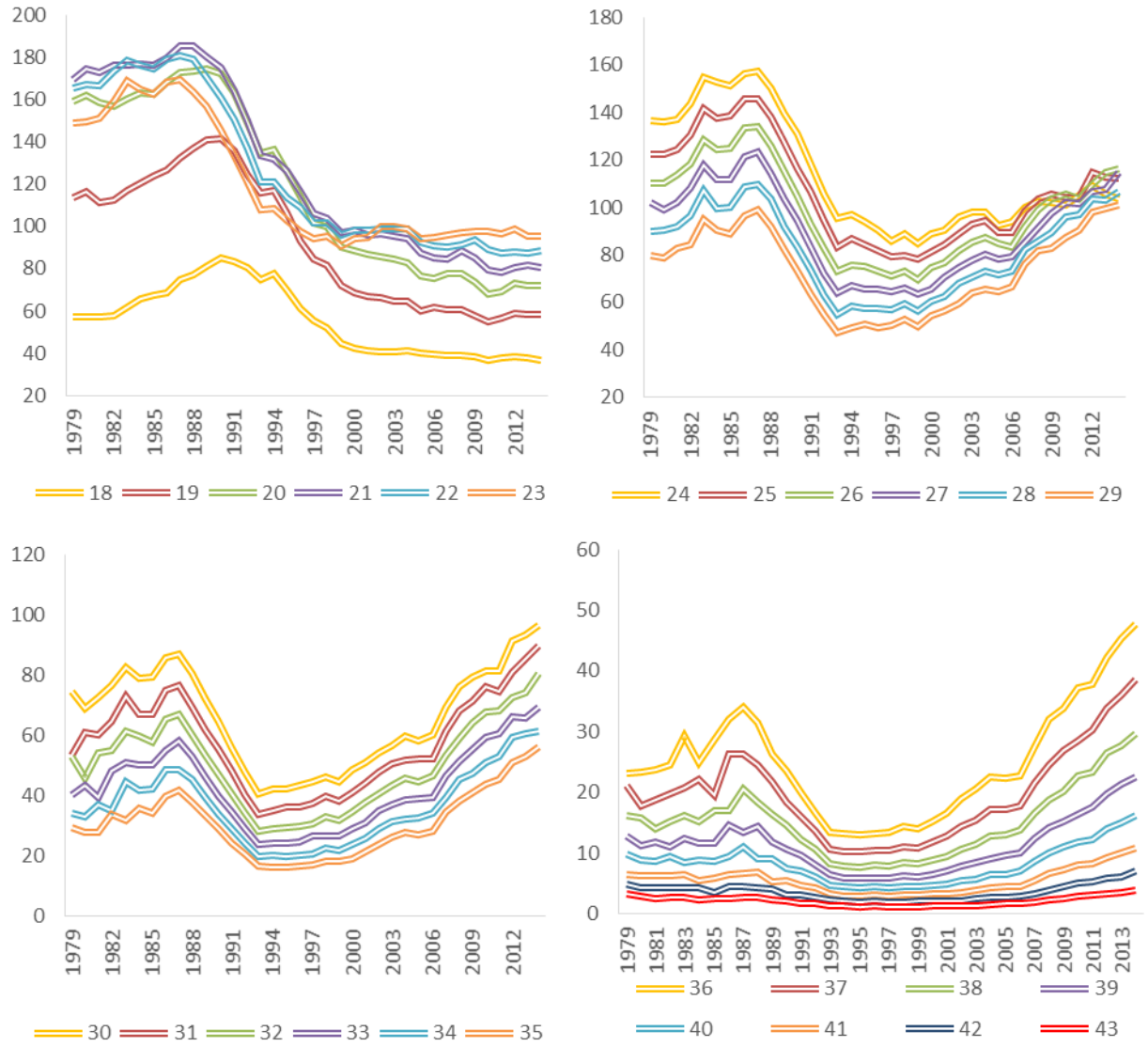

Figure 3. Age-specific fertility for one-year age groups per 1,000 women of the indicated age, Russia, 1979-2014

Source: Author's calculations based on unpublished data from Rosstat.

The average age of mothers, including at each birth parity, presented in dynamics, gives a general idea of the vector of changes (Table 6). The average age of mothers in 2014 in Russia was 28.12 years, including 25.30 years at the birth of the first child, 29.53 at the birth of the second, and 32.21 at that of the third. These values are much higher than not only those that occurred in the 1990s, when they were minimal for all the post-war period, but also the values for the 1970s

and 1980s. For all birth parities, the average age of motherhood as compared to the first half of 1990 increased by more than 3 years, and at the birth of the first child it increased by 2.6 years.

At the same time, it should be noted that in the last few years the increase in the average age of motherhood has slowed down; in 2014, the first signs of a drop in the mother's age at the births of the second and subsequent children appeared. Women's age at the birth of the first child is still growing, but the near-term prospects for the continuation of this trend are not obvious. It is still too early to say that the transformation of the age profile of motherhood in Russia has turned back towards rejuvenation. However, this fact confirms that there is an acceleration in the formation of the final number of offspring in the family, and the time intervals between the births of children in families, particularly between the first child and second child, are shrinking. It can be assumed that the accelerated pace of childbearing was aided by the approaching completion of government programmes of maternity capital and other benefits to support large families. This widely held explanation seems quite logical, although direct empirical evidence is lacking. According to the same logic, the government's widely publicised decision to extend the maternity capital programme, adopted at the end of 2015[11], should weaken the impact on the intensity of higher-parity births in the family.

Table 6. Mean age of mothers at birth of children of each parity, Russia, 1980, 1985, 1990, 1995, 2000-2014, years

Year	All births	By birth parity				
		First	Second	Third	Fourth	Fifth and subsequent
1980	25.67	22.99	27.33	30.07	31.81	35.49
1985	25.78	22.92	27.13	30.03	31.56	34.71
1990	25.24	22.65	26.86	29.95	31.64	34.38
1995	24.79	22.67	26.91	29.85	31.55	34.29
2000*	25.76	23.54	27.88	30.88	32.49	34.57
2001*	25.93	23.66	28.21	31.13	32.60	34.53
2002*	26.12	23.75	28.41	31.26	32.75	34.74
2003*	26.27	23.85	28.61	31.41	32.77	34.78
2004*	26.39	23.96	28.77	31.51	32.99	34.85
2005*	26.53	24.10	28.92	31.60	33.01	34.97
2006*	26.61	24.20	29.04	31.69	33.11	34.99
2007*	26.96	24.33	29.14	31.76	33.18	35.01
2008*	27.18	24.44	29.30	31.94	33.34	35.16
2009*	27.38	24.67	29.44	32.02	33.34	35.07
2010*	27.65	24.90	29.55	32.19	33.41	35.09
2011*	27.69	24.91	29.49	32.16	33.42	35.06
2012	27.85	25.01	29.52	32.21	33.38	34.99
2013	27.98	25.19	29.54	32.22	33.38	34.93
2014	28.12	25.30	29.53	32.21	33.33	34.86

Source: Author's calculations based on unpublished data from Rosstat, using fertility rates for one-year age groups as weights.
*Notes: *Estimates for 2000-2011 are based on the use of incomplete data: only for those territories that kept and provided Rosstat with processed data on births simultaneously by the age of the mother and birth parity. For detailed annual dynamics of the 1980s and 1990s, see: [The population of Russia ... 2004: 47].*

[11] On December 30, 2015, President Putin signed a law on the extension of the maternity capital programme for two years (see: Federal Law №433-FZ of 30 December 2015, "On Amending Article 13 of the Federal Law 'On Additional Measures for State Support for Families with Children'", URL: http://publication.pravo.gov.ru/Document/View/0001201512300055. Date of circulation 04/04/2016).

The slowing down of the rise in the age of mothers at higher-parity births has not yet shown itself in a breaking of the long-term trend towards an increase in the contribution of older mothers to total fertility. If, several decades ago, more than half of the overall fertility rate in Russia was due to the reproductive activity of the youngest women under 25 years of age, now more socially mature women are making a decisive contribution: all women older than 25 years provide two-thirds of the value of the total fertility rate, with women over 30 accounting for more than a third of its value (Table 7).

Table 7. Contribution of age groups of mothers to period total fertility rate, Russia, 1980, 1985, 1990, 1995, 2000-2014, %

Year	Mother's age. years					Total
	Under 20	20-24	25-29	30-34	35 and older	
1980	11.6	41.9	26.7	13.8	6.0	100.0
1985	11.5	40.0	27.4	14.5	6.6	100.0
1990	14.6	41.6	24.7	12.8	6.3	100.0
1995	16.8	42.3	24.9	11.1	4.9	100.0
2000	11.5	39.3	28.3	14.8	6.1	100.0
2001	11.2	38.2	28.7	15.6	6.3	100.0
2002	10.7	37.2	29.2	16.2	6.7	100.0
2003	10.5	36.0	29.7	16.7	7.1	100.0
2004	10.5	35.0	29.8	17.0	7.7	100.0
2005	10.5	34.0	30.0	17.4	8.1	100.0
2006	10.7	33.4	29.8	17.7	8.4	100.0
2007	9.9	31.3	30.4	19.0	9.4	100.0
2008	9.7	30.0	30.4	19.8	10.1	100.0
2009	9.2	29.0	30.8	20.4	10.6	100.0
2010	8.5	27.6	31.3	21.2	11.4	100.0
2011	8.6	27.5	31.1	21.2	11.7	100.0
2012	8.0	26.7	31.2	21.7	12.4	100.0
2013	7.7	26.1	31.2	22.1	12.9	100.0
2014	7.4	25.4	31.2	22.6	13.4	100.0

Source: author's calculations based on the data presented in Table 4.

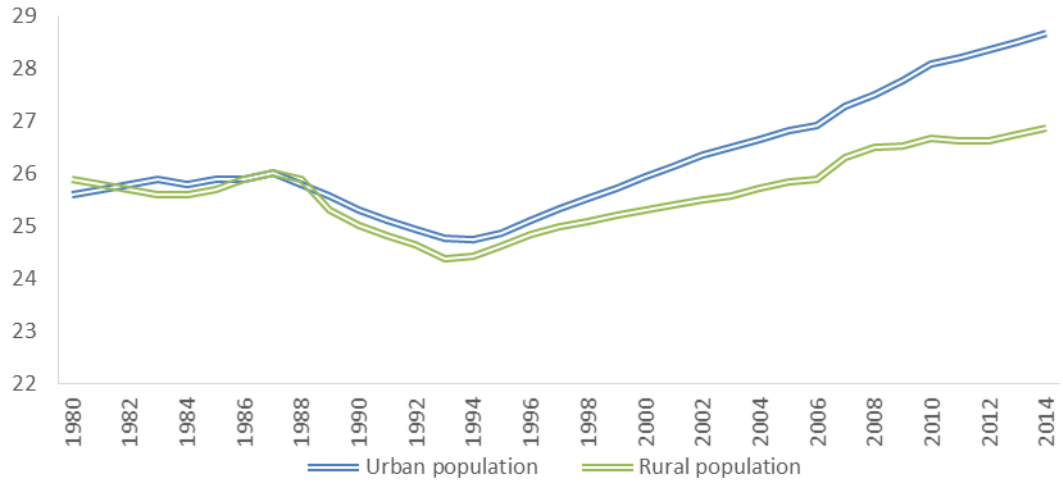

Figure 4. Mean age of mothers in urban and rural areas in Russia, 1980-2014, years

Source: [Demographic Yearbook of Russia 2015] and the author's calculations based on unpublished data from Rosstat.

The age profile of fertility among the urban population over the past two decades has changed faster and more consistently than that of the rural population, as evidenced by a comparison of the average age of first-time mothers. Moreover, in the last few years the increase in the mean age at childbearing for women in rural areas has been barely noticeable (Figure 4). It is precisely rural residents who are mainly responsible for the slowing down of the transformation of the age profile of Russian fertility. If, in the countryside in 2014, the mean age of mothers was 26.9 years, which is not even a year later in comparison with the values which had remained steady 3-4 decades ago, in urban areas the figure reached 28.7 years in 2014, already 3 years above the level observed in the Soviet period.

Since the ageing of fertility has been slower in the rural population than in the urban population, rural-urban differences in this indicator have greatly increased. If, at the end of the Soviet period in the 1980s-1990s, the difference in the average age of mothers in urban and rural areas was negligible (a mere 0.3 years in favour of city-dwellers), then by 2014 it had increased to 1.79 years. One might then ponder the emergence, at least on a temporary basis, of essentially two different age-fertility patterns: a "modernised, post-industrial urban pattern" (with relatively later parenthood, a lower number of children and effective family planning) and a "rural pattern conserving the outward features of the former, more traditional prototype" (with relatively early parenthood, a higher number of children, less efficient family planning).

It is worth remembering that today the rural population of Russian regions in terms of fertility is extremely heterogeneous, and that ethnic and cultural differences and associated features of the demographic transition and social modernisation as a whole continue to play a key role. Moreover, the differences between the rural residents of the regions of the Russian Federation have increased greatly in the last decade [The population of Russia ... 2014: 100-102; 158-173; The population of Russia ... 2015: 90-91]. Further development will show whether and how soon the stage of increasing rural-urban and inter-rural differences will be followed by a stage of convergent dynamics in Russian fertility. Historical experience tells us that, at the stage of rapid changes in socio-demographic models of behaviour – including on a temporary basis – triggered by government policies, a generally continuous increase in regional heterogeneity of statistical indicators is almost inevitable. As the rationality of choosing new behavioural practices gains more widespread approval, a smoothing out of social and territorial disparities becomes the dominant trend.

3. THE PROLONGED STAGNATION OF THE LIKELIHOOD OF A FIRST BIRTH AND THE GROWTH OF LARGE FAMILIES

Russia's low level of fertility is connected with the mass proliferation of one-child families and, accordingly, with a very high proportion of first-borns in the total number of births. The distribution of births by order is an extremely important initial datum for an in-depth study of fertility schedules and an evaluation of its most important characteristics, such as parity progression ratios. Unfortunately, from 1999 to 2011 researchers were unable to take full advantage of these indicators for characterising fertility in Russia. The Law on Civil Status Acts, adopted in 1997 (Federal Law №143-FZ of 15 November 1997), did not provide for the registration of a newborn's birth parity in the birth record (the initial document for national

statistics). This absence of information on the sequence of childbearing did not follow international and previous domestic practice. Continuous time-series data of fundamental characteristics of fertility were unexpectedly interrupted.

Nonetheless, many territorial statistical agencies continued on a voluntary basis to gather relevant information and make it available to the Federal State Statistics Service. Both public authorities and experts, realising the absurdity of the situation, ignored the fact that such activities came into conflict with the law. The composition of Russian territories, which continued to monitor the distributions of births by parity, changed from year to year, but because the regions represented all geographic zones of Russia and accounted for up to 70% or more of all births in the country, it was possible for S.V. Zakharov and E.M. Andreev (as well as colleagues maintaining the reputable Human Fertility Database) to extend, albeit with certain reservations, incomplete data to the whole of Russia. Tables 8 and 9 present the final results of our calculations.

Table 8. Period total fertility rates for each birth order* per woman, Russia, 1980, 1985, 1990-1995, 2000-2014

Year	Children by birth order					Overall TFR (children of all birth parities)*
	First	Second	Third	Fourth	Fifth and subsequent	
1980	0.967	0.643	0.147	0.048	0.061	1.866
1985	0.964	0.758	0.214	0.060	0.055	2.051
1990	0.995	0.624	0.178	0.052	0.045	1.893
1995	0.802	0.387	0.098	0.029	0.021	1.337
2000**	0.702	0.358	0.092	0.026	0.018	1.195
2001**	0.720	0.368	0.090	0.027	0.018	1.223
2002**	0.742	0.394	0.099	0.028	0.019	1.281
2003**	0.758	0.412	0.103	0.028	0.018	1.319
2004**	0.772	0.420	0.105	0.029	0.018	1.344
2005**	0.743	0.406	0.100	0.028	0.017	1.294
2006**	0.753	0.409	0.100	0.027	0.016	1.305
2007**	0.761	0.475	0.125	0.033	0.020	1.416
2008**	0.787	0.515	0.143	0.037	0.020	1.502
2009**	0.801	0.535	0.147	0.038	0.021	1.542
2010**	0.786	0.564	0.156	0.040	0.021	1.567
2011**	0.781	0.574	0.164	0.041	0.022	1.583
2012	0.809	0.620	0.189	0.047	0.026	1.691
2013	0.811	0.625	0.198	0.049	0.025	1.708
2014	0.799	0.658	0.212	0.053	0.027	1.750

Source: author's calculations using the fertility rates for one-year age groups. When calculating the indicators for 1995 and 2000-2003, Chechnya was excluded.

Notes:

**The average number of children of each birth parity expected to be born to a woman by the age of 50 years, provided there is no change in the current age-related intensity of childbearing age and the structure of births by birth parity. The sum of values for all birth parities gives a traditional indicator of the total fertility of a conditional generation (the same as in Table 4).*

***Estimates for 1999-2011 are based on the use of incomplete data: only for those territories that kept processed data on births simultaneously by age and birth parity. For detailed annual dynamics of the 1980s and 1990s, see: [The population of Russia … 2007: 81-82].*

The distribution of births by parity for the year 2012 became available for all Russian territories for the first time after a hiatus of over ten years. Therefore, our estimates of Russian

fertility rates based on birth parity for 2012 and subsequent years are fully comparable with the estimates obtained for the period before 1999.

Already in 2001-2005, that is, before the start of the state policy to stimulate fertility, there was a slow increase in the contribution to the overall dynamics of fertility of second and third births, given the slow reduction in the contribution of first-borns. At the same time, the contribution of fourth and subsequent births decreased.

Table 9. The contribution of each order of birth to the period total fertility rate, %, and the average birth order, Russia, 1980, 1985, 1990-1995, 2000-2014

Year	Children by birth order					Total	Average birth order*
	First	Second	Third	Fourth	Fifth and subsequent		
1980	51.8	34.5	7.9	2.5	3.3	100.0	1.74
1985	47.1	36.9	10.4	2.9	2.7	100.0	1.80
1990	52.5	33.0	9.4	2.7	2.4	100.0	1.72
1995	60.0	28.9	7.3	2.2	1.6	100.0	1.58
2000	58.7	29.9	7.7	2.2	1.5	100.0	1.59
2001	58.9	30.1	7.4	2.2	1.4	100.0	1.59
2002	57.9	30.8	7.7	2.2	1.4	100.0	1.60
2003	57.5	31.2	7.8	2.1	1.4	100.0	1.60
2004	57.5	31.3	7.8	2.1	1.3	100.0	1.60
2005	57.4	31.4	7.8	2.1	1.3	100.0	1.60
2006	57.7	31.3	7.7	2.0	1.2	100.0	1.59
2007	53.8	33.6	8.9	2.4	1.4	100.0	1.65
2008	52.4	34.3	9.5	2.5	1.4	100.0	1.68
2009	52.0	34.7	9.5	2.5	1.4	100.0	1.68
2010	50.1	36.0	10.0	2.5	1.4	100.0	1.70
2011	49.4	36.2	10.4	2.6	1.4	100.0	1.72
2012	47.9	36.7	11.1	2.8	1.5	100.0	1.75
2013	47.5	36.6	11.6	2.8	1.5	100.0	1.76
2014	45.7	37.6	12.1	3.0	1.6	100.0	1.79

Source: author's calculations based on the data presented in Table 8.

*Notes: *The indicator is calculated as the weighted arithmetic mean, where weights are taken for the total fertility rate for each birth parity. For detailed annual dynamics of the 1980s and 1990s, see: [Population of Russia 2007: 82-83].*

In 2007-2014, the structure of fertility by birth *parity* began to change more rapidly. The expected total fertility for first births, compared with 2006, did not change much, but the total fertility of second and subsequent children increased significantly (Table 8). Even the contribution of fourth and fifth births increased, though not significantly. Due to a substantial increase in the contribution of higher birth parities to total fertility, the structure of fertility by birth order practically returned to the level of the mid-1980s (Table 9).

The reduction in the shares of first and, at the same time, of fourth and subsequent births for a long time compensated each other, so that the average birth order (ABO)[12] in 1993-2006 fluctuated around the same level of 1.6 (Table 9). Structural changes in fertility in 2007-2014 caused an increase in the ABO to 1.79, which can be interpreted as evidence of some success in

[12] The average birth parity is calculated as the average arithmetic weighted value of the biological parity of births to a mother, whose weights are the total fertility rates of a synthetic cohort for each birth parity.

the demographic policy carried out in recent years to stimulate fertility. The fact is that the ABO as a statistical indicator of the level of fertility serves as a relatively good predictor of the magnitude of the cohort total fertility[13]. Empirical proof of this claim is shown in Figure 5, where the curve of the cohort total fertility rate is compared with the curves for two period indicators – the period TFR and ABO.

For real generations/birth cohorts of women, there can be no differences between the average birth order and the total fertility rate, as they are essentially the same indicator – the average number of children born per woman by the end of her childbearing years. For synthetic cohorts, in the case of smooth changes in the age patterns of fertility and a stable percentage of women who have never given live birth, discrepancies between the indicators are also minimal, as took place in 1980 and 1990, for example (a difference of fewer than 0.2 births per woman).

However, in the case of sudden changes in the timing of births of many women, or of abrupt changes in the average tempo of formation of the final offspring size in generations, divergences between these integral characteristics of the fertility level for synthetic and real cohorts become inevitable, and are all the greater, the greater the changes in the average tempo of family formation. Recall that the period TFR and ABO are indicators for a synthetic cohort, and therefore should be interpreted as the *expected* values of the ultimate fertility of the generations. In the case of a faster tempo of childbearing (children born to parents at a younger age, shorter intervals between births than before) the conventional period total fertility rate *overestimates* the actual level of fertility and, accordingly, is higher than the ABO, which acts as a more conservative indicator of the expected completed fertility for generations. An example of this is the situation in the mid-1980s when family policy measures that entered into force in 1981 – above all, childcare leave – caused a disruption of the previous calendar of births of the average woman: a significant number of women born in the 1960s were quick to give birth to children, especially to a second child, a few years earlier (the age of mothers went down, the interval between births decreased). The period TFR jumped from 1.89 in 1980 to 2.23 in 1987, or more than 0.3 child per woman. In fact, the demographic effect of these policies was much less significant, since families did not so much change their intentions with regard to the final number of their offspring as change the "schedule" of their birth, as indicated by the poor response of the ABO indicator (1.74 in 1980 and 1.83 in 1987, a difference of only 0.09 children, very close in magnitude to the positive assessment of the impact of policies on completed cohort fertility; for details, see: [Zakharov, 2006]).

[13] Inclusion in one way or another in the calculation of fertility rates differentiated by birth parity significantly reduces the dependence of the total fertility indicators for synthetic cohorts (calendar years) on short-term or longer-term changes in the timing of births occurring in real generations. Thus, it is considered that the indicator characterising the average birth parity of a mother (Period Average Parity [PAP]), obtained on the basis of the probabilities of the next birth from special fertility tables for synthetic cohorts, is one of the best alternatives to the traditional total fertility rate (see, for example: [Rallu, Toulemon 1994a, b; Suzuki 2007, Buber et al. 2012]). The ABO index discussed here is certainly inferior in its heuristic capabilities to indicators obtained on the basis of special fertility tables taking into account the parity of birth and intervals between births. Nevertheless, while remaining an indicator for synthetic cohorts, it will, firstly, be certainly more resistant to the influence of changes in the age profile (calendar) of childbearing that distort the overall estimate of fertility given by the TFR, and secondly, it is easily accessible for calculations based on current statistical data (does not require the construction of complex multi-status tables), which allows it to be widely used for comparative purposes.

In the 1990s, the opposite was true. The indicator of the average birth order was significantly higher than the period total fertility rate, which points to a significant slowdown in the tempo of childbearing: Women born in the 1970s and 1980s began to have children later than previous generations. As a result, the TFR – estimated for calendar years (for synthetic cohorts) – *underestimated* the expected value of the ultimate fertility of generations undergoing a process of transformation of the age patterns of fertility towards later motherhood.

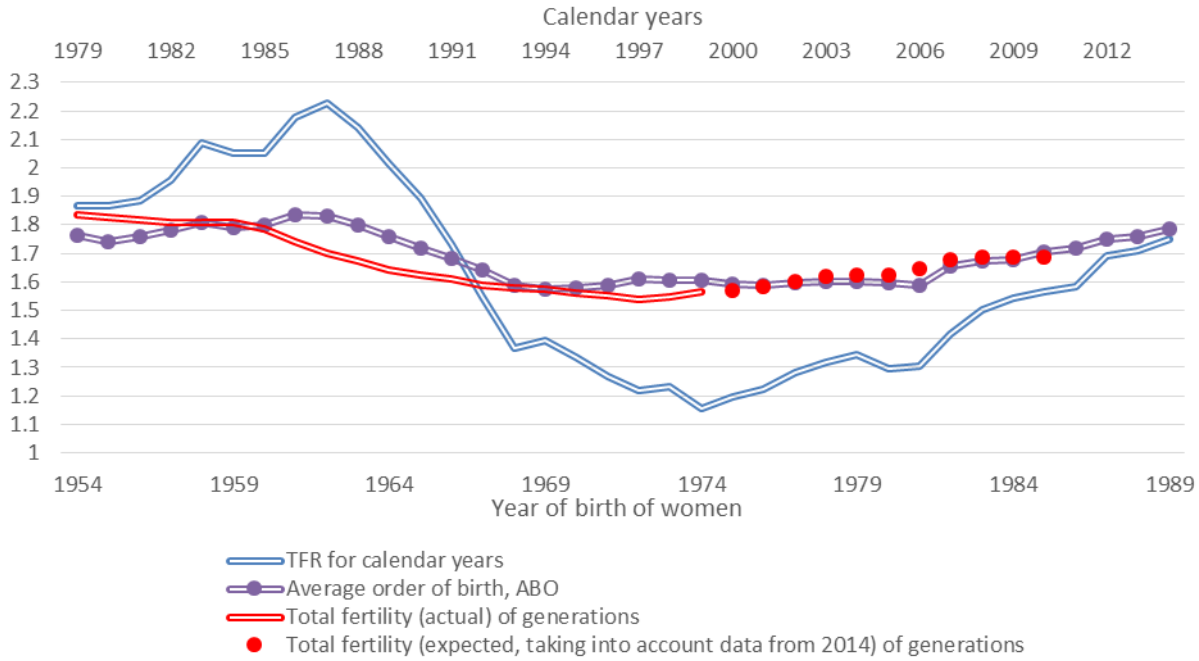

Figure 5. Period and cohort total fertility rates, Russia, births per woman

Source: Author's calculations based on unpublished Rosstat data for one-year age groups.

Notes: TFR is the total fertility rate for calendar years; ABO is the average birth order for calendar years; completed fertility (actual) is for cohorts of women born in 1954-1974; total cohort fertility (expected if age-specific fertility rates observed in 2014 are maintained) is for cohorts of women born in 1974-1989.

Since 2000, the increasing period total fertility rate has been coming close in magnitude to the average birth parity, which has displayed greater stability in recent decades. Does this trend not indicate the completion in Russia of the most dynamic stage of the formation of a new, later model of fertility, where the completed cohort fertility changes little?

Based on the average estimate of the ABO for the past 10 years, we can assume that if there is no further increase in the proportion of permanently childless women (i.e. those never giving live birth), and the structure of mothers by number of births does not change, then the total fertility of female generations, now with an average maternal age of about 27-28 years (i.e. born in the second half of the 1980s), will be around 1.7 children per woman. If the upward trend of the ABO observed after 2006 continues, it would seem we can count on a slightly higher result for these generations (recall that the ABO for 2014 was close to 1.8; see table 9). However, this optimistic scenario is opposed by a steady decline in the probability of first births, as will be discussed below.

The most correct estimate of the probability that, in a given calendar year, the birth of children of one or another parity to mothers of all ages occurred is given by an indicator demographers call the Parity Progression Ratio (PPR): the proportion of women who gave birth to another child in the current year, including those who already gave birth to one fewer child (for example, the probability of the birth of a first child is the proportion of women who gave birth to their first child in the given year among women who had given birth to no children at the beginning of the year, while the probability of a third child is the proportion of mothers with two children who gave birth in a given year to a third child). This indicator is derived based on the construction of special fertility tables by order of birth – a method similar to life tables in mortality analysis, in which the aggregates, in descending order by age, are the number of women with a certain number of children actually born. Annual estimates of the probabilities of having another child are obtained by using a YOY annual cohort transformation of the distribution of women by the number of children ever born based on the annual distributions of live births by the age of the mother and the parity of the birth provided by current statistical records, as well as the annual changes in the size of the female cohorts due to mortality and migration, as estimated by Rosstat.

Our annual estimates of the probabilities of having another child over the last 35 years – with the proviso that the estimates for the period 1999-2011 are based on incomplete data[14] – are presented in Figure 6.

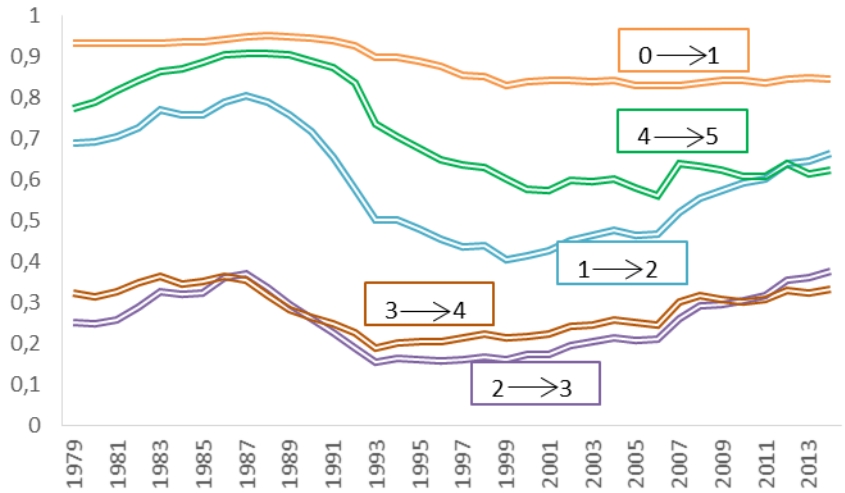

Figure 6. Period parity progression ratios for women by the age of 50, Russia, 1979-2014

Source: Author's calculations based on unpublished data from Rosstat.

Notes: For 1999-2011 the estimate was made based on incomplete data for territories that submitted to Rosstat data on distributions of births by age of mother and birth parity.

In the first half of the 1980s, the probability of a next birth increased for children of all parities, which was an obvious reaction to the innovative measures of family policy (particularly the introduction of childcare leave, partially paid benefits in the provision of housing, etc.), but

[14] In fact, Russian data became incomplete not in 1999, but even earlier: in 1993-1994, no information was collected on Ingushetia, and in 1993-2003 none was collected on Chechnya.

then the movement went in the opposite direction. In the second half of the 1980s, there was a rapid postponement (in some cases, seemingly indefinite) of births not only of second and subsequent children, but even of first-borns. The situation began to improve only in the mid-1990s. In 1994, the probability of the birth of a third and fourth child began edging up, as did the likelihood of a second birth starting in 2000. The probabilities of the birth of a first and fifth child remained at the level of 1999.

As part of the impact of the new pronatalist measures of population policy introduced in 2007, there was a jump in the probability of birth of children of all parities except firstborns. In 2008, the growth in the probabilities of birth of second, third and fourth children continued, and the increase in the likelihood of birth of fifth and subsequent children stopped. In 2009, the probability of second births continued to increase, but more slowly, the growth in the probability of third births stopped, and the probability of fourth and subsequent births went down. In 2010, the only increase was in the likelihood of a second and, to a small degree, third birth. In 2011, the probability of second births continued the trend of slowing growth, and almost imperceptibly the probability of the birth of subsequent children increased. In 2012, there was another jump in the probability of the birth of children of all parities, and in the case of second, third and fourth births, a highly significant one, repeating the jump that occurred in 2007. In 2013, there was a weak and nearly identical increase in the probabilities of having a second or third child. The probability of the birth of a first child also increased, but to an even lesser degree, and the probability of fourth and fifth births declined over the year. Finally, in 2014 we again see a decrease in the probability of the birth of a first child with a relatively low increase in the probability of second and third births (2% and 1.5%, respectively) and even weaker growth in the probability of fourth and subsequent births (less than 1%).

With regard to the probability of a first birth, it is necessary to note a continuation of a long, fifteen-year period of stagnation of this indicator with fluctuations within the range of 0.82-0.85. Thus, the perceptible increase starting in the late 1990s of period total fertility is not related to an increased chance of firstborns appearing in families.

The situation with the probability of birth of a firstborn is alarming, because if it doesn't increase, then the base for further growth for second and subsequent children narrows. If the intensity of birth of first-borns continues to remain at the same level as in 1999-2014, then the expected magnitude of definitively childless women (those who have not had a single live birth by the age of 50) will come to an average of 16% (from 15% to 18%). Assuming this value does not change, then in order to reach an average value of total fertility of 2.1 births per representative of a generation (a threshold that guarantees simple replacement of generations), it is necessary for each woman who has ever given birth to have an average of 2.5 births (and for each woman who has ever been married, even more). Under these conditions, one in two families (a parental family) must have at least three children. Given the current situation, such a situation is difficult to imagine. According to a special birth-order-specific table of fertility for 2014, we expect that for one woman who has ever given birth by the age of 50 years there will be an average of 2.0 births, and among them the proportion of women who have given birth to one child will be 34%, to two children a share of 41% and to three or more children a share of 25%. At the same time, if the proportion of women who have never given birth decreased to 6-7% (as was consistently the case in 1970-1980), then in order to achieve the desired TFR value of 2.1 per woman, it would be enough to have 2.2

births per woman who has ever had children. The share of families with two children in this case would continue to be much larger than that of families with three or more children. Theoretically and practically it is much easier to imagine such a future situation for Russia, given that, according to numerous public opinion polls, the two-child family has always been and remains the most desirable.

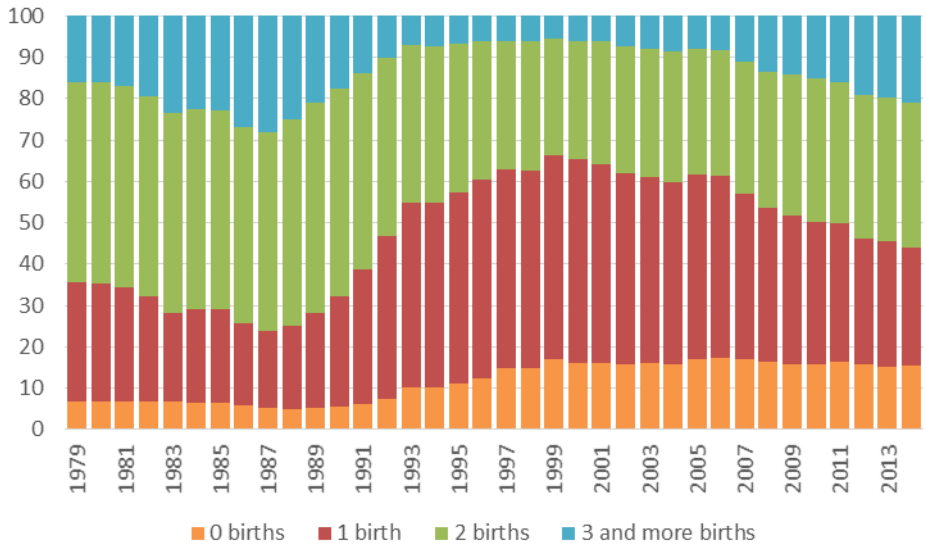

Figure 7. Expected distribution of women by number of children born by the age of 50, assuming no change in the tempo and quantum of fertility of the given year, Russia, 1979-2014, %

Source: Author's calculations based on unpublished data from Rosstat.

The expected distribution of women by the total number of children ever born by the age of 50 years in accordance with special age-specific and birth parity-specific period fertility tables for 1980-2014 is shown in Figure 7. If the parity progression ratios for each birth order stay the same as in 2014, the proportion of women who have given birth to one child in their life among all women (who have and have not given birth) would be 28% versus 44% in 2006 and 49% in 1999-2000 (an historic high). The proportion of women with two births can be expected to reach 35% (31% in 2006 and 28% in 1999-2000). Finally, the proportion of women with three or more births can be expected to be 21% (8% in 2006 and 6% in 1999-2000). Worth noting is the more than three-fold increase in the expected share of large, mostly three-child families which occurred at the end of the 1990s. At the same time, it is not clear to what extent this increase can be attributed to the success of the policy of "stimulating the birth rate" (in any case, the upward trend appeared long before the activation of the demographic policy), and, more importantly, we are not ready to confidently answer the question as to whether these structural changes in Russian fertility are of a short-term or long-term nature.

If we leave aside childless women and focus our attention on changes in the structure of the expected number of children born to mothers, that is, to women who have ever given birth to a live child, then from a thirty-year retrospective view, the increase in the proportion of large families observed in the last 10 years does not look quite so impressive (Figure 8). First of all, during the period of active demographic policy in the 1980s the increase in the share of women

with three or more children was about the same, and the share itself reached 30% in the peak year of 1987; while being a higher value than today's, this level could not be maintained. Secondly, the picture shown in Figure 8 is more evidence in favour of the notion of "recuperation" in dynamics of the structure of Russian fertility by birth order after the disturbances experienced in the 1980s and 1990s, rather than of radical successes caused by measures of demographic policy which took on an openly pronatalist character in the second half of the 2000s.

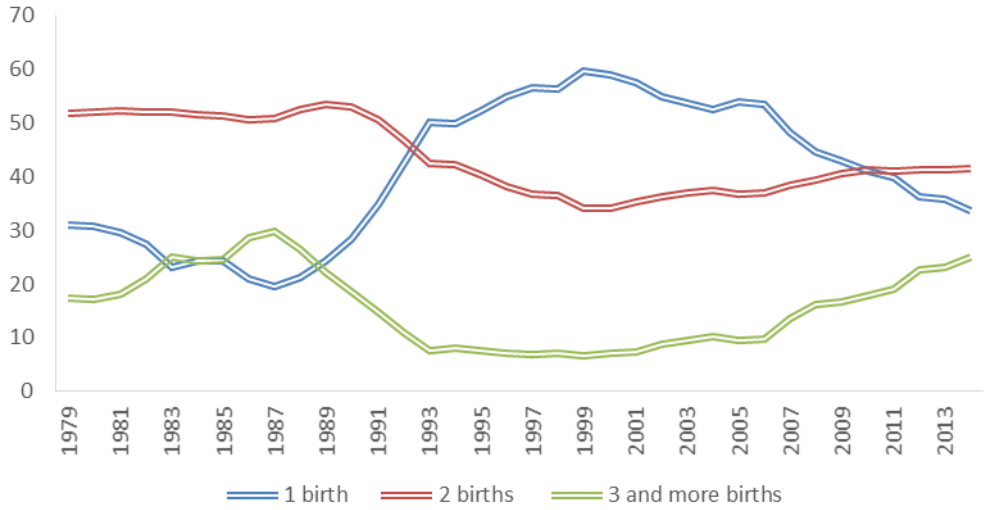

Figure 8. Expected proportion of mothers (women with at least one live birth) with the indicated number of children born by the age of 50 years assuming no change in the tempo and quantum of fertility of the given year, Russia, 1979-2014

Source: Author's calculations based on the data shown in Figure 7.

4. THE FERTILITY OF FEMALE BIRTH COHORTS: IS THERE ANY REASON FOR OPTIMISM?

As mentioned above, in Russian society the notion of the extraordinary growth of fertility in Russia is extremely popular. It allegedly testifies to the positive results of special pronatalist measures taken by the state after 2006. At the same time, many demographers are not inclined to share the increased optimism of politicians, administrators of different levels and widely disseminated media today. There are some positive developments, but their significance is completely insufficient to look at the future of Russian fertility with optimism. Moreover, the one indisputable criterion for a change in fertility – the dynamics of indicators of total fertility of female cohorts by year of birth – does not give cause for great enthusiasm.

Total fertility for the cohorts born in the 1970s and 1980s is likely to be lower than the total fertility of their mothers born in the 1950s and 1960s, which indicates a continuation of the historical decline in the fertility quantum, which so far has proven hard to break (Figure 9). On the other hand, the convergence of fertility rates of mother and daughter generations is a historical fact indicating the completeness of the demographic transition to fertility regulated at the individual and intra-familial level, and the affirmation of the two-child family as the most desirable and common model [Demograficheskaya modernizatsiya ... 2006: 153-175]. If we accept the historical

variation of the length of a generation in the interval from 25 to 30 years[15], then Russian women born in the 1970s and the 1980s and finishing their childbearing today have given birth to an average of 10% fewer children than their "mothers" born in the 1940s-1950s. For comparison, their "grandmothers", born in the first decades of the twentieth century, produced half as many children as their "great-grandmothers" – women born at the turn of the 19th and 20th centuries (Figure 10).

Let's consider in more detail the prospects for stabilisation and possible growth of total fertility rates for birth cohorts of women in Russia, taking into account the final data for 2014 (the most recent complete data available at the time this article was completed).

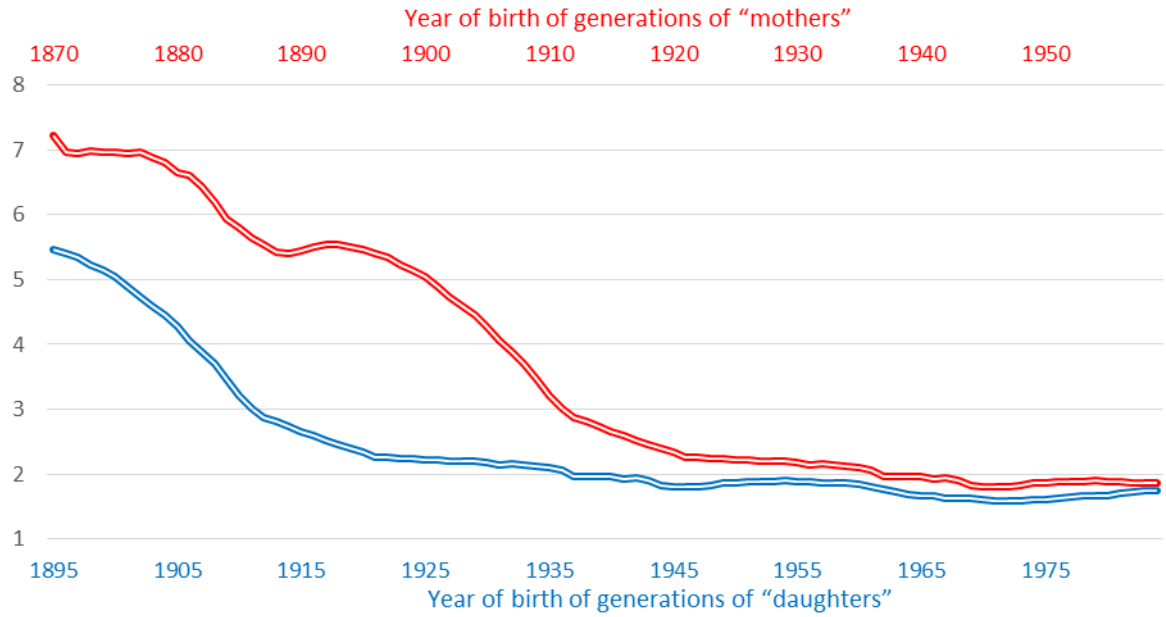

Figure 9. The total number of births per woman in the generations of "mothers" of 1870-1960 and their "daughters" born in 1895-1985

Source: Estimates obtained by the author from the reconstruction of historical dynamic series of period and cohort fertility rates. See: [Demograficheskaya modernizatsiya... 2006: 155-157; 170-171].

Note: For generations of 1965 and younger – the expected value while maintaining the age-specific fertility rates of 2014.

[15] The length of a generation in demography is the interval of time between the appearance of generations of parents and children. If we neglect the effect of the mortality of women in the reproductive age range, it is approximately equal to the average age of the mother at the birth of daughters of all birth parities and is usually in the range of 25 to 30 years.

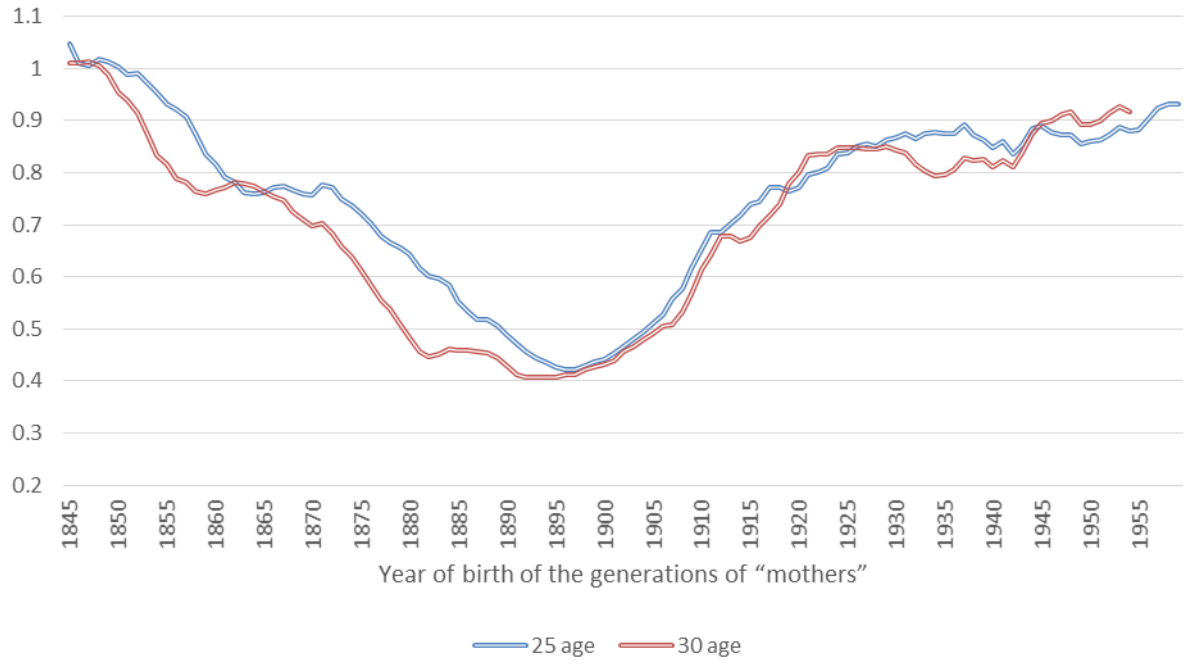

Figure 10. The ratio of total fertility rates of generations of "daughters" to the values of their "mothers", with the length of the generation taken at 25 and 30 years, Russia

Source: Estimates obtained by the author from the reconstruction of historical dynamic series of indicators of total fertility. See: [Demograficheskaya modernizatsiya... 2006: 155-157; 170-171].

Recall that the methodology for obtaining cohort fertility rates includes the transformation of current birth records by birth order distributed over one-year age groups of mothers into distributions of births for cohorts of women by year of birth, which are then used as the basis for constructing special fertility tables, which are similar to life tables, differentiated by birth order. The technique for constructing such tables is similar to that for period (calendar years) age-specific and birth order-specific fertility tables, as discussed above. As a result of the construction of the cohort fertility tables, we also obtain time-series data on the probabilities of an increase in family for each age, differentiated by birth order and generalising the characteristics of fertility (total fertility for each birth order, mean age at each birth order, distribution of women by the number of children ever born, etc.). Unlike similar indicators calculated for period tables, characteristics from tables for female birth cohorts will be maximally free from the influence of changes in the timing of births that occur from generation to generation. There is, however, a problem with the evaluation of ultimate fertility and the lifetime parity progression ratios for cohorts which, due to their age, have not yet completed their reproductive biographies.

Figure 11 shows cumulative fertility rates for average representatives of female generations born in 1940-1990, at ages 20, 25, 30, 35, 40 and 50 years (the accumulated fertility by the age of 50 can be considered completed fertility of the generation), based on the cohort transformation of the recorded age-specific fertility rates for the period from 1959 to 2014.

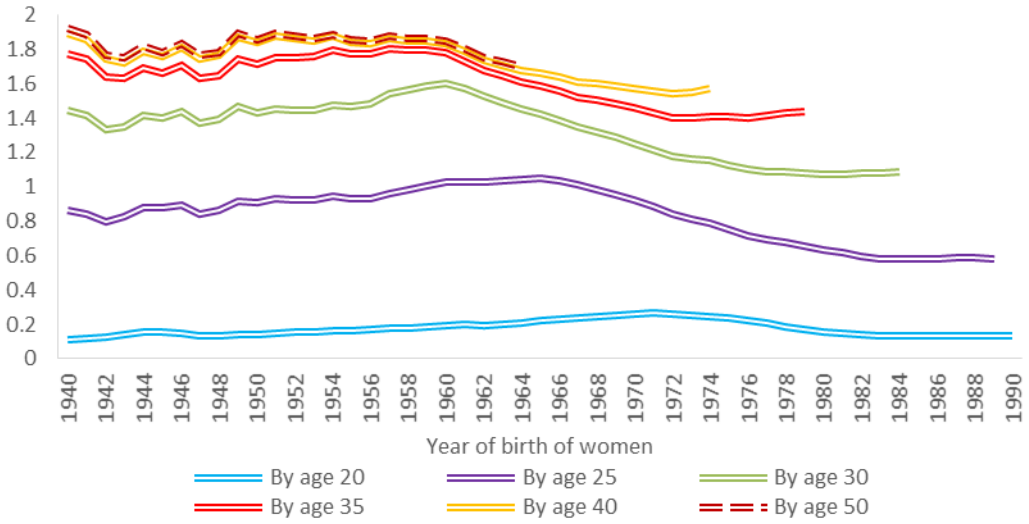

Figure 11. Cumulative fertility rates for the indicated ages (most recent data refer to 2014), Russia, one-year cohorts of women born in 1940-1990, number of births per woman

Source: The author's calculations based on [HFD 2016] and unpublished Rosstat data.

Cumulative fertility by the age of 25 for generations born in the mid-1980s is 40% lower than for generations of the second half of the 1960s (0.6 births on average per woman versus 1.0). No signs of growth in the youngest cohorts are observed at young ages.

Generations born in the late 1970s and early 1980s and reaching ages 30-35 by 2015 demonstrate a barely noticeable recovery of accumulated fertility, indicating a certain stabilisation or even faint signs of growth. At the same time, accumulated fertility by a comparable age in these generations is more than 20-30% lower than for generations of Russian women born in the 1960s: by the age of 30, cumulative fertility in the cohort of 1979 is 1.08 births per woman versus 1.60 in the 1960 cohort; by the age of 35 the figures are, respectively, 1.44 versus 1.78 for the same cohorts.

By the age of 40, cumulative fertility close to the ultimate fertility of a generation, which was continually decreasing in cohorts of women born in the late 1950s and early 1970s, has shown faint signs of growth in the last few years; its value, however, which is equal to 1.57 for the cohort of 1974, still falls short by at least 0.2 births, lower than that of their mothers born in the late 1940s and early 1950s.

Can the generations of the 1980s return to the total fertility level of their mothers – the generations of the 1950s-1960s (1.8-1.9 births per woman)? Probably not. Even the level of 1.7 births per woman will be an overly optimistic forecast for them (see Figure 12, which shows the deviation of the cumulative age-specific fertility rates of the 1965-1985 cohorts from the rates for the 1960 cohort).

The expected result for the generations born in the 1980s is, on average, 1.6 births or slightly more per woman, provided that the trends of the last few years continue over the next decade. This will mean a halt to the long-running historical decline in fertility in Russia and, correspondingly, a decrease in the average number of children in Russian families, but at a level too low to escape the narrowed-down replacement of generations. There are, for now, no grounds

for hope that each new generation of children in numerical terms will at least roughly correspond to their parents' generation. It is still too early to say whether such grounds will be given by the generations of the 1990s – most of them have not yet reached the age of maximum intensity of procreation.

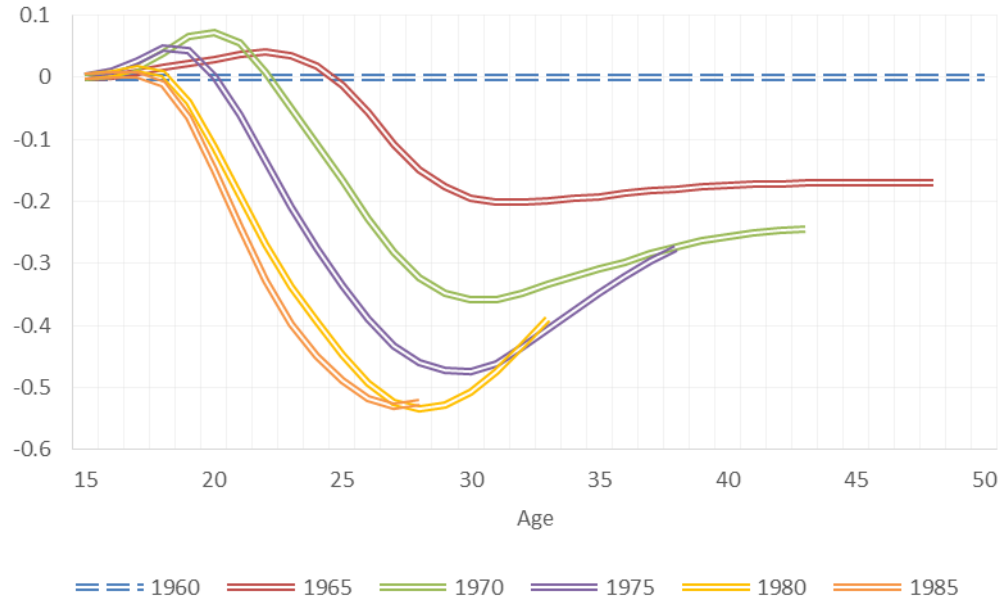

Figure 12. Differences in the values of age-specific cumulative fertility rates for women born in 1965, 1970, 1975, 1980 and 1985 from the values for the 1960 cohort (most recent data refer to 2014). Number of births per woman

Source: The author's calculations based on [HFD 2016] and unpublished Rosstat data.

Cohort birth order-specific fertility tables make it possible to estimate the accumulated values of the probabilities of an increase in the family by a certain age (cumulative parity progression ratios by age). These indicators are similar in nature to those discussed above with regard to period fertility tables, i.e. they also represent the accumulated share of women who gave birth to a next child among those who gave birth by a fixed age to one child less: a first child among those who have never given birth, a second among those who have given birth to a first, etc. But if in the case of the period fertility table we interpreted the probabilities of an increase in the family as the expected indicators if the intensity of childbearing of the current year is maintained, then for the cohort fertility table the probability of an increase in the family size by a given age reflects the proportion of women who actually realised the transition to a status with one more birth. Thus, the probability of an increase in the family size for women who have never given birth (PPR 0→1) shows the proportion of women from some cohort who actually gave birth to a first child by a particular age (Figure 13).

The cumulative parity progression ratio for null-parity women by the age of 50 makes it possible to estimate the final share of childless women, for which it is necessary to subtract from the number 1 (a theoretical value indicating the total absence of children). For example, the 1960 generation completed its reproductive biography with a probability of giving birth to a first child of 0.95, which indicates a 5% level of final childlessness (only live births are taken into account and the mortality of children is not taken into account). For women born in 1970 – i.e. over 40

years of age – the expected value is 0.92 (8% will remain permanently childless). Our estimate of the accumulated probability of a first birth by the age of 35, equal to 0.83 for the youngest generation who reached this age by 2015 (women born in 1979), allows us to state that there is still a trend in Russia towards an increase in the proportion of women who have never given birth. The values of the PPR for 35-year-old women differ slightly from the values for 50-year-old women, which gives us grounds for predicting the share of final childlessness for women born in the second half of the 1970s at the level of 12-14%. Similar estimates of the expected share of final childlessness for the same generations were obtained by S. Biryukova and A. Tyndik by constructing a survival function using the Kaplan-Mayer method based on the population census data of 2010 [2015].

During the time equal to the period of reproductive activity of fifteen one-year female birth cohorts, the prevalence of childlessness in Russia increased twofold. As already mentioned, the pronatalist state policy did not affect this trend in any way. It is important to emphasise that with such a significant increase in the proportion of women who have not given birth to at least one child in their lives, efforts aimed at encouraging repeated births may not lead to the desired result – an increase in the average total fertility of cohorts to a level that allows at least a simple replacement of generations, as was shown above. The increase in the likelihood of the birth of children of the second and third order (Figures 14 and 15) is not so significant as to compensate for the cumulative effect of significantly reducing the probability of first births.

Demographic policy after 2007 probably affected the likelihood of second and third births in the country. It is interesting that the policy, conceived as a "second child" policy, brought a comparable result with respect to the increase in the probability of the birth of third children (Figure 15). There are even some signs of an increase in the likelihood of the birth of fourth and subsequent children at an early age (Figure 16).

By the age of 30, among those who gave birth to a first child by this age, 43% of the representatives of the 1984 birth cohort of mothers gave birth to a second child. In comparison with the minimal value demonstrated by the birth cohort of 1976 (36%), the increase was 7 pp. By age 35, this figure was 55% for the youngest cohort that reached that age (the birth cohort of 1979), against the historical minimum of 49% (the birth cohort of 1971), i.e. the increase was 6 pp. The probability of the birth of a third child by the age of 30 for the youngest cohort is at the level of 18%, which is 3 pp. higher than the historical minimum for Russia. By the age of 35, for the youngest generations, the probability of a third birth is at the level of 24%, which means an increase of 5 pp in comparison with the minimum values. The latest estimates for the probability of third births indicate that they are approaching the maximum values achieved by representatives of the 1950s generation, whose reproductive activity also occurred during the period of activation of the demographic policy in the 1980s. At the same time, the probability of second births today is still very far from the values achieved in the 1980s by the generations of the 1950s and 1960s.

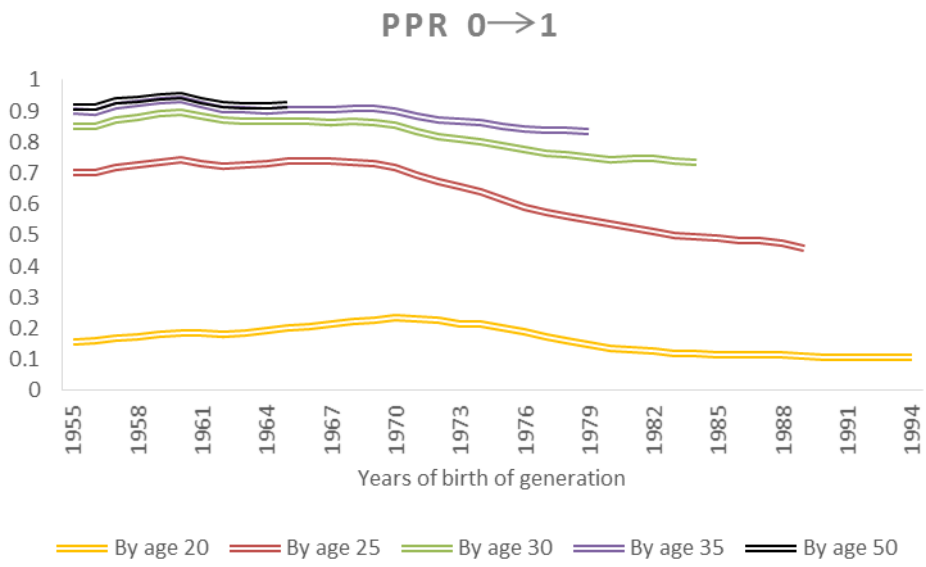

Figure 13. The cumulative probability of the birth of a first child (PPR0) at the indicated ages (most recent data refer to 2014), Russia, female cohorts born in 1955-1994

Source: Author's calculations based on [HFD 2016] and unpublished Rosstat data.

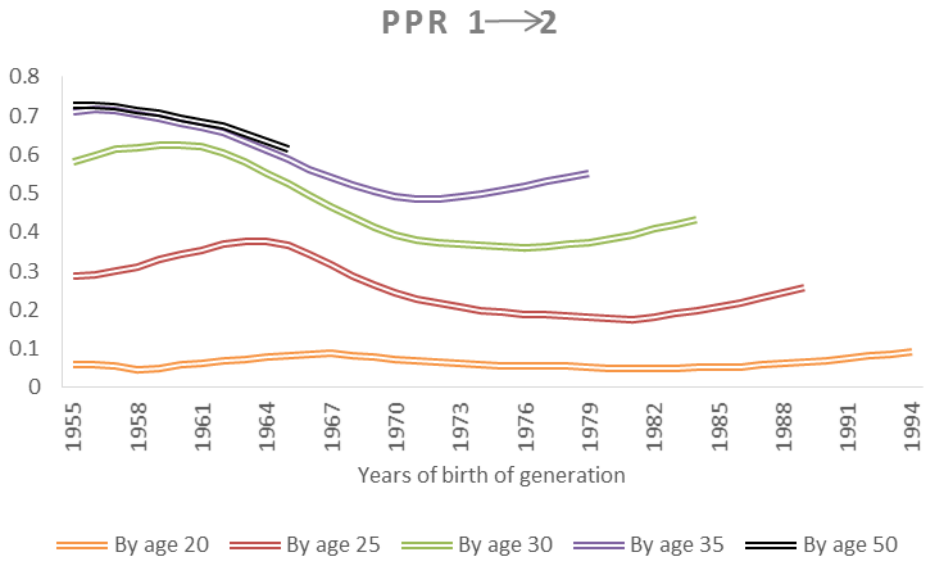

Figure 14. The cumulative probability of the birth of a second child (PPR1) at the indicated ages (most recent data refer to 2014), Russia, female cohorts born in 1955-1994

Source: The author's calculations based on [HFD 2016] and unpublished Rosstat data.

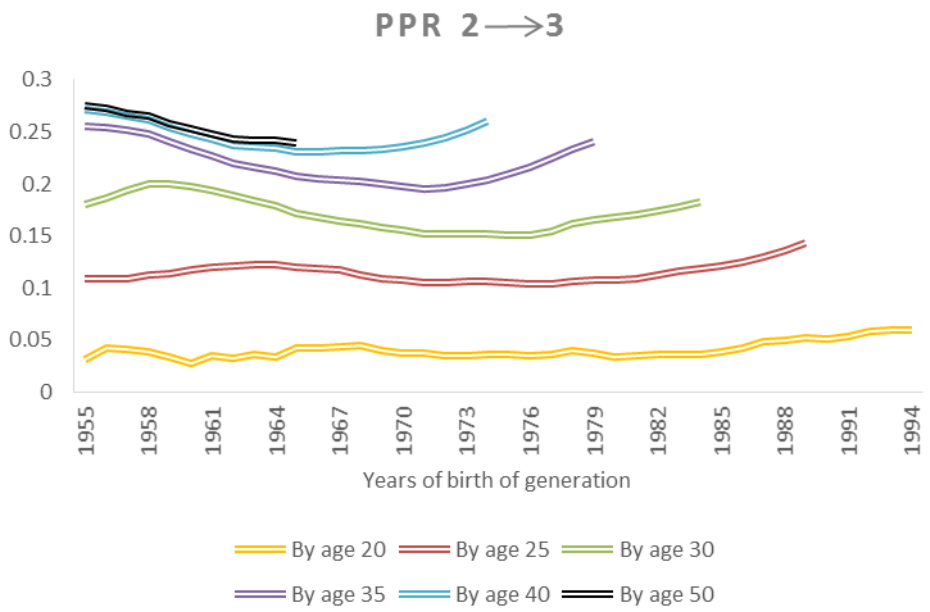

Figure 15. The cumulative probability of the birth of a third child (PPR2) at the indicated ages (most recent data refer to 2014), Russia, female cohorts born in 1955-1994

Source: Author's calculations based on [HFD 2016] and unpublished Rosstat data.

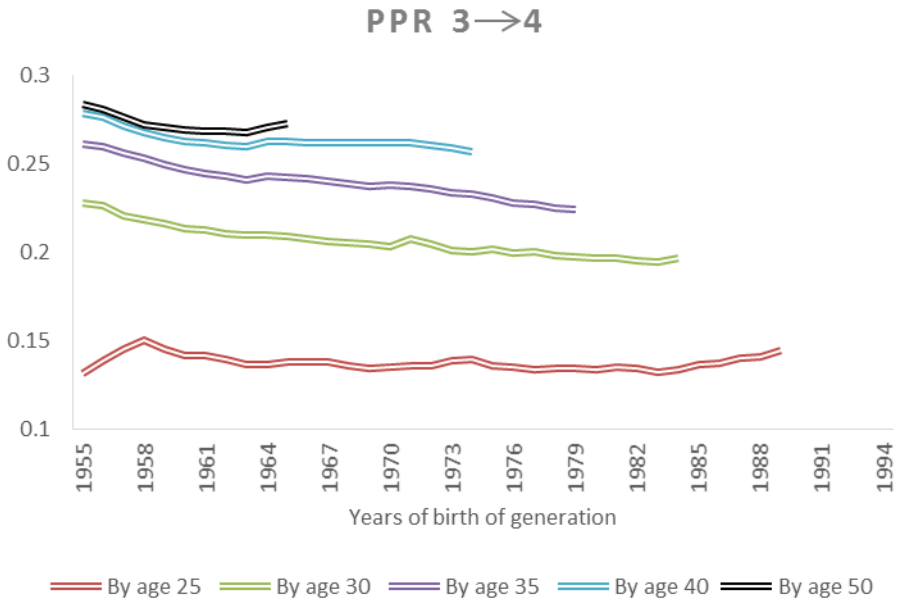

Figure 16. The cumulative probability of the birth of a fourth child (PPR3) at the indicated ages (most recent data refer to 2014), Russia, female cohorts born in 1955-1994

Source: The author's calculations based on [HFD 2016] and unpublished Rosstat data.

It is difficult to explain the significant increase in the probability of third births only by the intensification of financial incentives to which Russian official propaganda pays special

attention[16]. This phenomenon deserves closer attention from researchers. As I pointed out before [Population of Russia ... 2014: 144-147; Zakharov 2015], possible explanations go beyond actual demographic analysis and, apparently, are related to the socioeconomic, regional and ethnic heterogeneity of Russian society. It is also possible that the attractiveness of Russia to migrants strengthens the socio-cultural heterogeneity of its population, including in relation to its reproductive strategies. At the same time, one cannot help but notice the fact that the emerging situation with repeated births is in many ways reminiscent of the situation experienced by Russia in the 1980s, when, following the adoption of new family policy measures, there was also an acceleration of second and third births, which, however, did not lead to a significant increase in the total fertility of generations. The future will show whether we will witness a repetition of the experience of the 1980s or can expect a different and more hopeful situation.

The magnitude of total fertility for cohorts that have not yet emerged from reproductive age can be assessed by "extrapolating" the number of children for each female birth cohort actually born by the time of observation with expected numbers of "not-yet-born children". At the international level, an approach has been adopted that sums up the number of children actually born by the time of observation for each cohort of women and the hypothetical number of children that can be expected if, at subsequent ages, the average woman of this cohort has the same fertility as that shown by women who, in the year of observation, had reached these ages. With this approach, for the cohort of women who were 15 years old in the year of observation, the estimate of total fertility is based entirely on the "expected" component, and numerically coincides with the usual period total fertility rate for the given calendar year, i.e. this is a completely conditional value. The older the generation, the lesser the contribution of the "expected" component, and the greater the role played by the already realised actual fertility in the evaluation of total fertility.

If regular estimates that take into account the age-specific fertility rates that vary from year to year are made, one can obtain a dynamic picture of successive changes in the estimates of both the "actual" and the "expected" components of total fertility for the same cohort and, consequently, their total value. In recent decades, in developed countries and in Russia there has been an increase in fertility among women over 25, even over 35; as long as this increase continues, the expected estimates of cohort total fertility will be revised upwards, not only for the youngest generations, but also for representatives of older cohorts with a growing contribution of late fertility.

Reports of the Institute of Demography of the Higher School of Economics, "Population of Russia", have for many years presented my annual estimates of the expected total fertility of

[16] For example, one often hears about the positive role of a special monthly allowance in the amount of the subsistence minimum, payable at the birth of the third and subsequent children until they reach the age of 3, in more than 50 regions of the Russian Federation from the list of regions approved annually by the government in which the total fertility rate is lower than the average Russian level or which have a natural or migratory decline in the population (this measure was introduced on the basis of Presidential Decree №606 of May 7, 2012 "On measures to implement the demographic policy of the Russian Federation" and is regulated by regulations approved by Government Decision No. 1112 From October 31, 2012 with subsequent amendments). The size of the allowance is quite large: in 2014, it ranged from 4,800 rubles in the Tambov region to 13,700 in the Kamchatka Territory. It is likely that such a measure is now having some kind of influence on the growing number of large families in Russia. However, this can in no way be connected with the trend of an increased probability of a third birth, which began long before 2013, when this policy measure was introduced.

Russian generations, based on an internationally accepted approach and incorporating data on cohort fertility for the most recent year[17].

Let us see what estimates could be made of total fertility for post-war generations based on historical data limited to 1999 (the year of the historically minimal value of the total fertility rate), and compare them with estimates obtained for the same generations on the basis of the latest available data for 2014 (Table 10). In addition, in order to evaluate the particularly significant contribution of the growth in fertility after 2006 (that is, after the new measures of population policy were introduced), the table reproduces the estimates of the expected total fertility that I made earlier based on data for 2006.

Table 10. Actual and projected average number of births by generations in Russia, women born in 1955-1989

Years of birth of women	Total number of births		Estimate based on 2014 data			Difference between estimates of 1999 and 2013	Difference between estimates of 2006 and 2013
	Estimate based on 1999 data	Estimate based on 2006 data	Actually born by 2015. children per woman	Expected births in addition to those already born	Total number of births		
1955-1959	1.88	1.88	1.88	0.00	1.88	0.00	0.00
1960-1964	1.75	1.76	1.76	0.00	1.76	0.01	0.00
1965-1969	1.58	1.63	1.64	0.00	1.64	0.06	0.01
1970-1974	1.40	1.52	1.58	0.02	1.60	0.20	0.08
1975-1979	1.23	1.43	1.52	0.12	1.64	0.41	0.21
1980-1984	1.16	1.33	1.30	0.42	1.72	0.56	0.39
1985-1989	-	-	0.86	0.90	1.76	-	-

Source: The author's calculations based on unpublished Rosstat data: population censuses of 1979 and 1989 (the distribution of women by the number of children born for one-year age groups) and the age-specific fertility rates for one-year age groups in 1979-2014.

It is clear that the total fertility rate for female cohorts in the second half of the 1950s (1.88 children per woman) did not change. These generations were already close to the end of their reproductive careers in the first half of the 2000s and had already left it by 2010. Indicators for generations born in the first half of the 1960s changed in comparison with the estimate for 1999, slightly increasing from 1.75 to 1.76, and the changes that took place after 2006 go beyond the limits of our significance indicator (in the hundredths). The growth in fertility noted in the last decade did not pass without a trace for generations of women born in the second half of the 1960s: their final fertility exceeded 1.6 children (1.64 compared to 1.58 in 1999). True, the increase in births in 2007-2014 was for them barely significant – just 0.01 per woman.

The expected fertility rates for cohorts born in the 1970s changed more significantly. In comparison with estimates based on the actual accumulated and expected fertility by the year 2000, later estimates show an increase of 0.2-0.4 children per woman. In 2007 alone, these generations "reached" a total fertility rate of 0.03-0.07 children, and for 2007-2014 overall, a rate of 0.1-0.2. It is easy to calculate that, if the trend towards an increase in fertility after age 30 persists, then cohorts of women born in the 1970s will have an average of 1.62 births. Unfortunately, these

[17] Such estimates were first published by us in 2004; see: [Population of Russia: 2004:55].

generations no longer have the chance to cross the indicated threshold, because their representatives are inexorably approaching age 40 or have already reached it. Total fertility of the 1970s cohorts will undoubtedly be lower than that of previous generations.

Cohorts born in the 1980s may complete their reproductive biographies with a slightly higher birth rate than generations of the 1970s. Given the trends observed today, they have a chance to achieve an average of 1.75 births per woman. If such a value is reached, this will mean that the long-term decline in the fertility quantum in Russia will stop, and one can even hope for its growth. With such characteristics, Russia will not differ much from the average period and cohort fertility rates for Europe.

So, given age-specific fertility rates at the 2014 level, for cohorts that reached the age of 25 and above the prospect of a stabilisation of cohort total fertility in Russia by 2015 at the level of 1.7-1.8 looks quite well-founded.

In order to check the result, we resorted to an alternative method of long-term estimation of total fertility for female cohorts over the age of 25. Given the current Russian age pattern of fertility, all women older than 25 years have reached or already passed the peak age of the intensity of childbearing.

The method proposed below is based on the extrapolation of the age-specific probabilities of the birth of the next child in a "real" cohort of women, based on modeling the rate of decrease in the age probabilities of giving birth for a "synthetic" or "hypothetical" cohort (for calendar periods) separately for each birth order beyond the age at which peak values of fertility rates were reached. The probability values for giving birth to another child are taken from the period age-specific and order-specific fertility tables discussed above. It should be noted that, in the period tables, the curve describing the rate of change in the probabilities of childbearing for each parity after age 25 demonstrates a sufficiently high stability over time (Figure 17).

The stability of the change in the probabilities of a next birth is clearly demonstrated when comparing the averaged values for three-year periods with different levels and the age profile of fertility (Figure 17): 1988-1990 (the last years of the Soviet period, with a relatively high level and a "young" fertility profile), 1998-2000 (a period with a historically low fertility level at the very beginning of the transformation of its age profile), and 2012-2014 (recent data with increased intensity of births and an age profile in the stage of active ageing). It can be assumed that, in the next decade, the function of relative changes with age of the probabilities of giving birth to a next child will not change significantly.

The above curves for the 2012-2014 period were smoothed out separately for each birth order using fourth or fifth-order splines (standard smoothing functions offered by MS Excel), which almost perfectly approximate the average annual curves for a given triennium (R^2 is 0.95 for first births, 0.99 for second and subsequent births). After the model curve was obtained, the changes in the period age functions of the probabilities of the next birth were used to extrapolate cohort values within each age interval of childbearing from the age reached in 2014 (25 years and older) to 50 years. The actual values of the probabilities, supplemented by extrapolated values, were used to construct complete, lifetime cohort fertility tables by birth order. The advantage of this approach is that we are able to construct complete special fertility tables and, consequently, to

obtain prospective estimates of such important characteristics as the complete or final set of parity progression ratios, the average age of the mother at the birth of the next child, the intervals between births of children, etc.

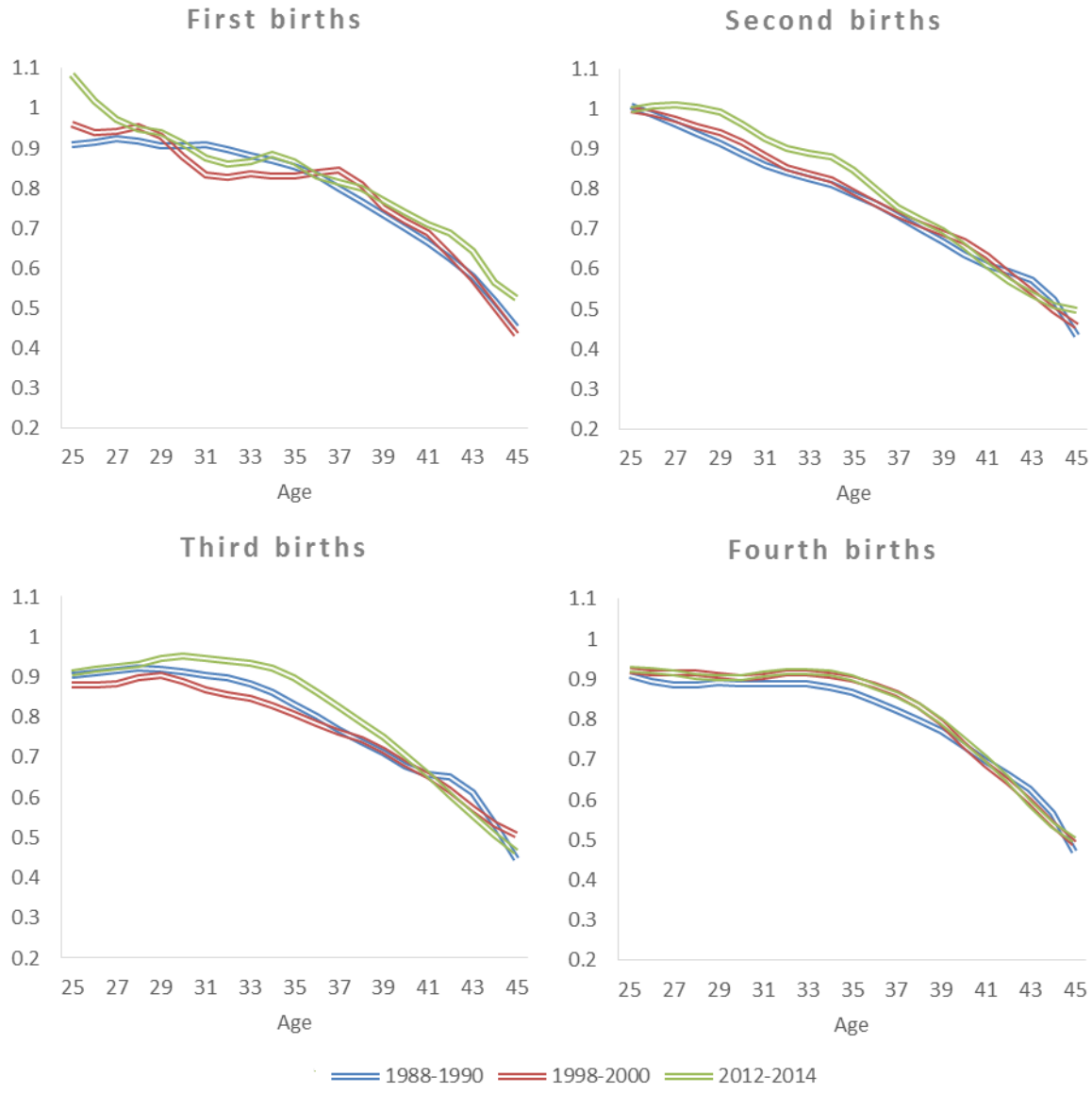

Figure 17. The rate of decrease in the probability of giving birth to a first, second, third and fourth child in the 25-45 age range, Russia, the average annual values for the periods 1988-1990, 1998-2000, 2012-2014

Source: Author's calculations based on unpublished data Rosstat.

The projected change in cohort total fertility for women born in 1968-1988 is presented In Figure 18, where the estimates obtained by modeling the age curve of the probabilities of the birth of the next child are reflected in comparison with estimates obtained in a more traditional way (freezing the age-specific fertility rates at the level fixed in 2014.)

Both methods of obtaining prospective estimates of cohort total fertility are based on the partial use of period characteristics of fertility and give approximately the same results, but the second, more sophisticated method yields slightly more conservative estimates.

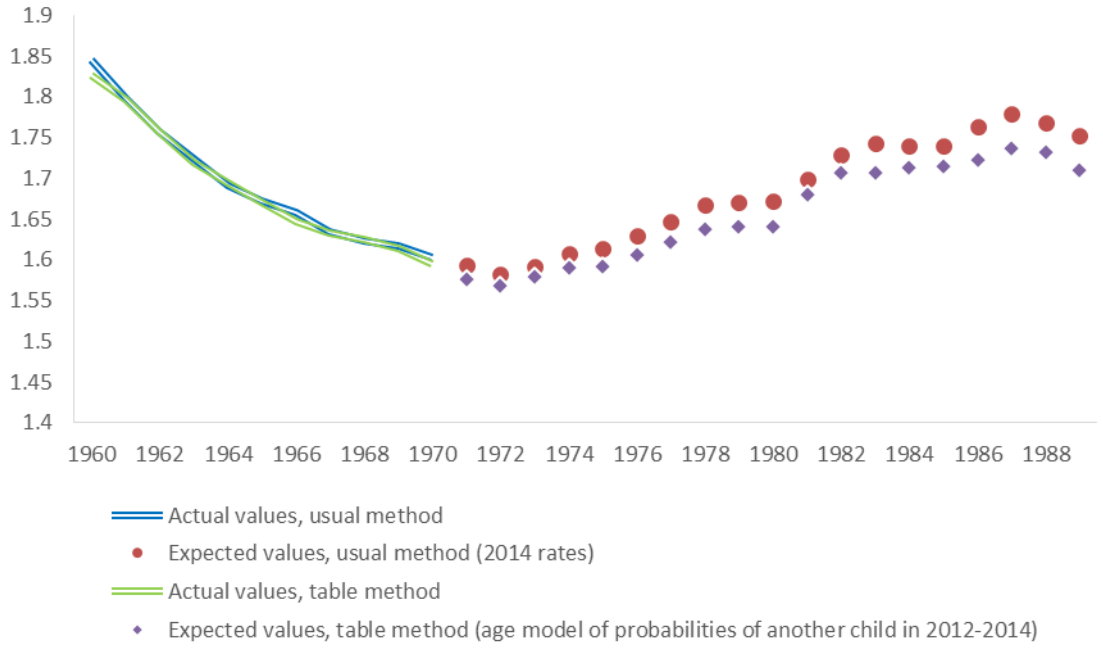

Figure 18. Actual and expected changes in the completed cohort fertility of women born in 1960-1989, obtained by different methods, Russia, per 1000 women

Source: The author's calculations.

Summing up the results of the estimation of a prospective change in the fertility quantum of generations, we come to the conclusion that, most likely, Russia has passed the point of the historical minimum of fertility – the level of fewer than 1.6 births per woman achieved by the cohorts of the 1970s. Given the level and structure of fertility by birth order observed in the most recent years, the total fertility of generations born in the late 1970s will be higher, though not by much, than that of their immediate predecessors. Most likely, slow growth will continue in the generations of the 1980s with a tendency to stabilise at 1.7-1.75 births per woman.

PROSPECTS FOR THE REPLACEMENT OF THE RUSSIAN POPULATION (IN LIEU OF A CONCLUSION)

The positive trend of the last decade inspires some optimism, but it is not worth getting carried away by the relative successes achieved in a decade and a half, especially over the past seven years. It is not impossible that the short-term burst of reproductive activity may be followed by a compensatory decline caused by the exhaustion of the potential for further growth in fertility in generations that, under the influence of favourable conditions, had the desired number of children earlier or at shorter intervals than previously planned. In this case, our rather conservative estimates of the prospective change in fertility, based on the knowledge of today's current situation, may seem extremely optimistic.

Table 11. Components of the period female net reproduction rate, Russia, 1958-2014

Years	Average number of children per woman (Total fertility rate)	Including girls (Gross reproduction rate)	Average age of mother. years	Probability of a girl surviving until her mother's average age of reproduction	Net reproduction rate	Intrinsic rate of natural increase. per 1000*
1958-1959	2.62	1.28	27.8	0.93	1.19	+6.0
1964-1965	2.14	1.05	27.6	0.93	0.97	-1.1
1968-1969	1.97	1.00	27.2	0.96	0.96	-1.5
1974-1975	1.99	0.97	26.4	0.96	0.93	-2.7
1978-1979	1.90	0.92	25.9	0.96	0.88	-4.9
1984-1985	2.06	1.00	25.8	0.97	0.96	-1.4
1988-1989	2.07	1.01	25.7	0.97	0.98	-0.8
1994-1995	1.37	0.66	24.7	0.97	0.64	-17.8
1998-1999	1.20	0.58	25.5	0.97	0.56	-22.4
2004-2005	1.31	0.64	26.6	0.97	0.62	-18.6
2008-2009	1.52	0.74	27.3	0.98	0.72	-12.1
2000	1.19	0.58	25.8	0.97	0.56	-22.2
2001	1.22	0.59	25.9	0.97	0.58	-21.1
2002	1.29	0.62	26.1	0.97	0.61	-19.1
2003	1.32	0.64	26.3	0.97	0.62	-18.1
2004	1.34	0.65	26.4	0.97	0.63	-17.3
2005	1.29	0.63	26.5	0.97	0.61	-18.6
2006	1.30	0.63	26.6	0.97	0.62	-18.2
2007	1.42	0.69	27.0	0.98	0.67	-14.9
2008	1.50	0.73	27.2	0.98	0.71	-12.5
2009	1.54	0.75	27.4	0.98	0.73	-11.4
2010	1.57	0.76	27.7	0.98	0.74	-10.7
2011	1.58	0.77	27.7	0.98	0.75	-10.3
2012	1.69	0.82	27.9	0.98	0.80	-7.9
2013	1.71	0.83	28.0	0.98	0.81	-7.4
2014	1.75	0.85	28.1	0.98	0.83	-6.4

Source: Published and unpublished Rosstat data, as well as the author's calculations based on common period fertility tables constructed to account for the age-specific mortality rates for one-year age groups of women.

*Notes: *The intrinsic rate of natural increase is calculated by the formula:* $r = \frac{lnR_0}{T}$,

where R_0 is the net reproduction rate, and T is the length of the generation or the average number of years in the interval between the birth of the hypothetical generations of mothers and their daughters. The length of a generation is usually estimated as the average age of the mother at the time of the birth of a girl who has survived to the age of her mother. With the current age functions of fertility and mortality, the evaluation of the length of the generation only slightly differs from the average age of the mother at the birth of the child without taking into account the survival index presented in the table. So, in 2014 in Russia, according to our estimates, the length of a generation was 28.09 years, and the average age of the mother without taking mortality into account was 28.12 years. For detailed annual dynamics of the indices from 1987 to 2000, see: [Population of Russia ... 2006: 271-272].

When analysing fertility, it is very important to assess its level in terms of how well it provides replacement of generations and affects the reproductive regime of the population as a whole. The latter depends not only on fertility, but also on mortality, so an indicator that takes into account both these processes is necessary. As such an integral indicator, the net reproduction rate – the number of girls born on average to one woman and surviving to the average age at which their mother had them – is used. This indicator does not reflect the overall mortality rate, but only the mortality of women in the ages from birth to the end of the reproductive period (the age limit

of reproduction is usually 50 or 55 for women). In modern conditions, fertility is the leading factor in the replacement of generations, since the mortality rate of women in childhood and young age in Russia has long been quite low, and its further decline is not able to significantly affect the integral indicators of reproduction. This is evidenced by the data in Table 11, which shows the main components of the calculation of the net reproduction rate of the population in Russia.

Russia was one of the first large countries in which, after the Second World War, fertility fell below the replacement level of generations. This happened in the distant 1964, when the net reproduction rate below one was observed only in Hungary, Latvia, Estonia, Romania and Japan. In 1968, only two Soviet republics – Ukraine and Latvia – as well as the Czech Republic, had a net reproduction rate lower than Russia's.

However, the situation in the world soon changed. The process of declining fertility spread to all industrialised countries, and in the 1980s its level almost everywhere dropped below the level of a simple replacement of generations. In 2011-2014, there was not a single developed country in which the value of this indicator would be at the level of simple reproduction of the population[18]. Ireland, Iceland, New Zealand and France, with net reproduction rates in the range of 0.95-0.99, come close to replacement level. At the same time, in the countries of Southern, Eastern and Central Europe, in East Asia as well as in Russia, the reproduction regime is far from the threshold of simple replacement of generations.

The net reproduction rate (0.83) observed in Russia in 2014 indicates that, taking into account mortality, the current level of fertility provides only an 83% replacement of generations of current mothers. Therefore, if for the next two or three decades the current (that is, observed today) fertility and mortality regimes do not change, one can expect that each successive generation will be 17% smaller than the previous one. In such a stable (i.e. having an invariable reproductive regime) population, the annual "true" rate of natural increase (the so-called intrinsic rate of natural increase, or Lotka's coefficient, rid of the influence of the age structure) will become negative at a level of -6.4 per 1000 persons. In this case, the population of a country that is closed to migration will decline annually by 0.64% (Table 11).

In 2014, the actual crude rate of natural increase for the entire population of Russia was 0.2 per mille, i.e. negligibly greater than zero (0.4 per 1000 population in urban areas, and 0.0 in rural areas). The cause of the discrepancy between the *"true"* and the *actual* rates of natural increase is explained by the fact that the actual age structure of the population of Russia differs greatly from the structure of the model stable population corresponding to today's patterns of fertility and mortality. Today, the age composition of the Russian population is favourable for the population not to decrease too quickly. But if the observed regime of replacement of generations persists for a long time, then the actual rate of natural increase will approach the intrinsic one, which will mean a growing negative balance of births and deaths among both the urban and, even more so, the rural populations. The significant increase in period fertility indicators in 2007-2014 and altogether for the entire period since 1999 (after reaching its historical minimum) could not but have a positive

[18]We leave aside the specific case of Israel, which, by its level of economic development, is certainly a developed country. At the same time, due to specific historical and sociocultural conditions in this country, a fairly high TFR of 3 or more births per woman has been preserved for more than one decade, which guarantees the maintenance of a net rate significantly exceeding the level of reproduction in a simple scale – 1.4 and higher.

effect on the integral indicators of the reproductive regime, which also concern the hypothetical generation. At the same time, the path that Russia should take to exit this sub-replacement pattern is still long.

Although Russian mortality rates are generally far from those of other developed countries which serve as Russia's standard, the gap is small at childhood and motherhood ages; therefore, the available reserves are also insignificant from the point of view of the indicators of population reproduction. While 98% of Russian girls live to the average age of their mother, the best indicators in the world are 99%. Even assuming that no girl born in 2014 dies, and that she can (and wants to) become a mother, then at the current level of fertility this could only increase the net reproduction rate to the level of the gross rate (i.e. from the observed level of 0.83 to 0.85). Only two things can significantly improve the situation regarding the reproduction of the population: an increase in the fertility of current and subsequent generations of parents and – in part – immigration, if fertility among migrants is higher than that of those living today in Russia.

However, the impact of migration on the number of births is not limited to higher fertility in the families of immigrants[19]. The majority of migrants are young, which has a beneficial effect on the age structure of the population; this in turn increases the number of marriages and births and, accordingly, inhibits the transition to the sustainable negative natural increase seen in developed countries. At the same time, the possibility of moving to a long-lasting negative balance of births and deaths – not only in Russia, but also in most developed countries – should be viewed as a plausible threat, as we can see in the net reproduction rate below one and the intrinsic rate of natural increase below zero which have persisted in these countries since the mid-1970s.

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[19] The differences in fertility among migrants and non-migrants in Russia were considered earlier: [Zakharov, Surkov 2009; Population of Russia ... 2010: 111-132; Population of Russia ... 2013: 82-84]. See also: [Biryukova 2012].

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DEMOGRAPHIC CONSEQUENCES OF THE GREAT PATRIOTIC WAR*

ANATOLY VISHNEVSKY

75 years have passed since the beginning of the Great Patriotic War, yet its demographic consequences, felt by Russia throughout all of this time, even now have not been completely overcome. Using general census data starting with the 1939 census, the article traces the fate of the generations who fought (those born between 1890-1926). It is shown that 82% of women and only 53% of men registered in the 1939 census survived until 1959. The resulting gender imbalance caused a sharp increase in the proportion of single women as a result of widowhood, and due to a shortage of suitors in the marriage market the share of non-marital births increased significantly. The war set in motion an oscillating cycle of the annual number of births which continues to this day. A relatively small number of deaths in the postwar decades, due to the fact that a huge number of people killed during the war did not live to a normal age of death, created the illusion of a safe balance of births and deaths in the 1970's-1980's. Cyclical fluctuations in the size of generations induced by the war resulted in a wave-like dynamics of the working population and dependency ratio, complicating the functioning of the labor market and the implementation of economic and social programs, effects which are felt even in our day, for example, in the dynamics of pension contingents.

The author discusses the reasons for the huge military losses and suggests that if the war had not been preceded by erroneous decisions of the country's political leaders, these losses could have been much smaller.

***Key words**: warring generations, war losses, consequences of the war, cost of the victory, gender imbalance.*

BACKGROUND: THE 1939 CENSUS

June 22, 2016 marked 75 years since the start of the most terrible war in the history of Russia. Like other republics of the former USSR, the Russian Federation suffered huge, unprecedented demographic losses in this war. Estimating direct human losses of wartime is not easy. While the war was going on, there was no time for scrupulous recording of casualties (although some recording was of course done). The Soviet leadership was not all that interested in it immediately after the war, either - on the contrary, it tried to avoid a reliable estimate of the losses. This disturbed many, and gave rise to a huge literature. Even today, debate over the estimates has not subsided, and most likely never will. This article is not about the direct evaluation of demographic losses, but about the demographic consequences of the war, which are still being felt. Unlike the extensive literature on military losses, always based on an analysis of unavoidably incomplete data obtained from a variety of sources that often contradict each other, our article uses only official data of state statistics, primarily the results of population censuses , starting with the 1939 census, which recorded all the mobilization contingents of the future "immortal regiment", and ending with the 2010 census, which few veterans lived to see.

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THE RESULTS OF THE PROJECTS «DEMOGRAPHIC», CARRIED OUT WITHIN THE FRAMEWORK OF THE BASIC RESEARCH PROGRAM AT THE NATIONAL RESEARCH UNIVERSITY HIGHER SCHOOL OF ECONOMICS (HSE) IN 2016-2016, ARE PRESENTED IN THIS WORK.

The USSR census of 1939 does not have the best reputation. It was carried out in January 1939 to replace the previous 1937 census, declared "defective," as many researchers believe, because it did not show the size of the population that the leadership of the country at that time wanted to see. The task of the new census was to correct this at any cost. Three months after its completion, in March 1939, the 18th Congress of the All-Union Communist Party (Bolsheviks) was held in Moscow. In the report of the Central Committee of the ACP(b) made by Stalin at this congress, the population of the USSR was referred to as if by chance, without mentioning the census. Comparing Russia with England, the speaker noted that "our population is several times larger than that of Great Britain, and hence our requirements are greater: the Soviet Union has a population of 170,000,000, whereas Great Britain has a population of not more than 46,000,000" [Stalin 1978]. It is often assumed that this estimate, given as if merely in passing, was not put in Stalin's report by chance, but to let the statisticians know what result the country's leadership expected from them. And it was just such a result (170,126,000 people) which, 10 days later, on March 21st, was announced to Stalin and Molotov by the Chairman of the State Planning Committee of the USSR, N.A. Voznesensky, and the head of the Central Statistical Bureau, I.V. Sautin [Volkov 2014: 146-147; Andreev, Darsky, Kharkov 1993: 31; Tolts 2004]. There is another version, according to which the chairman of the State Planning Committee and the head of the Central Statistical Bureau could not have known before the congress what population size Stalin expected from them, and he had no opportunity to inform them other than from the rostrum of the party congress. However, already on March 5th Sautin had informed the country's leadership in a memorandum that the population of the USSR was about 170 million people, so "Stalin announced the figure he was told by the statistical authorities, and not vice versa" [Bashkin, Nazarov, 2014][1].

In any case, the 1939 census gives the last more or less accurate picture of the pre-war population of the USSR, including the population of Russia, which at that time was about 65% of the population of the USSR. It seems to me that even if the use of the results of this census, taking into account their probable falsification, requires certain reservations, the effect of such falsification on our subsequent calculations can not be significant. If the population of the USSR was artificially overstated by the addition of several million "dead souls" (the number is variously estimated at 1-2 million people for the entire USSR [Zaplin 1989: 180], about 3 million [Volkov 2014: 175], and 1.7 million [Andreev, Darsky, Kharkov 1993: 33], then these additions were distributed among different republics, and the population of Russia is estimated to be overstated by less than half a million people [Andreev, Darsky, Kharkova 1998: 41]. Such overstatement cannot greatly affect the structural proportions nor significantly change the size of individual sex and age groups of the population of a Russia totaling about 110 million people.

From the perspective of demography, 75 years is a short period. If we measure it by the length of a generation – in the demographic sense, this is the average time that passes between the

[1] To this one can add, to make the picture fuller, that the three predecessors of I. Sautin as head of the statistical bodies of the USSR - Valerian Obolensky (Osinsky), Ivan Kraval and Ivan Vermenichev - by the time of Sautin's arrival at the job had been shot one after the other, and altogether, out of eight pre-war leaders of the country's main statistical office, five were shot. Sautin survived, but Voznesensky, who signed a memorandum along with him on March 21, 1939, was also executed, albeit later, after the war, during which, as head of the USSR State Planning Committee, he directed the entire Soviet economy, which accomplished the impossible and by the end of the war had ensured a huge superiority over the enemy in the production of weapons.

birth of a child and the moment when he becomes a parent – then 75 years is just about three cycles of such transformations. And for all these 75 years we have felt, perhaps without realizing it, the unhealed wounds of the war.

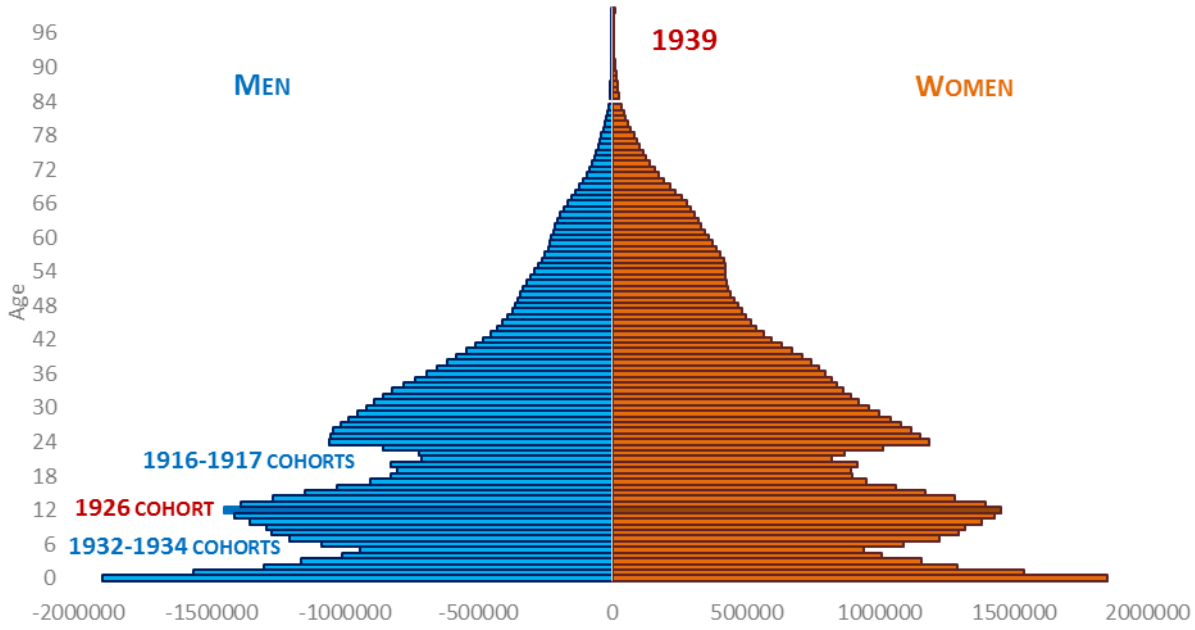

Figure 1. Russia population pyramid according to the population census of January 17, 1939, persons

The 1939 census gives the last more or less accurate picture of the pre-war population of Russia (as of the whole of the USSR, but this article only deals with Russia). The main part of the population that directly fought in 1941-1945 were male generations born between 1890 and 1926. They suffered the greatest losses. Of course, the age boundaries between generations participating and not participating in the fighting are somewhat blurred. Furthermore, women also took part in the war, and losses were incurred by the civilian population, too, so it is impossible to reduce everything only to the losses of these male cohorts. Still, it is men who bore the main impact.

Figure 1 shows the age pyramid of the population of Russia according to the 1939 census. In its lower part we see a deep depression - the terrible trace of the famine of 1932-1933, but this is not relevant to the topic of our article. We are interested in the part of the pyramid that covers the generations of Russians born between 1890 and 1926. For simplicity, we will continue to refer to these generations as "the warring generations". In 1939, they accounted for the majority of the population of Russia - 58% of all men and almost 57% of all women (Table 1).

Table 1. The population of Russia according to the 1939 census

	Men	Women	Both sexes
All generations, million people	51.1	57.3	108.4
Including generations of 1890-1926			
Million persons	29.6	32.6	62.2
as % of the whole population	58.0	56.9	57.4

The warring generations were, in turn, heterogeneous in terms of their history, which left its imprint on the size and structure of the population. In January 1939, when the last pre-war census took place, representatives of these generations were from 12 to 48 years old. Some of them

were born during the ordeal of the First World War and the Civil War (1915-1921); the low fertility of these years left a deep hole in the population pyramid. In the 6 years before the First World War (from 1909 to 1914), 27.9 million children were born in Russia. In the 6 years after the war (from 1923 to 1928), when the storms of the Civil War had died down, 27.4 million were born. But between 1916 and 1921 – the same length of time – the figure was only 20 million (1915 and 1922 were transitional years from peace to war and from war to peace).

For most members of the warring generations this was not their first war. If we assume, with of course a certain degree of conditionality, that only men aged 17 and older could participate in the Civil War, and that this war ended in 1921, then the more or less participating generations were those born before 1905. In 1939, these generations accounted for more than 27% of men and almost 30% of women of the warring generations. By that time the gender balance had already been significantly disrupted: there were only 83 men per 100 women (Table 2).

Table 2. Warring generations according to the 1939 census

Generations	Generation size						Excess of females, millions	Sex ratio (men per 100 women)
	Million persons			%				
	Men	Women	Both sexes	Men	Women	Both sexes		
1890 - 1926	29.6	32.6	62.2	100.0	100.0	100.0	2.9	91
including:								
1890 - 1904	8.1	9.7	17.7	27.2	29.7	28.5	1.6	83
1905 - 1922	16.3	17.6	33.9	55.1	54.1	54.5	1.3	93
1923 - 1926	5.3	5.3	10.6	17.8	16.3	17.0	0.0	99

The most numerous component of the warring generations were those born in 1905-1922, who had not yet taken part in any war by the time of the 1939 census. Between 16 and 33 years old at the beginning of 1939 (hence, between 18 and 35 in 1941), they make up about 55% of the warring generations. They include also the small generations of 1916-1921, 17 to 22 years old at the time of the census, for a total of only 4.8 million men (1.3 million fewer than men aged 24-29). In two years, when the war began, these small generations would reach the age of 19 to 24 years. For the whole group of generations born between 1905 and 1922 there were not 83 men per 100 women, as in the previous group, but 93 – a much better sex ratio, yet still a perturbed one, primarily due to the generations born in 1915-1917. The cause of this perturbation is not clear.

Finally, another group – adolescents 12-15 years old, born in 1923-1926. Their sex ratio is not perturbed, but in 1941 they would be 14-17 years old, and in 1944, 17-20 years. They would still have to fight, although not in the most difficult period of the war.

THE DEATH PATH OF THE IMMORTAL REGIMENT

As is known, Stalin did not allow a census or at least a simplified population count of the USSR after the war, meaning this very important information about the war's demographic results was irretrievably lost. However, the consequences of demographic shocks take a long time to fade; the population pyramid retains their memory for many decades to come. The first post-war census, although conducted only in 1959, 20 years after the previous census of 1939 and almost 15 years after the end of the war, showed very much of what Stalin wanted to conceal, and all subsequent

censuses, including the census of 2010, allow us to see how the warring generations passed.

In Figure 2 and Table 3, we see how their demographic fate developed up to 1979. In 1939 (Figure 1), the right and left parts of the population pyramid were also not completely symmetrical, but their asymmetry still did not stand out at first glance. 20 years later, the contour of the pyramid narrowed from both sides, but the asymmetry became plain as day. And it continued to grow. 20 more years later, by 1979, it had become even more pronounced: the male part of the warring generations was dying faster than the female one.

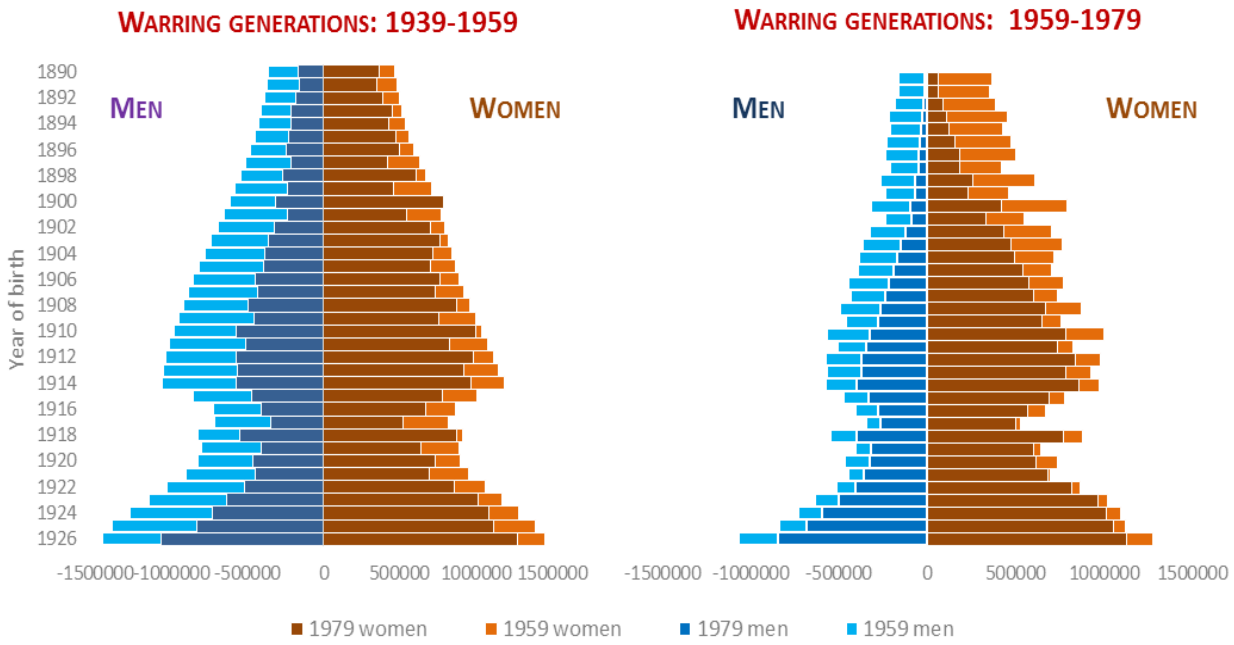

Figure 2. Population pyramids of the warring generations in 1939-1959 and in 1959-1979 according to population censuses of 1939, 1959 and 1979, persons

Table 3. Warring generations in 1939, 1959 and 1979

	Men	Women	Both sexes
Total size, million			
1939	29.6	32.6	62.2
1959	15.7	26.8	42.5
1979	9.4	20.0	29.4
Decrease, million for period			
1939-1959	13.9	5.8	19.7
1959-1979	6.3	6.8	13.1
1939-1979	20.3	12.6	32.8
Decrease, % of reference year			
for 1939-1959	47.1	17.8	31.7
for 1959-1979	40.2	25.3	30.8
for 1939-1979	68.4	38.6	52.8
Still alive from the total number recorded by the 1939 census, %			
by 1959	52.9	82.2	68.3
by 1979	31.6	61.4	47.2

Between the censuses of 1939 and 1959 the number of people in the warring generations decreased by 19.7 million, while the loss of men exceeded that of women by 8.2 million (Table 3). Although this difference cannot, of course, be automatically identified with losses at the front,

affecting mainly men, it seems to be not far from them, because wartime hardships not directly related to military action, as well as the difficulties of post-war life, were equally experienced by both men and women.

For the next 20 years (between the censuses of 1959 and 1979), the losses of the warring generations from mortality were much smaller and did not differ so much by sex. In absolute terms, the decrease in women was even greater than that of men, but this is explained by their much higher initial total number in 1959. In relative terms, the male part of the warring generations was reduced by more than 40%, while the female part was reduced by only a quarter.

By the time of the 1979 census, the original size of the warring generations recorded in the 1939 census had shrunk by more than half – but this is only for both sexes together. While the number of women declined by less than 40%, less than a third of the men from the warring generations remained (Table 3).

A little more than 20 years later, in 2002, the first census of post-Soviet Russia was conducted. It showed that by this time approximately one-tenth of the initial number of the warring generations (62.2 million in 1939) remained: 1.6 million men and 5 million women (Figure 3). It was at about this time that Victory Day celebrations of the war in which they fought became particularly loud and triumphant.

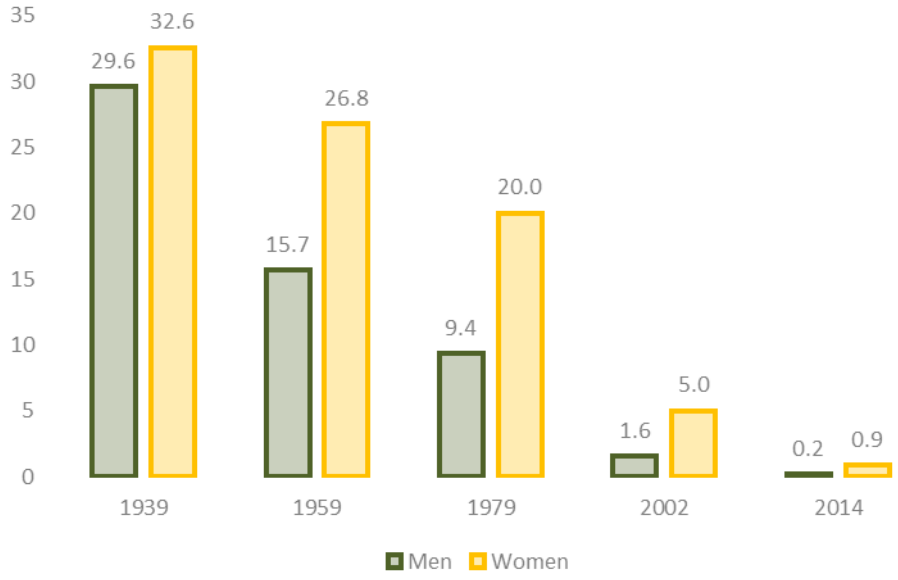

Figure 3. The passing of the warring generations, in millions

THE TRACES OF THE WAR ON THE POPULATION PYRAMID

The death of a huge number of people belonging to many generations greatly deforms the entire age pyramid. But to this are also added deformations caused by a sharp decline in fertility during the war years. The deformations caused by war not only persist for a long time, shifting over time to the top of the pyramid, but generate new deformations in its lower part, “echoes” of war that can be heard for many decades. The war launched a cycle of fluctuations in the number of cohorts one after the other, giving a cyclical, wave-like character to the entire demographic development

of Russia. This is clearly seen on the graphs, and it very much affects the real life of many tens of millions of people – their private life and the economic and social life of the whole country.

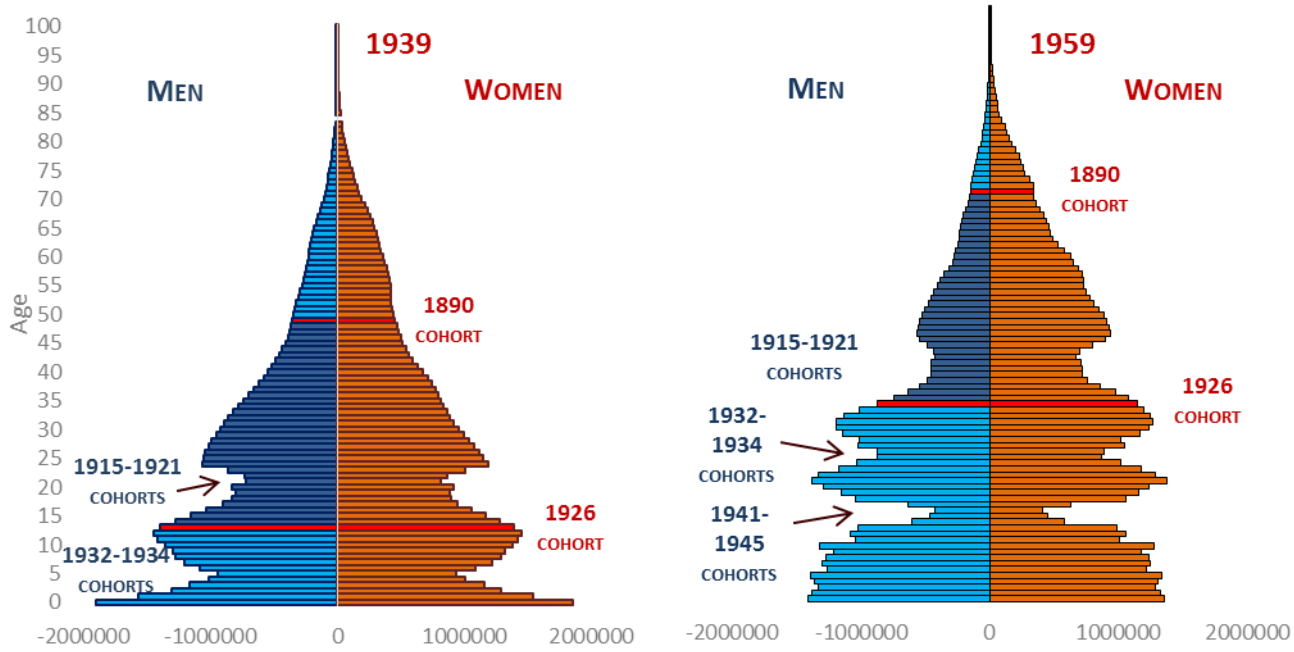

Figure 4. Russia population pyramids in 1939 and 1959, persons

We have already seen a sharply increased asymmetry of the male and female parts of the pyramid in the warring generations, as well as an upward moving but still persisting depression – the consequence of the fall in fertility and the increase in infant mortality in 1915-1921 and in 1932-1934. A comparison of the pyramids of 1939 and 1959 (Figure 4) shows yet another new huge depression: a trace of the extremely low fertility of 1941-1945.

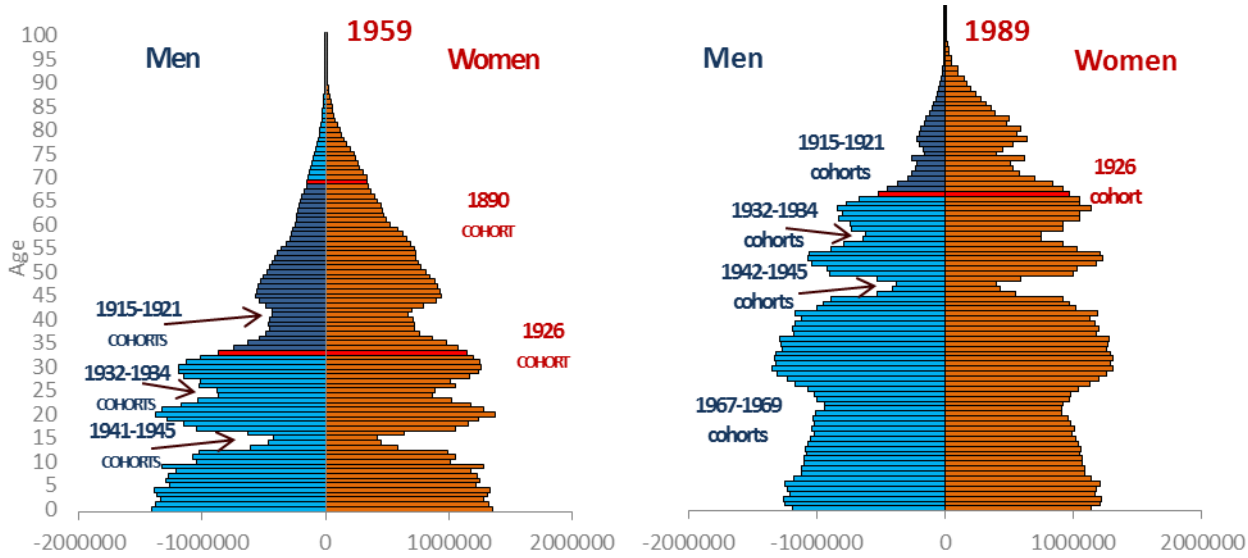

Figure 5. Russia population pyramids in 1959 and 1989, persons

If we now move another thirty years ahead and compare the 1959 pyramid with the 1989 pyramid built on the basis of the last Soviet population census (Figure 5), we will see a clear improvement in gender balance in the lower part of the pyramid, while in the upper part of the

pyramid, where the warring generations are now concentrated, a pronounced gender asymmetry remains. But what attracts attention is the appearance in the lower part of the age pyramid of 1989 of a new hollow - the echo of the fall in fertility in the war years. A quarter of a century after the war, the children of the war years became parents themselves, but as there were few of them, the number of their children was also small – the deepest fall was in 1967-1969, 25 years after 1942-1945.

Finally, we compare the population pyramid of 1989 with the pyramid of 2010, built according to the most recent census data at the time (Figure 6). The red line of the birth year 1926, separating the generations of those who fought from those who did not, is approaching the top of the pyramid; in 2010, those who were born in 1926 were 84 years old. But the trace of the war can be spied in a new hollow in the lower part of the pyramid – the next echo of the war. A quarter of a century after the first post-war decline in the number of children born to children of the war, their children became parents, and, as we have seen, they too were relatively few, so that a new fall in the number of births was to be expected. Judging by the pyramid of 1989, it had already begun to take shape in the late 80's. But, apparently, the fall in the number of births in the 1990s, which was inevitable in any case, intensified under the impact of socio-political, economic and even demographic changes taking place at that time, and was deeper than one might expect.

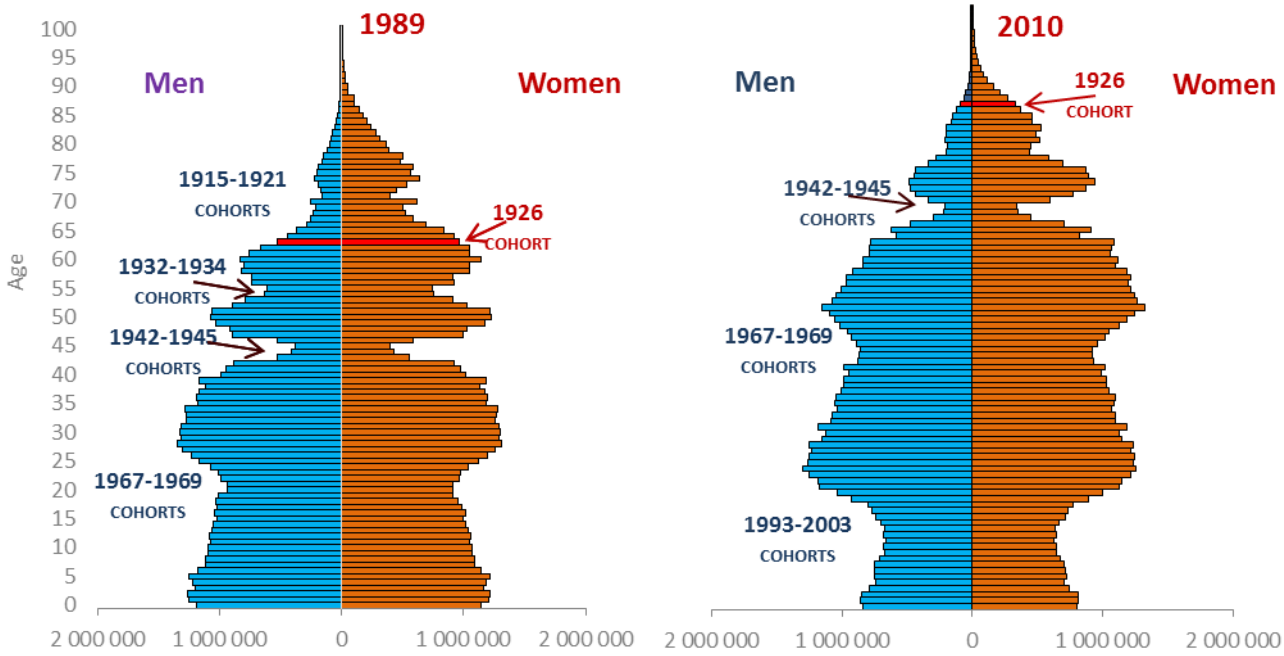

Figure 6. Russia population pyramids in 1989 and 2010, persons

GENDER ASYMMETRY

Throughout almost the whole of the twentieth century, Russia lived in conditions of an unnatural gender asymmetry that arose after the First World War and the Civil War and increased sharply after the Second World War.

A significant preponderance of women is characteristic of all countries that fought in the war, but in Russia it is especially large even in comparison with Germany, which also suffered

huge losses in the First, and especially, of course, Second World War. It is not surprising that in the post-war population pyramids of both countries there is much in common (Figure 7).

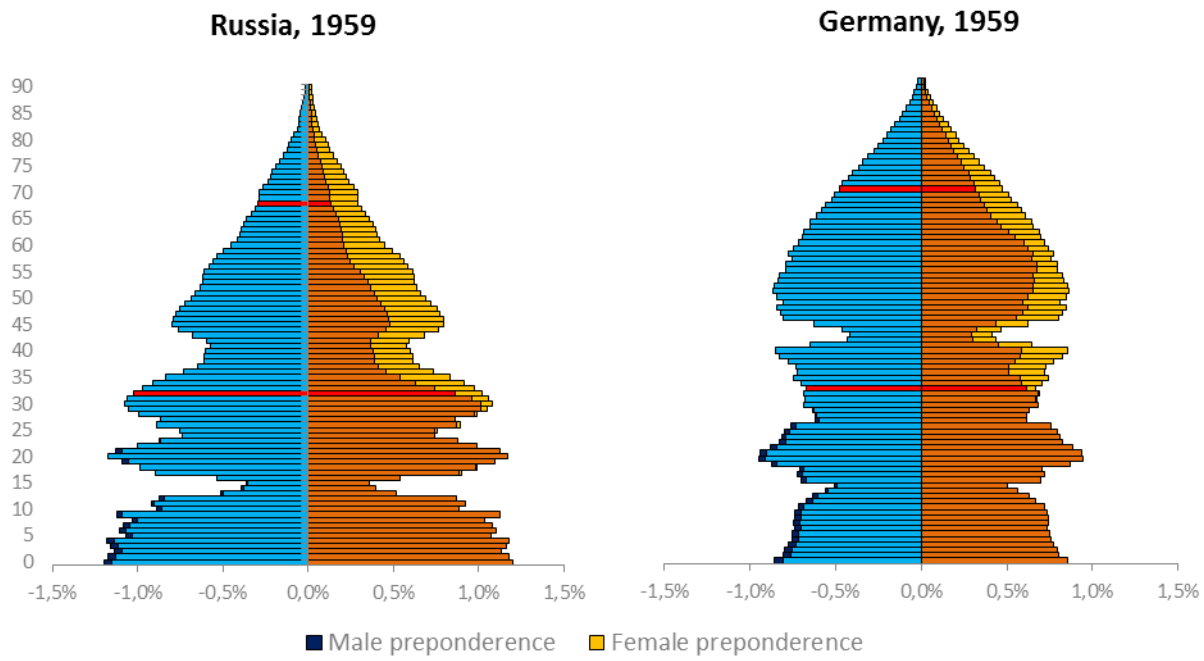

Figure 7. Russia and Germany. Population pyramids in 1959, percent of population

Source for Germany: [Statistisches Bundesamt 2016].

Nevertheless, upon closer examination it turns out that the female preponderance in the warring generations in Russia is incomparably greater than in Germany. It is especially great in the generations that fought in the wars of the second decade of the twentieth century (those born approximately before 1905), which is understandable, because unlike Germany, Russia suffered losses not only in the First World War, but also in the Civil War. Nevertheless, it is also significant in younger generations (Figures 8 and 9), which speaks also of the more significant losses of Russia in the Second World War.

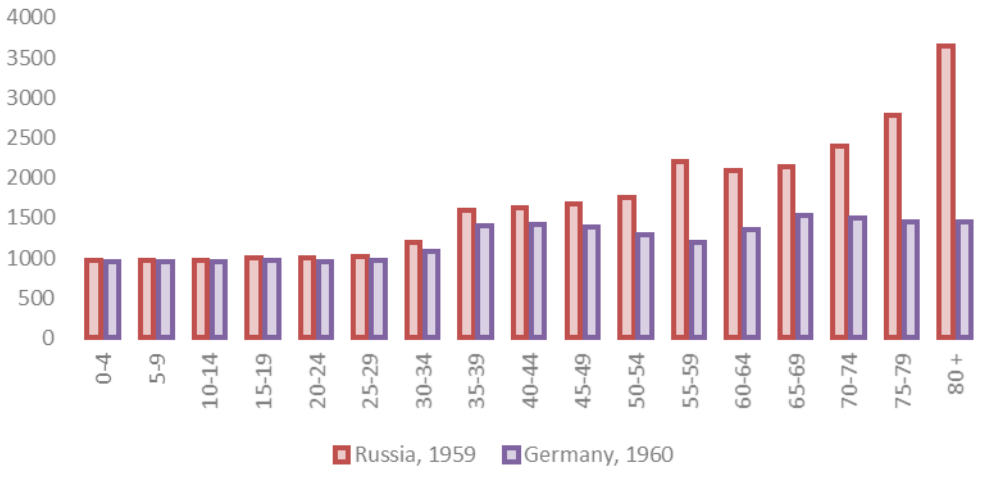

Figure 8. The number of women per 1000 men in Russia and Germany in 1959

Source for Germany: [Statistisches Bundesamt 2016].

Military losses are not the only source of disturbance of gender balance in the population. A second cause is the higher mortality of men during the postwar period, which in Russia greatly exceeds female mortality. Yet, for at least five decades after the outbreak of war, military losses were the main source of gender imbalance. As the warring generations began to age, the imbalance of the sexes also shifted to the upper part of the population pyramid; in the non-warring generations the sex ratio was much more favorable.

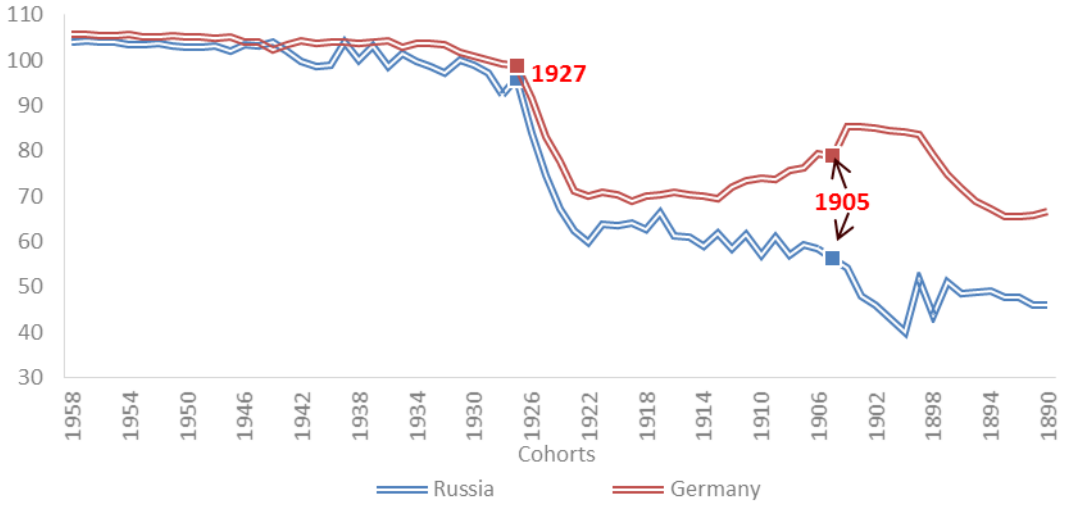

Figure 9. The number of women per 1000 men in warring and non-warring generations in Russia and Germany in 1959

Source for Germany: [Statistisches Bundesamt 2016].

According to the 1959 census, the female preponderance is noticeable starting from the age group of 30-34, in 1970 from the age 40-44 group, in 1979 from the group aged 50-54 years, etc. (Figure 10).

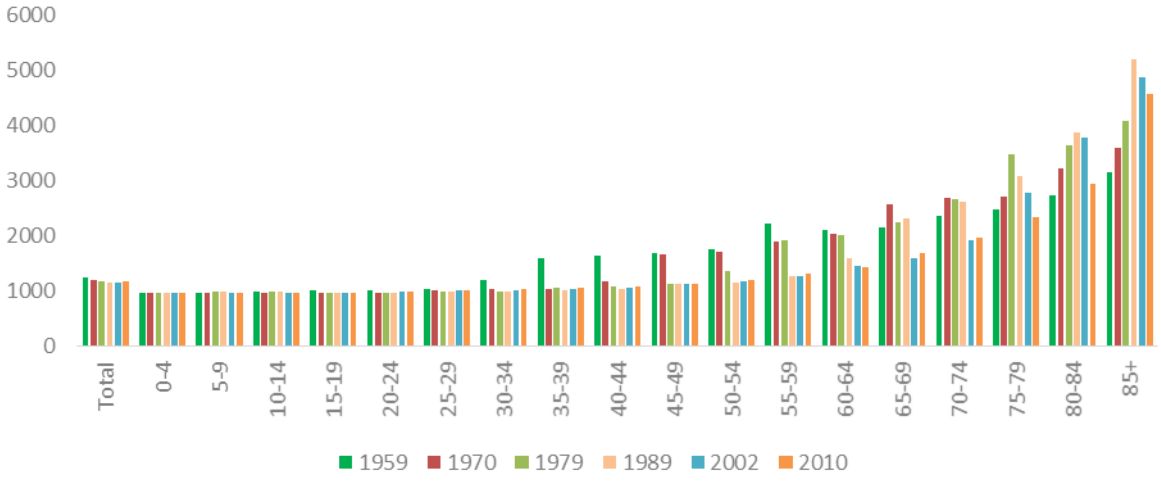

Figure 10. The sex ratio by age groups according to the Russian postwar censuses, women per 1000 men

Even in 1989, the main contribution to the overall female preponderance in the population of Russia was made by the warring generations – due to huge military losses, but also at the

expense of higher male mortality in the post-war period. As these generations became less numerous, their contribution to the female preponderance in the entire population also declined, and as a result this preponderance diminished. The change in the situation was registered only by the 2002 census: the contribution of the warring generations was significantly reduced, and yet the female preponderance increased (Figure 11). This is no longer connected with the consequences of the war, but is due to a significant excess of male mortality over female. Before 1992, despite the higher male mortality, the absolute number of male deaths was less than that of females – a consequence of the smaller size of the male population. Starting in 1992, the situation was reversed: even despite the smaller size of the male population, more male deaths were recorded each year. Over 10 years, from 1982 to 1991, the number of female deaths exceeded that of male deaths by 597,900. Over the 10 years from 1992 to 2001, on the contrary, 927,100 more men died than women, and in the next decade, from 2002 to 2011, 1,292,700 more. It is clear that this could not but affect the sex-ratio in Russia. Of great importance also is demographic aging, since it results in an increase of the proportion of older age groups with a less favorable sex ratio. But all this applies to the very last decades, while most of the twentieth century was marked by a gender imbalance due to military losses.

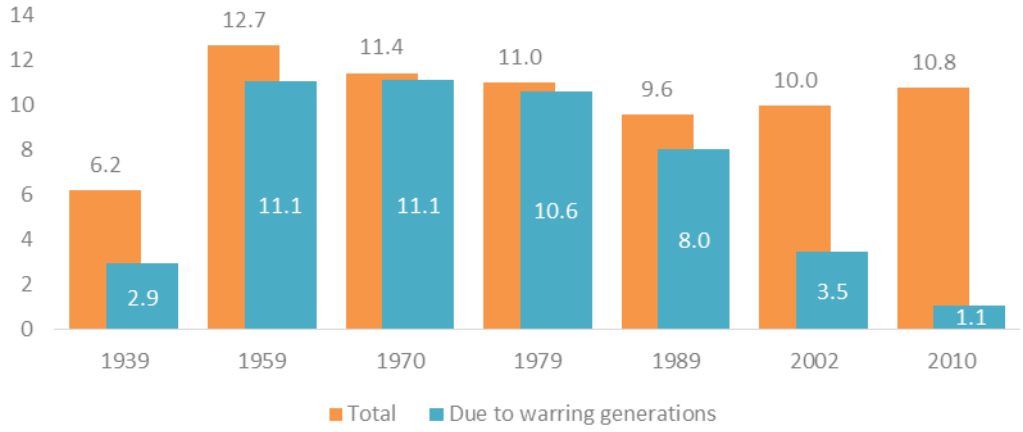

Figure 11. Female preponderance in Russia according to population censuses of 1939-2010, millions

THE WAR AND FAMILY

The unprecedented losses among the male population deprived many women of potential marital partners, which led to a significant increase in the proportion of women who never married. The matrimonial fate of women of the warring generations, beginning with the generations born in 1900, can be assessed with the help of retrospective estimates made by S. Zakharov on the basis of the data of the micro-census of 1994, taking into account not only officially registered, but also actual marriages (Figure 12).

While 95% -96% of the generations of women who did not participate in the war and who reached the age of 50 years or older by 1994 – when, that is, they were basically already beyond the age of a first marriage – were married during their lifetime, for women of the warring generations the corresponding figure is 93.5% or less, and this proportion falls sharply among the

youngest of the warring generations, for whom before 1941 the process of forming married couples had not yet gained momentum.

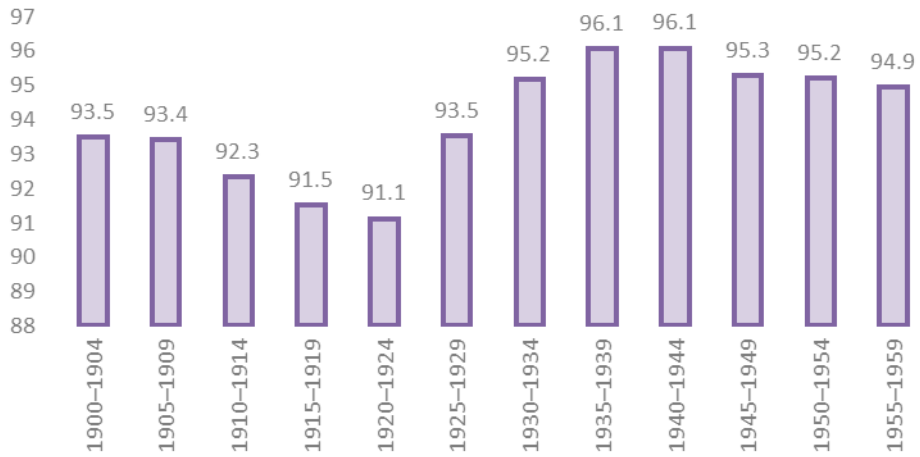

Figure 12. The proportion of ever married women in the warring and non-warring generations, %

Source: [Demograficheskaya modernizatsiya… 2006: 113-114].

But the effect of the war on the marital status of the population is by no means limited to women's difficulties in finding a marriage partner due to a shortage of suitors. The influence is much deeper and more varied. The war destabilized the marital and family status composition of the population, destroyed many marriages often barely begun, and increased competition in the marriage market, which had as a consequence an increase in the number of divorces. It is hardly possible to fully assess all these consequences today.

The country was left with a huge number of widows, but just how many was unknown, and the 1959 census is of no help in estimating the number. Although international standards for conducting censuses have always made provision for questions distinguishing four categories of marital status, including widows, and such questions were asked in Russia even during the first general census of 1897 and the first All-Union census of 1926, the statistics of Stalin's time considered such questions not worthy of attention, and, starting with the 1937 census and ending with that of 1970, Soviet censuses (hence the one in 1959) made it possible to distinguish between only two categories: married and unmarried at the time of the census. Accordingly, there was no information on the number of widows in them; questions concerning all marital statuses first appeared again only in the program of the Soviet census of 1979 [Vishnevsky, Zakharov 2010: 13].

There was also no information on the number of post-war orphans left without one or both parents, as well as on the number of disabled veterans, which was huge. Widows, orphans and disabled veterans have always been present in the propaganda rhetoric, but no one knew how many there were, and no one tried to find out. Probably, some statistics nonetheless existed in social security agencies that paid benefits to widows and children of those who died at the front and to war invalids, but they were never made public and were not present in the public discourse. In the scientific literature one can find only the most general mentions like "in the generations of women

who in 1941 were 17-25 years old and who suffered the most during the war ... there were a lot of widows and unmarried women" [Polyakov, Zhiromskaya, Aralovets 2004], but no more than that.

In fact, the 1959 census indicated only a very low percentage of married women among those between the ages of 40 and 59 in comparison with previous censuses (i.e. those who were between 20 and 39 years old in 1939; figure 13), and this, of course, is the result of the joint effect of widowhood, divorce and not getting married.

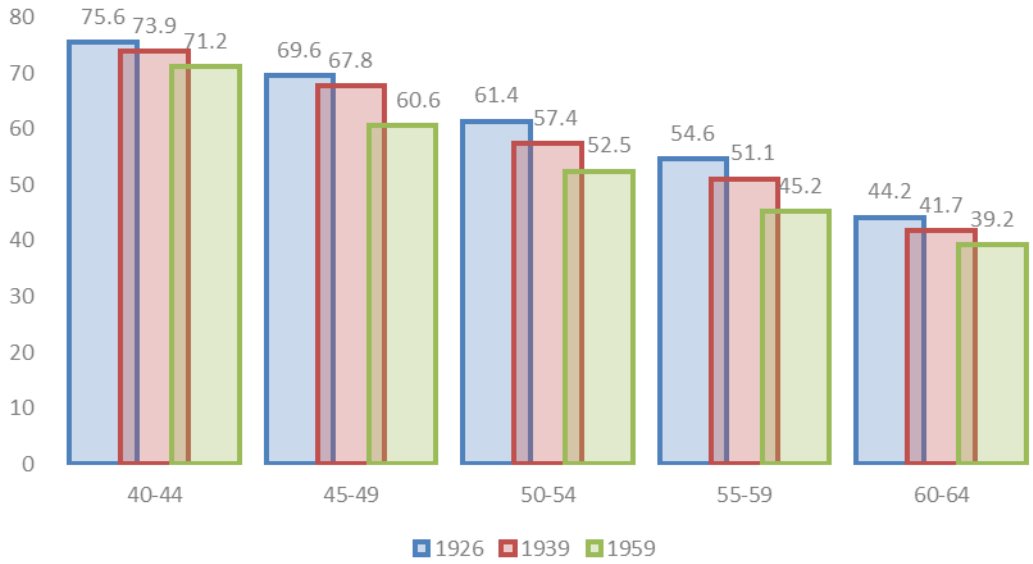

Figure 13. The number of married women per 100 women of the corresponding age group according to the censuses of 1926, 1939 and 1959

To a very large extent, all these factors are a consequence of the postwar deformations of the marriage market and the competition that arose due to the shortage of men. "The widowhood of many women who lost their husbands in the war, because of the gender imbalance, lasts for all the rest of their life ... In conditions of a significant numerical preponderance of women, the strength of marriages is significantly weakened, and the increase in the number of divorces initiated by men reduces the duration of marriage. In the presence of gender imbalance there is a process of spontaneous redistribution of marriage partners, and not only by age but also by marital status. This redistribution is made through the increase in marriages of women with their peers and younger men, whose generations have not been affected by the war, as well as with divorced and widowed men" [Ilyina 1977: 55].

The state tried to counteract the inevitable processes in the given situation by the only means available to it – the tightening of legislation regarding marriage and family. On July 8, 1944, less than a year before the end of the war, a Decree of the Presidium of the Supreme Soviet of the USSR was adopted which sharply altered the previously relatively liberal Soviet legal norms concerning marriage and family. The decree was beautifully called: "On increasing state aid to pregnant women, mothers with many children and single mothers, strengthening the protection of motherhood and childhood, and on establishing the honorary title of Mother Heroine, the Order of Maternal Glory and the Motherhood Medal" [Decree of 1944].

Nothing in the title of the decree said anything about the contents of section V, "On Amendments to the Law on Marriage, Family and Guardianship." Yet it was this section that set the condition that "only a registered marriage engenders the rights and duties of spouses" and abolished the "existing right of the mother to appeal to the court for the establishment of paternity and the awarding of alimony for the support of a child born of a person with whom she is not in a registered marriage." It stipulated that when registering the birth of a child born to a mother not in a registered marriage, the child be given the mother's surname and the patronymic chosen by the mother. A rule was introduced requiring that a registered marriage be recorded in one's internal passport, and divorce procedure was made much more complicated. The decree also reinforced the existing norm of authorizing "the prosecution authorities, in accordance with the current criminal legislation, to prosecute those guilty of illegally conducting abortions, or compelling women to have an abortion."

The innovations contained in the decree were motivated by the fact that "taking care of children and mothers and strengthening the family has always been one of the most important tasks of the Soviet state", but in fact the state unequivocally made it clear to women who were left without men that this was *their* problem. In a sense, the decree played the role of a screen making all phenomena the state wanted concealed inaccessible to state statistics and hidden from public opinion. The number of registered divorces did in fact decline, but this does not mean that marriages ceased to disintegrate without registration. About the number of actual divorces driven into the underground nothing was known, but when in 1965 the procedure of divorce was simplified, the number of divorces in one year increased 1.8 times (from 360 to 646 thousand) [Central Statistical Board of the USSR 1975: 150]. The difficulty of the divorce procedure made remarriages harder, but this only means that a significant part of them ceased to be recorded by statistics, so their number is also unknown.

No decrees could change the post-war demographic realities. A huge number of women were doomed to loneliness, and children to fatherlessness. Non-marital children became common after the war, and in the USSR the number of single mothers increased sharply. According to available estimates, in 1945 there were 281,700 such mothers, and in 1957 – 3,312,000 [Kharchev 1979: 168-169]. About a quarter of all births in 1945 were non-marital, and even 10 years later – almost 17%. It is typical that this share in the rural population was higher than in the urban population (Table 4).

Table 4. The share of extramarital births in the total number of births,%

Year	Whole population	Rural population
1945	24.4	…
1955	16.9	…
1965	13.0	14.5
1975	10.7	13.7

Source: [Ivanova, Mikheeva 1998: Table. 3].

According to the decree of 1944, in the birth certificate of children born outside a registered marriage, instead of information about the father it was obligatory to put a dash. During the period in which this "humane" rule was in effect (from 1945 to 1968), more than 15 million children received a dash in their passport [Tolts 2014: 161]. But society was not supposed to know anything

about this. In the archives is a letter from the head of the Central Statistical Bureau (CSD) of the USSR to the Central Committee of the CPSU.

"To the CPSU Central Committee

14.01.1970

... In the article "Fatherlessness" of the 7.01.1970 issue of Literaturnaya Gazeta, Urlanis cites data on children of mothers not in a registered marriage which are not printed in the open press… Bourgeois propaganda can use [this] for hostile purposes, because in bourgeois countries such children are usually referred to as illegitimate ... The CSD asks that the attention of the editorial board of the Literaturnaya Gazeta be drawn to the inadmissibility of publishing data not subject to publication in the open press ...

Starovsky"[2]

THE WAR AND FERTILITY

It has been said above that the war launched a cycle of fluctuations in the size of cohorts one after the other, which, in particular, had a very strong effect on fertility. During the war, the number of births, and hence the number of those who were to become parents of new generations of children in about two decades, fell sharply, and this decline is repeated several more times with an interval of about 25 years.

The fall in the number of births in 1942-1945, especially great in 1943-1944, was not the first in the twentieth century, but it was much deeper than the previous ones. In 1943, when this fall reached the bottom, almost three times fewer children were born than in the years of the previous minima - 1917 and 1934. The postwar growth of fertility allowed the total number of births to return only for a short time to the level of these two minima (Figure 14).

The fluctuations in the number of births corresponded to the fluctuations in the number of women of maternal age that they generated. Figure 15 shows that, although these fluctuations gradually fade, they still remain very large. Approximately 80% of all children are usually born to women aged 20-34 years; a change in their number determines, though not in full, but to a decisive extent the dynamics of the country's maternal potential. Between 1984 and 1998 the number of women in this age group decreased by 3 million, stayed at this level for 3 years, and then between 1998 and 2010 again increased by 2.2 million, which largely led to the increase in the number of births in the "aughts". But then began a new cycle of reductions in the number of women of maternal age – the third after the war. Though it seems like the war was a very long time ago, in reality we are only somewhere in the middle of the third cycle - near the point of inflection, when the number of births again begins to decline.

[2] RSAE (Russian State Archive of Economics). Collection 1562, Inventory 47. Storage unit 35. Memorandum reports to the Central Committee of the CPSU and the Council of Ministers of the USSR on population and health statistics for 1970. Sheet 1.

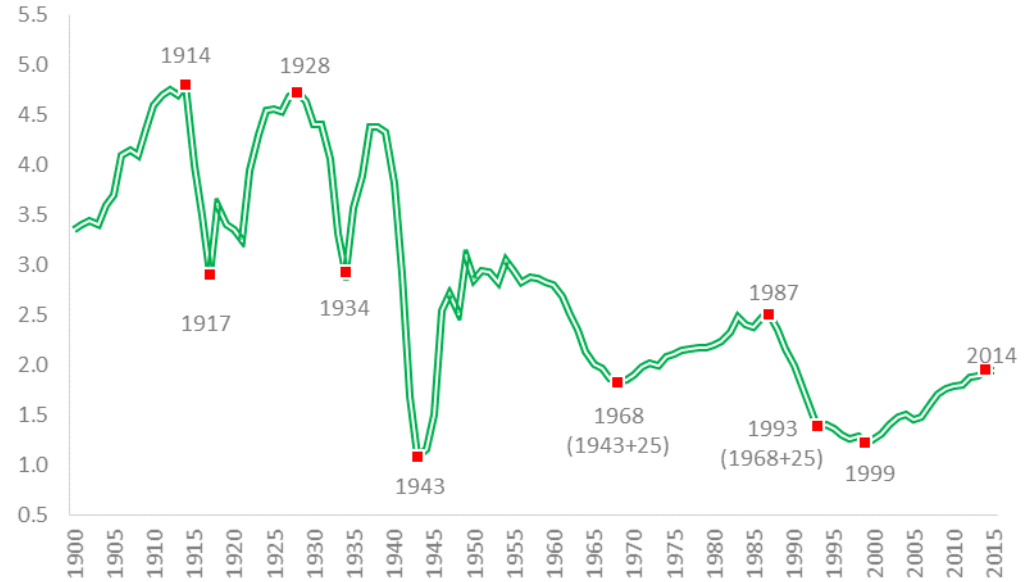

Figure 14. Number of births in Russia in 1900-2015, in millions

Sources: [Demographic modernization of Russia 2006: 184; Demographic Yearbook of Russia 2015: tab. 2.1].

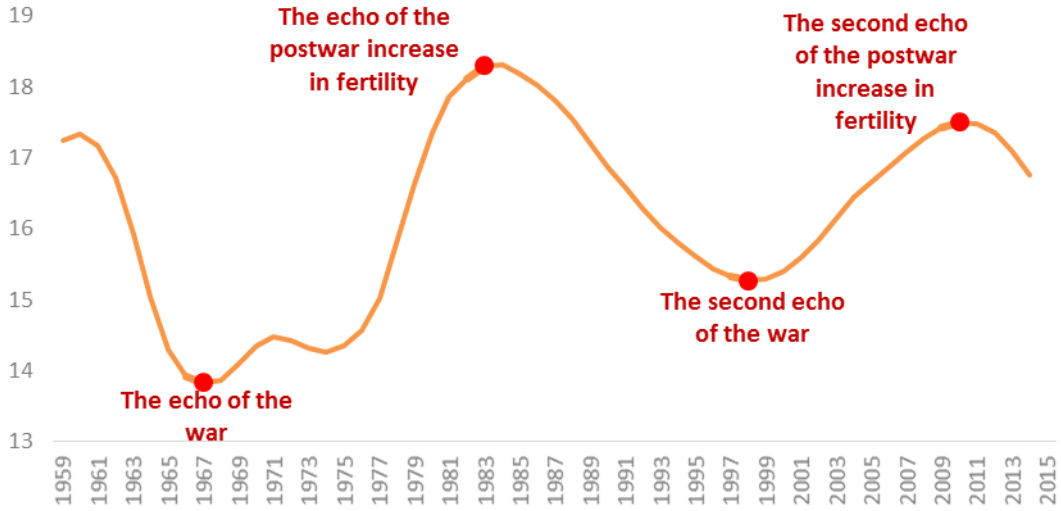

Figure 15. The number of women aged 20-34 years, in millions

Source: Demographic Yearbook of Russia for different years.

How much do these fluctuations affect the total number of births, which also depends on other causes?

Given the decisive contribution to fertility of mothers aged 20-34 years, in a first approximation and with a certain degree of conditionality, fertility can be measured by the number of births only in women 20-34 years old per 1,000 women of this age group. In demography, much more sophisticated indicators are used, but for rough estimations you can use this indicator, a kind of "general fertility rate" with narrower than usual limits of women's reproductive ages. Its changes over a long period of time indicate a decline in fertility in Russia. In 1984, when the number of women aged 20-34 reached their historical maximum (18.3 million), per 1000 women of this age group 132 children were born to women of all ages (15-49), while to women of precisely

this age group 111 were born . This is significantly lower than, for example, in 1960, when these indicators were 162 and 130, respectively, although much higher than in subsequent years when they reached very low values (79 and 66 per 1000 in 1999). But for some time after 1984 these rates were still growing, counteracting the negative impact of the beginning of the decline in the maternal potential, and the number of births increased until 1987. However, then the decline in the number of women in the most productive maternal age joined with a decline in fertility, and the number of births in Russia began to decline. Later, after 1999, both factors began to act in the opposite direction, contributing to an increase in the number of births.

We can try to separate out the specific factors contributing to these changes – on the one hand changes in fertility due to current social and economic causes and policy measures, and on the other hand changes in the number of potential mothers on the descending and ascending branches of the waves of war-triggered fluctuations.

Figure 16 shows the *actual* (according to Rosstat) change in the number of births after 1984 under the influence of both factors, and its *hypothetical* change on the assumption that the fluctuations in the number of women aged 20-34 years after 1984 stopped, their number remained constant, and the changes in the number of births per 1,000 women in this age group corresponded to the actual changes. As we see, the change in the hypothetical number of births would still have the same direction as the actual one, but the fall in the absolute number of births would be less. With this assumption, in the three decades after 1984 (1985-2014) 55.5 million children would have been born in Russia, including 45 million to women aged 20-34. In reality, 50.7 million and 41.2 million were born, i.e. 4.8 and 3.8 million fewer, respectively. Taking into account the fact that for the whole thirty years the average number of births was 1.8 million per year, 4.8 million births that never occurred is quite a significant number.

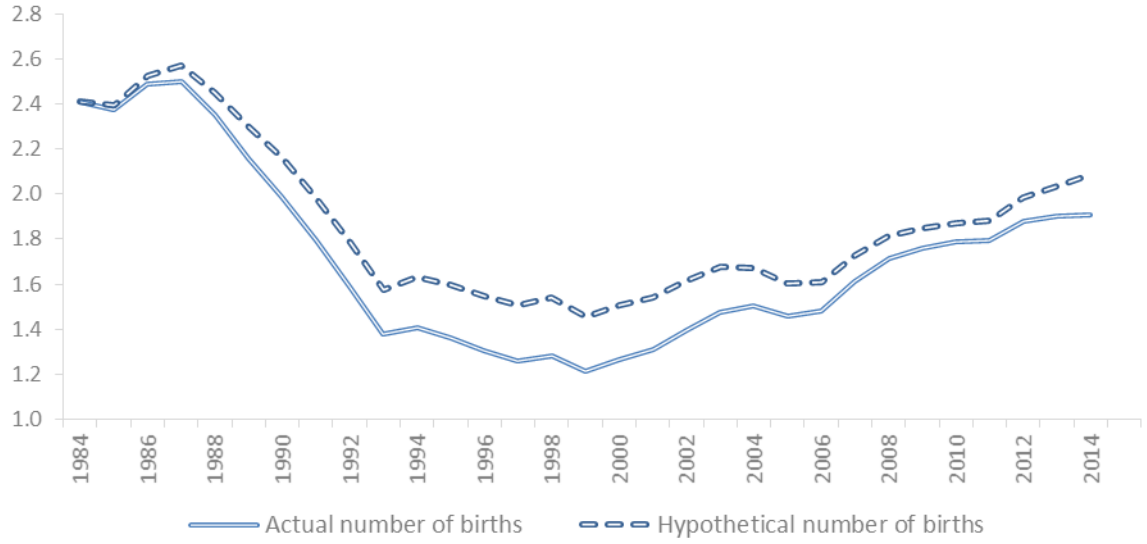

Figure 16. Actual and hypothetical (provided the number of women aged 20-34 remains constant at 1984 level) number of births, in millions

Figure 16 also draws attention to the fact that the gap between the two curves initially increases (until 1999), and then decreases. This is explained by the fact that the trajectory of the dotted curve (the hypothetical number of births) is determined by the action of only one factor –

changes in the actual fertility, and the trajectory of the solid curve (the actual number of births) is also influenced by the change in the number of women. Until 1999, this last change contributed to a decrease in the number of births, and after that - opposed it.

THE WAR AND NATURAL INCREASE OF THE POPULATION

In 1992, the natural increase in the population of Russia became negative for the first time since the war. In the 1990s - 2000s, negative natural increase was observed in many countries of Europe, especially in Eastern Europe. But Germany was the first European country where the number of deaths exceeded the number of births (20 years earlier than in Russia). In Russia, then, the natural increase in population exceeded 6 ‰, and it seemed that the situation here was much better. However, this apparent well-being was poorly combined with the fact that fertility in Russia already in 1964 had fallen below the replacement level (the net reproduction rate had descended below 1), and ever since, with the exception of three "Gorbachevian" years (1986-1988), the net reproduction rate of the Russian population has been below this level. And in Germany, throughout the 1960s, the net reproduction rate exceeded 1 and fell below 1 only in 1970 (Figure 17).

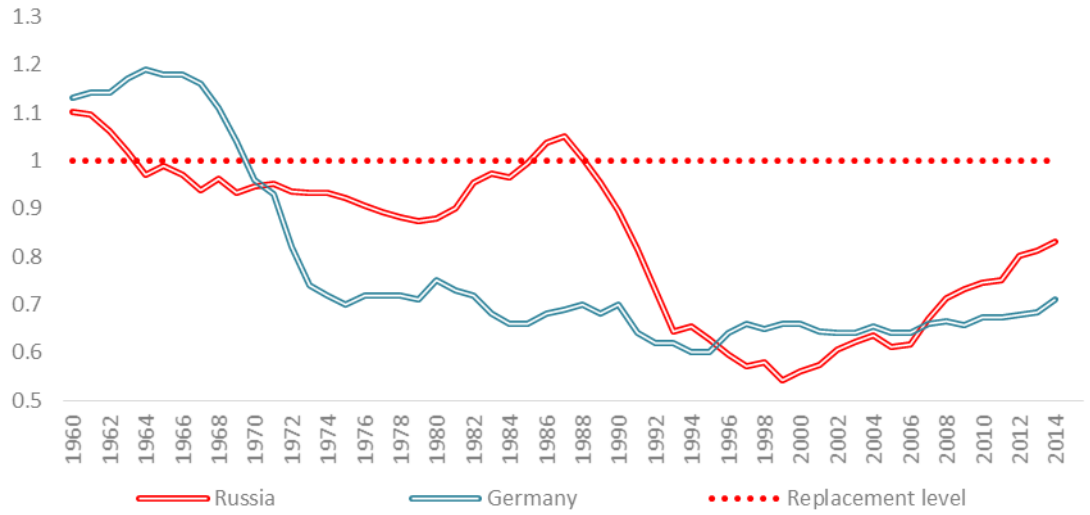

Figure 17. Net reproduction rate in Russia and Germany

Source: [Demoscope Weekly database]. URL: ttp://www.demoscope.ru/weekly/ssp/sng_rni.php (accessed June 22, 2016).

The long period of fertility below replacement level predetermined the intersections of the curves of total fertility and mortality rates (the so-called "Russian cross") and the appearance of a negative natural increase, but it appeared in Russia only in 1992, 20 years later than in Germany (Figure 18).

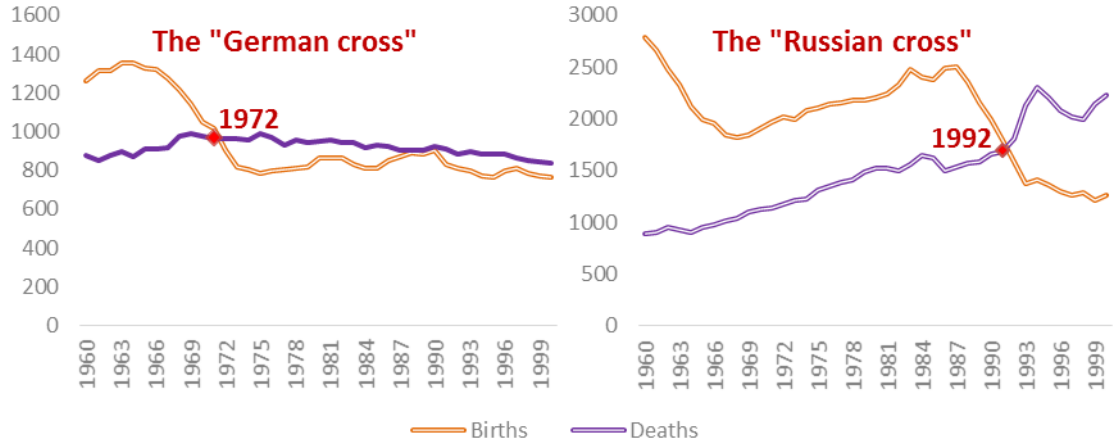

Figure 18. Natural increase in Russia and Germany, in thousands

Source: Demoscope Weekly database. URL: http://demoscope.ru/weekly/app/app4003.php (accessed: June 22, 2016).

The explanation of this paradox lies in the features of the post-war age and sex composition of the Russian population, including those that contribute to improving current indicators but did not at all indicate a real prosperity. Natural increase (decrease) is the difference between the numbers of births and deaths. In 1972, when a natural decrease appeared for the first time in Germany, there were 2,014,600 children born in Russia, and the total number of deaths came to 1,181,800, a natural increase of almost 833,000. With the same population as in Russia in 1972 (131.7 million people), and with the same age-specific fertility and mortality rates that were actually observed in Russia that year, but with the age-sex composition of the German population at that time, the picture in Russia would have been very different. The natural increase would have been not 832,800 people, but only 18,500, and in the next year, 1973, like in Germany, it would have become negative (table 5, figure 19).

Table 5. Natural increase in Russia in 1972, actual and with age-sex composition of the German population, thousands

	Actual	With sex-age composition of the population of Germany
Number of births	2014.6	1768.2
Number of deaths		
Men	579.2	954.4
Women	602.6	795.3
Total	1181.8	1749.7
Natural increase	832.8	18,5

It would seem we should be happy that the actual number of deaths in 1972 turned out to be much less than the hypothetical one corresponding to the gender and age structure of Germany. However, one must take into account that the number of deaths depends on the number of people at risk of death at different ages. With the Russian population size of 1972, but with the sex and age composition of Germany, in Russia there would have been 11.4 million people aged 50 and over (including 6.7 million men) more than in reality, and correspondingly there would have been more deaths. But in 1972, these people were no longer alive.

1972 was not, of course, an exception. The vast majority of those who, by age, should have died in the 1970s - 1980s, had died earlier, most on the field of battle. If we apply the sex and age

proportions of the population of Germany to the actual population of Russia and calculate the hypothetical natural increase in the population of Russia while maintaining the actual Russian age-specific rates of fertility and mortality of every year, one can see that the natural decrease would appear only a year later in Russia than in Germany, in 1973, and most certainly not in 1992 (Figure 19).

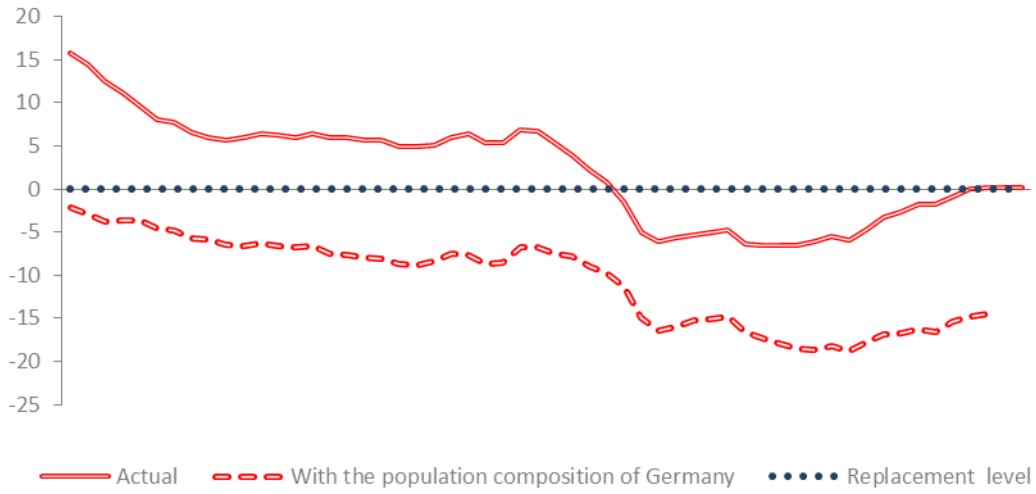

Figure 19. The natural increase in Russia, actual and hypothetical with the age and sex composition of the population of Germany, ‰

THE WORKING AGE POPULATION AND THE DEPENDENCY RATIO

The cyclical fluctuations in the size of generations caused by the war have a huge economic, and perhaps political, significance, which is not always recognized.

In particular, they lead to extremely uneven dynamics of the number of labor resources formed by generations entering and leaving the working age. Figure 20 shows the annual ratios of the numbers of young people entering working age and of older people exiting it, beginning in 1959 (20 and 60 years are taken as the lower and upper boundaries of the working age). During this time, Russia experienced at least three periods of deterioration in the "entry-exit" ratio for working ages, when small generations of workers born in periods of low fertility (war and its two echoes around 1968 and 1993) took over for the numerous generations born 40 years earlier. One more period of worsening of this ratio, though less significant, coincides not with a decrease in the number of those entering working age, but with an increase in those leaving it, those who were born in the period of a short-term rise in fertility in the late 1930s.

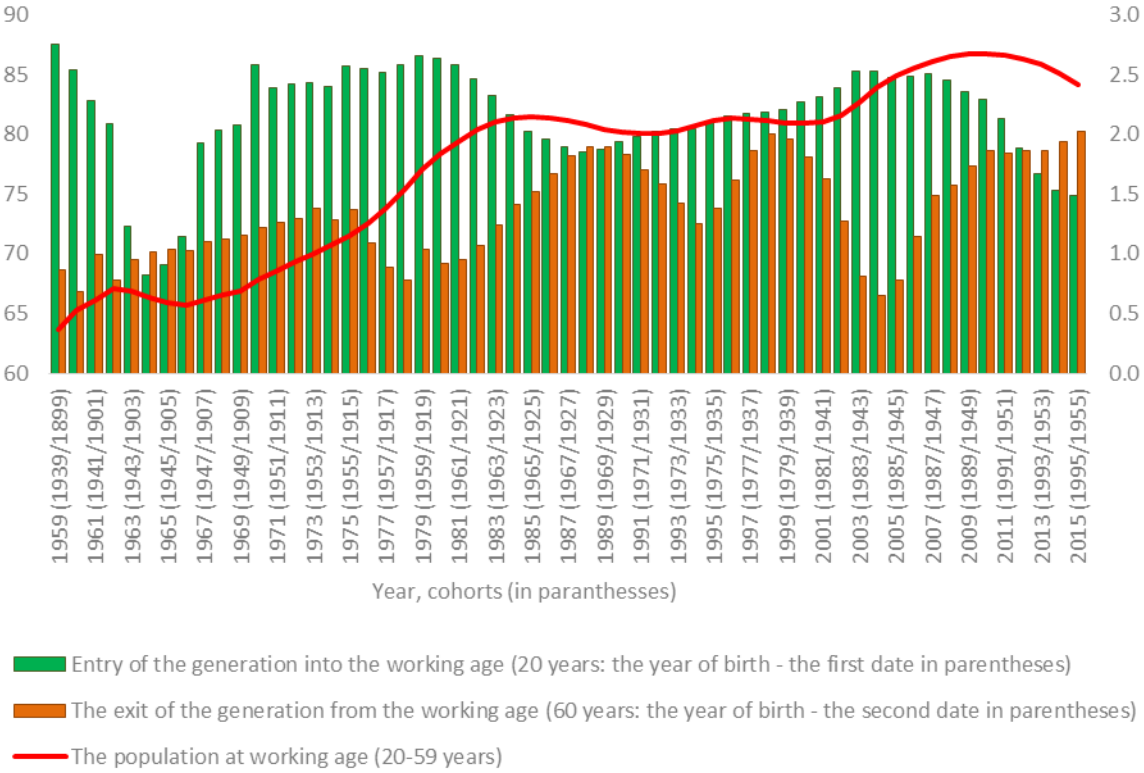

Figure 20. Population at working age in 1959-2014 (left axis), entry into this age (20 years) and exit from it (at 60 years) by generation (right axis), million people

Source: Demographic Yearbook of Russia for different years.

The cyclically changing proportion of incoming and outgoing generations results in a wave-like dynamics of the working-age population size (Figure 21). Such dynamics hamper the sustainable growth of the economy, which is forced to constantly adapt to the changing situation in the labor market.

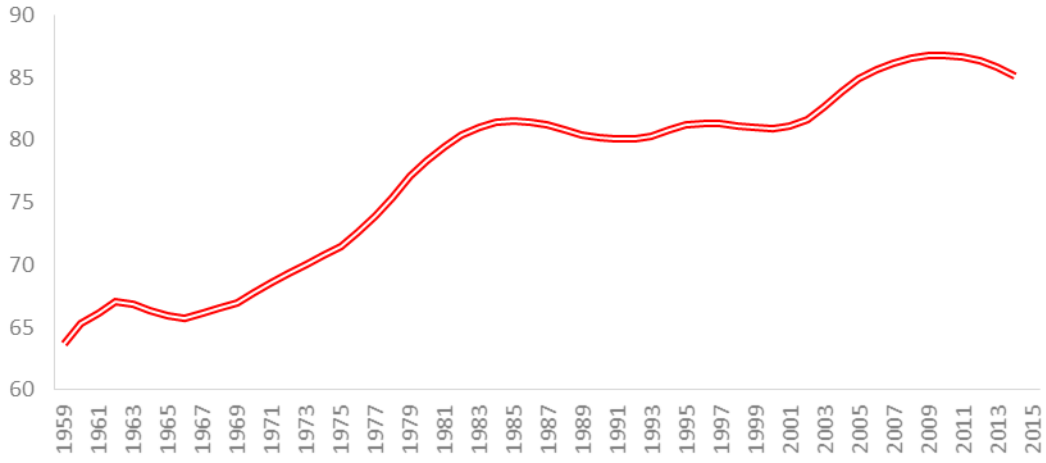

Figure 21. Population at working age (20-59 years), millions

Source: Demographic Yearbook of Russia for different years.

But probably of even greater economic and social importance are the differences in the magnitude of the dependency ratio, and hence the burden of social expenditures on health, education, and social security of the unemployed population, i.e. mainly the population of pre-working and post-working ages.

If we begin with the 1959 population census, the overall trend of changes in the aggregate dependency ratio was its decrease due to a reduction of the child dependency ratio, which for a long time successfully counteracted the growth of the old-age dependency ratio. At the same time, both parts of the dependency ratio, once very different, converged. If in 1959 the old-age dependency ratio (60 years and older) was 17 per 100 people aged 20-59 years, and the child dependency ratio (up to 20 years) was 67 per 100, by 2014 they were almost equal: 33 and 36 per 100, respectively (Figure 22). But we already know that all such changes throughout the postwar period had an oscillatory character, and this led to significant differences in the dependency ratio in a relatively short time. Thus, the combined child and the old-age dependency ratio was very high in the second half of the 1960s (94 people of pre-working and post-working ages per 100 people of working age), but by 1982-1983 had decreased by more than 20%, to 74 per 100. Then, in less than 10 years, it again increased by 15%, to 84 per 100 in 1992. After that, the dependency ratio declined slowly during the 1990s and quickly in the 2000s, reaching an all-time low in 2008-2011 of 65 to 100, or almost a quarter less than in 1992 and more than 30% less than in the late 1960s. Then a new growth began, which will inevitably continue.

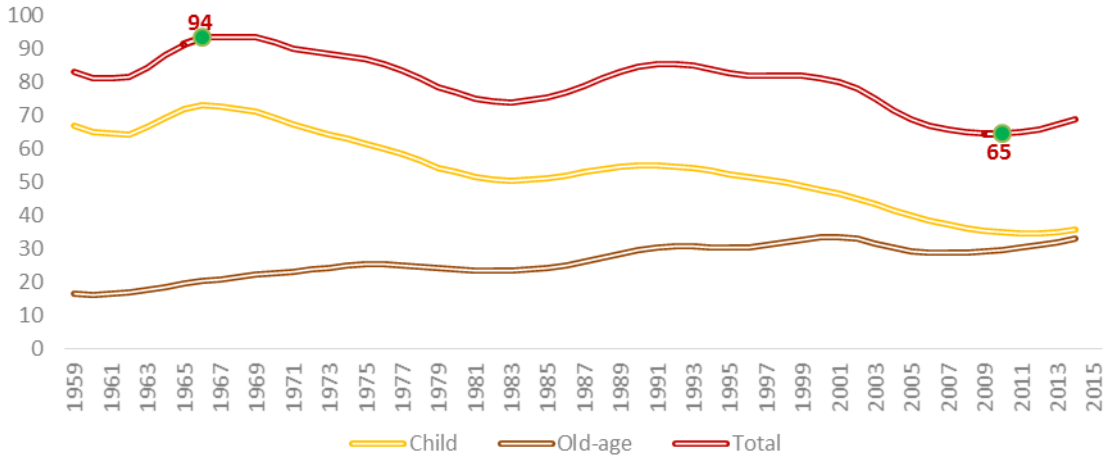

Figure 22. Dependency ratio per 100 people at working age (20-59 years)

Source: Demographic Yearbook of Russia for different years.

Public opinion and even many experts, not to mention politicians, usually do not attach much importance to such changes if these changes do not manifest themselves in a very obvious and, as a rule, negative way. In the favorable (and sometimes even unfavorable) demographic changes due to war-induced fluctuations in the size of generations, the authorities always tend to see their own merit, the fruits of their own policies, forgetting that in both cases these are but the repercussions of a terrible misfortune.

In the 2000s, few people realized both that there was an exceptionally favorable situation with the demographic burden in the country, and that this situation was a gift from a distant and hardly joyful past, and could not last long.

Demographic aging as a consequence of the demographic transition is taking place in all countries, including Russia, but in Russia it has several times come to a brief halt, when the generations born in the hard times of the first half of the twentieth century reached older ages (Figure 23). At that time, the old-age dependency ratio, and hence the burden on the pension system, did not increase, but decreased, while the easily predictable resumption of growth in the burden always seemed unexpected.

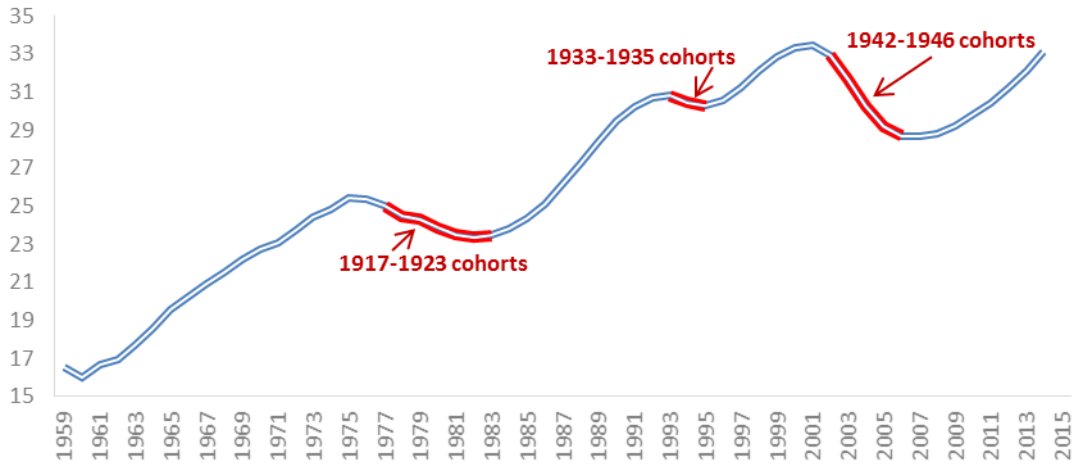

Figure 23. The old-age dependency ratio per 100 persons aged 20-59 years and the years in which different generations reached age 60

Source: Demographic Yearbook of Russia for different years.

The biggest decrease occurred very recently, in the past decade. A significant part of the economic well-being of the "fat" 1990s was due to an unprecedented low dependency ratio resulting from a halt in the population's aging. This temporary halt was owed to the fact that at this time the small generations of those born in the catastrophic war years were now reaching retirement age. The economy and politics reaped all manner of benefits from this.

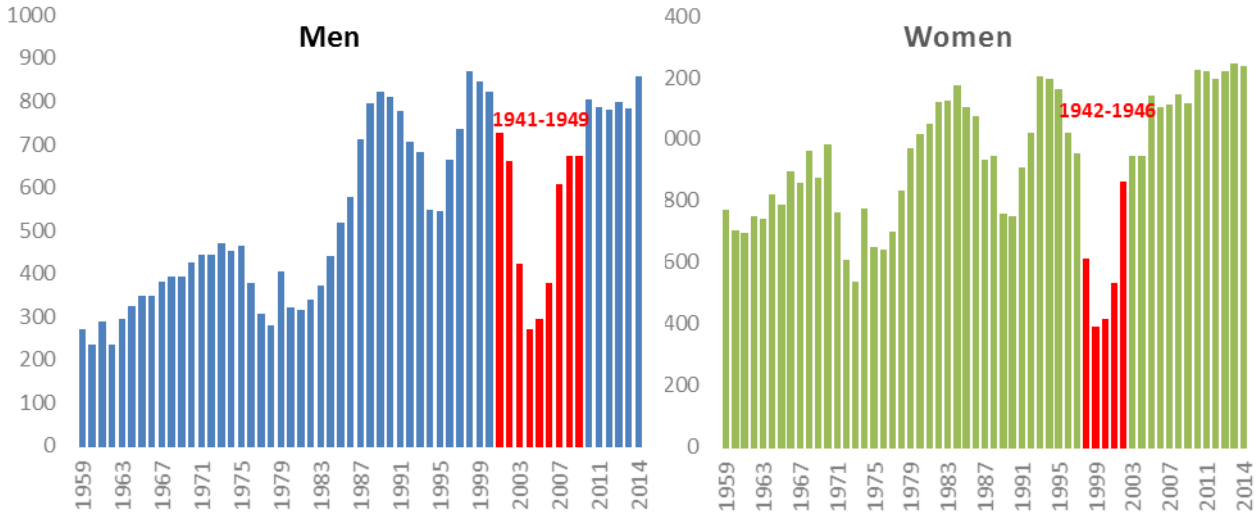

Figure 24. The number of men and women reaching retirement age (55 years for women and 60 years for men) in 1959-2014, thousands

Source: Demographic Yearbook of Russia for different years.

But the small wartime generations were followed by the numerous post-war ones, and this entailed a new growth in the old-age dependency ratio and in the burden on the pension fund (Figures 24 and 25).

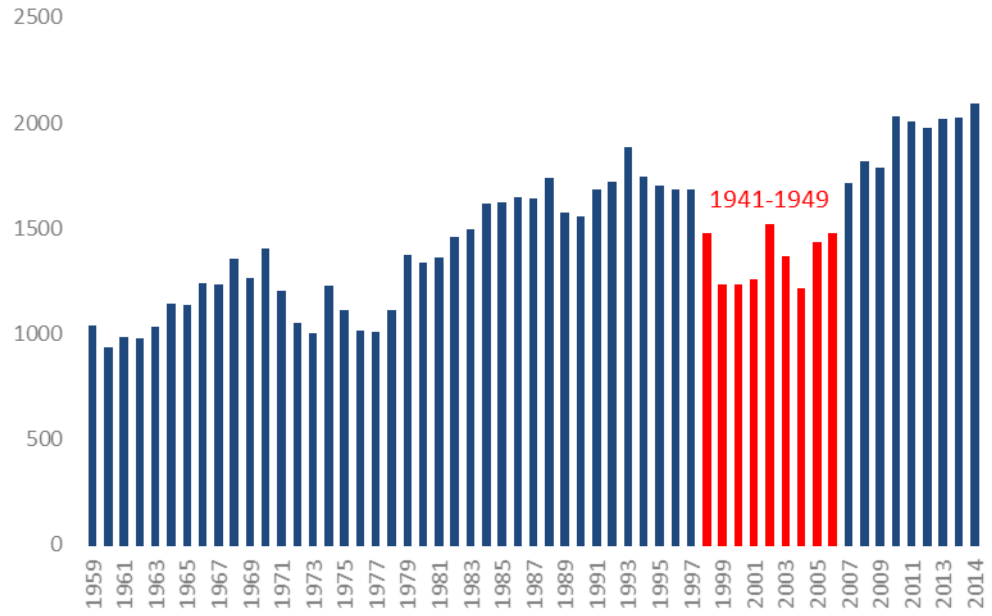

Figure 25. The population of both sexes reaching retirement age (55 years for women and 60 years for men) in 1959-2014, thousands

Source: Demographic Yearbook of Russia for different years.

This growth seems especially large, because it comes after a “hole” formed by wartime generations. Though quite predictable, it was unexpected for many, who began to come up with various explanations like the one given in an "analytical report" prepared on the instruction of the Minister of Health, which states that the 2006 increase in the proportion of older people in the country from 20.5% to 23.5% was due to "demographic changes that led to an increase in life expectancy"[3].

COULD THERE HAVE BEEN FEWER MILITARY LOSSES?

War is war: the warring parties inevitably suffer human losses. But such losses as the USSR suffered in 1941-1945 had never been seen in history. Estimates for these losses vary widely. L. Rybakovsky gives a summary of 28 different estimates, which range from 7 million people announced by Stalin in 1946, to 46 million calculated by one researcher [Rybakovsky 2010: 26]. But still the bulk of estimates are concentrated in the range of 26-27 million people, of which about half (13 million according to Rybakovsky's estimates [Rybakovsky 2010: 103]) falls on Russia. Based on these figures, the USSR accounted for one-third to one-half of the total losses of the countries participating in the Second World War [Vishnevsky 1998: 387], with Russia's share being between 16-17% and 25%. It is not surprising that the demographic echo of these losses is

[3] Living longer to work more. The Ministry of Health and the Federal State Statistics Service are exploring the reasons for increasing the retirement age. "Kommersant" №145 of August 13, 2015.

still heard in Russia today.

How to explain such high losses? Victory in the war was indispensable, but did it really require such a high price? Were these losses caused by the USSR's lesser military might? By the unexpectedness of war? By the mistakes of the country's political leadership, who incorrectly assessed the international situation on the eve of the war, or failed to draw conclusions from its assessment?

To try to answer these questions, we will have to return to 1939, where we began our article. The already mentioned 18th Congress of the CPSU (b), the main event of political life in the USSR at the time, is important for our topic not only because it was here that Stalin stated the size of the population. Much more important is that it assessed the international situation in relation to the approaching war.

In particular, Stalin's report spoke of the already begun new imperialist war, the characteristic feature of which was that "it has not yet become universal, a world war. The war is being waged by aggressor states, who in every way infringe upon the interests of the non-aggressive states, primarily England, France and the U.S.A., while the latter draw back and retreat, making concession after concession to the aggressors" [Stalin 1978]. By aggressor states he meant Germany, Italy and Japan, at the same time stressing that "non-aggressive, democratic states" "have tremendous opportunities" and "taken together, are unquestionably stronger than the fascist states both economically and militarily" [Stalin 1978].

The theme of superiority over the fascist states was developed in the report after Stalin's, of the ACP(b) delegation in the Executive Committee of the Comintern, presented by D.Z. Manuilsky. "In order to defeat the fascist aggressors, *actions* are needed, backed by arguments of *material force*, actions by states against which, in essence, the fascist aggression is directed (France, England, USA)… Fascist Germany is not ready for a large, serious war: it does not have enough raw materials or food, its financial situation is critical, its shores are vulnerable to a naval blockade, its army lacks command staff, its rear is a dangerous rear for fascism. The advantages of material power are undoubtedly on the side of the so-called Democratic states. These states have a population *three* times greater than the aggressor bloc, produce 1½ to 2 times more steel, generate twice as much electricity, produce *fourteen* times more cars, produce *fifty-five* times more liquid fuel, *nine* times more textile raw materials, *four* times as much food; they can fully cover their raw material needs, while the block of aggressors even in peacetime has a deficit of 50-55%; their gold reserves are *forty-nine* times greater than the reserves of the fascist states. Their production capabilities in aircraft construction, motorization of the army and its military-technical equipment far exceed the boldest calculations of the fascist bloc; the navy of France, Britain and the USA is twice as strong as the fleet of Germany, Italy and Japan "[S'yezd VKP(b) 1939: 57]

The delegates of the congress were very cheerful. Stalin sneered at the "fascist rulers" and the hall appreciated his humor, as the remarks in the transcript of the congress show, although they were omitted when the report was published in the collection of Stalin's works. "The fascist rulers decided, before plunging into war, to frame public opinion to suit their ends, that is, to mislead it, to deceive it. A military bloc of Germany and Italy against the interests of England and France in Europe? For goodness' sake, you call that a bloc? "We" have no military bloc. All "we" have is an innocuous "Berlin-Rome axis"; that is, just a geometrical equation for an axis. (Laughter.) A

military bloc of Germany, Italy and Japan against the interests of the United States, Great Britain and France in the Far East? Nothing of the kind. "We" have no military bloc. All "we" have is an innocuous "Berlin-Rome-Tokyo triangle"; that is, a slight penchant for geometry. (General laughter.)" [Stalin 1978]. “It is quite possible, of course, that there are madmen in Germany who dream of annexing the elephant, that is, the Soviet Ukraine, to the gnat, that is, to the so-called Carpathian Ukraine. If there really are such lunatics in Germany, rest assured that we shall find enough straitjackets for them in our country. (Thunderous applause.)" [Stalin 1978].

It should be recognized that if we reject the propaganda rhetoric, then the analysis of the balance of forces on the world scene presented at the Congress was correct. In general, this was confirmed by the course of the war, albeit with considerable reservations.

When the war ended, the idea was again expressed of the initial superiority of the victors, of the "enormous advantages of a coalition of democratic states that had far superior capabilities and reserves in economics and technology to win a world war. These advantages can also be seen from a comparison of the populations. The democratic states - the USSR, the USA and England - had a population of 372 million people, while the fascist states - Germany, Japan and Italy - had 186 million people." [Voznesenskii, 1948]. Once again this is not just a personal point of view, even if of a very high-ranking author. After publication, the book was awarded the Stalin Prize of the first degree, and there is evidence that "Stalin read the manuscript with pencil in hand, and made notes and even some insertions" [Congress of the CPSU 1962: 184].

But how to reconcile such superiority with such losses?

Any comparison is lame, but still some parallels arise. On December 7, 1941, several hundred Japanese aircraft ("without declaration of war") attacked the US military base of Pearl Harbor, after which the United States, the United Kingdom and a number of their allies declared war on Japan.

Japan was not at all an easy opponent. Its population in 1941 (73 million people) was about the same as the population of Germany (72 million), whereas the US population at that time (132 million people according to the 1940 census) represented about two-thirds of the USSR’s (197 million In June 1941). In addition, Japan owned colonies (including Korea) with a population of over 30 million people, and controlled significant areas of China, including the puppet state of Manchukuo with a population of over 40 million people. Japan had long been preparing for and waging war, it occupied significant territories in Asia and Oceania, the development of its industry was subordinated to military tasks, the country's politics were under control of the military, and the majority of the population fanatically supported the aggressive imperial goals of the country's leadership.

The war that began after Pearl Harbor was in the huge Pacific theater. Its first stage was unsuccessful for the US and its allies, but then a turning point came with the naval Battle of Midway in June 1942. The war lasted for over three more years, but with the clear superiority of the United States. The difference in the military and economic potentials of Japan and the United States was enormous, and this predetermined the outcome of the war: the Japanese were driven out of all the territories they occupied, and military operations moved to Japanese soil. The US war against Japan neutralized and then eliminated an extremely dangerous threat for the USSR

from one of the corners of the "triangle", the ironic mention of which in Stalin's report was met with the "general laughter" of the delegates of the XVIII Congress of the ACP(b).

In the course of this far from simple war with Japan, lasting, like the Great Patriotic War, from 1941 to 1945, total US losses of servicemen killed, dead in captivity or missing in action came to about 120,000 [1946: 8; CRS (2001): 3]. This is less than the irretrievable losses of Soviet troops in the Soviet-Finnish war of 1939-1940 (127,000 dead), and only 10 times more than were lost in about 25 days of military operations against the Kwantung Army in Manchuria after the USSR joined the war against Japan on August 9, 1945 (over 12,000 people) [Grif sekretnosti 1993: 121, 223]. By this time, Japan's military power was already weakened, and Japan had twice been subjected to atomic bombing. On August 15, Emperor Hirohito, addressing the nation on the radio, announced the surrender of Japan, but the Kwantung Army continued to resist until September 2, without, of course, any chance of success.

And how did the balance of world forces noted during the 18th Congress of the ACP(b) work in the case of the USSR?

For several months after the congress, the Soviet Union negotiated with England and France and simultaneously with Germany. There is a vast literature in which all the issues of the European diplomatic game of the summer of 1939 are discussed in detail, and the steps of the Soviet leadership of the time are condemned or justified. But for us what matters now is the result: Soviet diplomacy did not reach an understanding with "non-aggressive democratic states", but rather quickly found a common language with adventurist "fascist rulers", which led to the signing on August 23 of the Soviet-German Non-Aggression Pact (the "Molotov-Ribbentrop Pact"), and then (September 28) of the Frontier Treaty.

As General Sudoplatov, one of the heads of Soviet intelligence, responsible before the war precisely for the German sector, stated in his memoirs, "Stalin's policy toward Hitler was based on the correct belief that the hostility of the Western world and Japan to the Soviet system would make the USSR's isolation from the international community a constant factor "[Sudoplatov 1997: 146-147]. The meaning of this phrase is difficult to understand, especially against the background of what Stalin himself said several months before at the Congress about "politics towards Hitler". Much more understandable are the reflections of the intelligence officer on how "the secret consultations of Hitler, Ribbentrop and Molotov on a possible strategic agreement between Germany, Japan and the Soviet Union created the illusory idea in Stalin and Molotov that it was possible to reach agreement with Hitler," and his perplexity about the fact that "the military leadership and Stalin's entourage harbored the illusion that the might of the Red Army was equal to the strength of the Wehrmacht forces concentrated near our western borders. Why such a miscalculation?" "No one in the state security service seriously studied the real balance of forces on the Soviet-German border" [Sudoplatov 1997: 175, 180-181].

But it seems that Sudoplatov himself did not think, given the degree of trust that was established between the two countries' leaders, that such a study was necessary. Explaining why intelligence refused to use a valuable agent who had access to the top officials of the Reich, he writes: "Before Germany unleashed a war against us, there were in fact no problems where he could have been used to probe the position of the Germans on this or that delicate matter: after all, all this time Molotov and our Ambassador Dekanozov maintained a confidential relationship with

Ribbentrop and the German Ambassador, Schullenburg" [Sudoplatov 1997: 172]. So what exactly then was the intelligence service of "the German sector" doing? "As soon as Stalin learned that the German General Staff was conducting exercises on operational-strategic and material-technical supplies in the event of a protracted war, he immediately gave the order to acquaint the German military attaché in Moscow with the industrial and military might of Siberia. In April 1941 (!) he was allowed to travel to new military plants that produced tanks of the newest designs and aircraft. Through our residency in Berlin, we spread rumors in the ministries of aviation and the economy that the war with the Soviet Union would turn into a tragedy for the Hitlerian leadership "[Sudoplatov 1997: 176]. Thus did we prepare for war.

L. Rybakovsky, perhaps the person most involved in the study of the military losses of the USSR and Russia, introduced a strange formulation: "Stalin, by agreeing to a nonaggression pact with fascist Germany, did not make a mistake, but he did make a huge strategic miscalculation" [Rybakovsky 2000: 94; 2010: 19]. But his general conclusion still says that "the huge size of human losses is largely due to the criminal activities of Stalin and his entourage [in the book version – of his "clique"]; to strategic miscalculations committed on the eve of the war; to stubborn reluctance to reckon with the realities of the war, especially in its first stage" [Rybakovsky 2000: 94; 2010: 18].

Apparently, Stalin and his entourage were quite clearly aware that *such* losses were not justified, and did everything to hide their true scope. This manifested itself not only in the fact that Stalin informed the whole world of the absolutely unrealistic magnitude of the losses – 7 million people – while knowing that it was greater, but also that he banned any attempts to count the post-war population of the USSR. Well aware of Stalin's reluctance to name the true magnitude of the losses, the then head of the Central Statistical Bureau of the USSR, V. Starovsky, still believing that "for practical needs it is necessary to have data on the current population size ... and ... composition," suggested that a one-time population count should be made, stipulating that this would not be a census, and that "unlike the results of a census, the results will not be subject to publication, as is customary in international practice", but he was instructed by Stalin "to postpone [it] until the end of the five-year plan" [Demographic modernization of Russia 2006: 459]. After this instruction, received August 29, 1947, Stalin lived over 5 more years, but the question of counting, and all the more of conducting a census, no longer arose. And even after Stalin's death, the size of the Soviet Union's military losses for a long time was surrounded by a veil of secrecy, and the very same V. Starovsky did what he could to oppose its declassification. A secret note "of special importance" to the Central Committee of the CPSU dated November 14, 1956 has survived. Here is its full text[4].

"Of special importance

Comrade Shepilov asks to telegraph the figures to be published on the losses of the Soviet army and the Soviet people during the Second World War.

[4] RSAE, Collection 1562, Inventory 33, File 2990, Sheet 75.

In connection with this, I report:

a) In an interview with I.V. Stalin, published in the press on March 14, 1946, it was said: "... As a result of the German invasion, the Soviet Union irretrievably lost in battle with the Germans, and also as a result of the German occupation and the forcing of Soviet people into German hard labor, about seven million people. In other words, the Soviet Union lost several times more people than Britain and the United States of America combined."

b) According to the calculations of the Central Statistical Bureau, the decrease in the population of the USSR during the war years as a result of the Soviet army's losses, the extermination of Soviet people by occupants and the excess of deaths over births was over 20 million people;

c) From figures published in a statistical bulletin of the CSO [Central Statistical Office] on the population of the USSR for 1940 (191.7 million) and for April 1956 (200.2 million), as well as from data on population growth published in recent years, it can be concluded that the losses of the USSR in the war came not to 7 million, but significantly more.

I therefore would consider it necessary to instruct comrade Shepilov either not to name the number of losses, by limiting himself to the phrase "many millions", or to name the figure - over 20 million people – by wording it roughly as follows:

"During the Great Patriotic War the Soviet Union lost in battles with the invaders, as a result of the slaughter of the population by the invaders, as well as from the decrease in fertility and the increase in mortality, especially in the occupied areas, over 20 million people."

I await instructions."

At that time, Shepilov was considerably higher-ranking than Starovsky, but he apparently received an appropriate "instruction", because the new figure of losses ("more than two tens of millions of lives of Soviet citizens") was announced by Khrushchev only 5 years later [Khrushchev 1961: 8], and then corrected already in strict accordance with the recommendation of Starovsky ("more than 20 million people") [Brezhnev 1965: 15]. As D. Bogoyavlensky rightly points out, "We can assume that the basis of the figures for both Khrushchev and Brezhnev was first pointed out by Starovsky in this note. By the way, "Gorbachev's" "almost 27 million" formally corresponded to the "over 20 million people" in the letter from the head of the Central Statistical Office of the USSR. Apparently, the CSO had nonetheless made its own calculations of the losses, for which Starovsky deserves a large part of the credit. But it is also true that he considered it perfectly normal to conceal from the people and from the whole world the true extent of the losses, and was looking for ways to continue to withhold the figures at his disposal in the changed political situation. Even in his top-secret letter, Starovsky does not give specific figures, but only evasive and "rounded" estimates. In addition, he was mistaken, and maybe even dissembling, when including in his proposed formulation losses from a decline in fertility. Such losses, albeit hypothetical, did of course occur, but with them the "price of Victory" would have been even greater" [Bogoyavlensky 2012].

It did indeed turn out to be greater. All the post-war population censuses testify to this, as well as to how hard and how long the demographic wounds caused by the war took – and continue

to take – to heal. And the question remains: why were they so deep? The famous words from the Okudzhava song – "We need one victory, one for all – whatever it may cost" – do not give all answers to this question. The Soviet Union fought a strong, but not a stronger enemy, and it fought on the side with much greater economic and military might, which, as we have seen, was clear to the political leadership both before and after the war.

The very fact that instead of looking for an answer to the question of the causes of such unprecedented losses, the leaders of the country did all they could to avoid the question itself, says a lot. In understating and concealing the real extent of the losses, they hoped that time would wash away the truth, leaving only the memory of victory.

But "there is nothing hidden that will not be disclosed, and nothing concealed that will not be known or brought out into the open" (Luke, 8:17).

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MORTALITY IN MOSCOW AND OTHER MEGACITIES OF THE WORLD: SIMILARITIES AND DIFFERENCES*

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This paper is devoted to the comparison of mortality by cause of death in Moscow and other megacities of the world since 1990. The selection of megacities was determined by the availability of detailed mortality data in the selected period. The objects of our comparison are data for Berlin, Hong Kong, London, Los Angeles, New York, Singapore, St. Petersburg, and Tokyo. Mortality from major groups of causes of death are considered, including cardiovascular diseases, neoplasms, external causes, diseases of the respiratory and digestive systems, infections and some others. The analysis uses standardised mortality rates by cause of death.

The mortality level in Moscow is significantly lower than in the majority of regions of Russia, but is still substantially higher than in foreign megacities. Due to a big lag at the beginning of the period, the mortality level in Moscow nowadays is higher than in all selected foreign megalopolises in the year 2000. Where Moscow's mortality level lags most behind others is in mortality from circulatory diseases and external causes. Moscow's successes in reducing mortality in 2000-2014 are very impressive. However, it is difficult to predict how events will unfold in the deteriorating economic situation.

Key words: *Moscow, mortality, causes of death, megacities, circulatory diseases, external causes, neoplasms.*

Compared with mortality trends in the rest of Russia, the situation in Moscow now looks very favourable. In the early 1990s, the standardised death rate (SDR)[1] of both men and women in Moscow was almost no different from the rates in other urban settlements of the Central Federal District (CFD) and in St. Petersburg (Figure 1). On average, for the years 1990-1994 the SDR in Moscow was only 3-4% lower among men, and among women even higher by almost 3% in comparison with other cities of the Central Federal District, but 3.5% lower than in St. Petersburg. Over the next four years, until 1998, the dynamics and level of mortality in the two capitals nearly matched, but then their paths diverged. In Moscow, mortality continued to decrease among both men and women, while in St. Petersburg and in the other cities of the Central Federal District, as well as in the country as a whole, an increase in mortality was observed, with a decline beginning only in 2004.

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THE RESULTS OF THE PROJECT "DEMOGRAPHIC DEVELOPMENT IN RUSSIA IN 2005-2015 IN THE CONTEXT OF LONG-TERM TRENDS", CARRIED OUT WITHIN THE FRAMEWORK OF THE BASIC RESEARCH PROGRAMME AT THE NATIONAL RESEARCH UNIVERSITY HIGHER SCHOOL OF ECONOMICS (HSE) IN 2016, ARE PRESENTED IN THIS PAPER.

[1] Here and below, the standard population of 1976 [Waterhouse et al. 1976] is used for calculating standardised indicators.

As a result, the gap between Moscow and other cities of the Central Federal District (CFD) and St. Petersburg became more significant. So, if in 2000 in Moscow the SDR was lower than in St. Petersburg by 18% among men and 13% among women, and in comparison with the cities of the CFD without Moscow by 29% and 18% respectively, then in 2014 the gap increased accordingly to 21% and 45% for males and 15% and 30% for women.

The dynamics of the SDR for women in the cities of the CFD, with the exception of Moscow, are indistinguishable from those in Russia as a whole, while male mortality in the country as a whole is slightly lower than for the Central Federal District. By the end of the period here being considered – i.e. by 2014 – the SDR in Moscow was, relative to the rest of Russia, 1.7 times lower among men and 1.4 times lower among women. If you exclude the North Caucasus republics, where mortality data are still questionable, you will find that Moscow has had the lowest SDR among the regions of Russia since the second half of the 1990s (1997 for men and 1999 for women).

For almost the entire period since 1990, mortality trends in Moscow have been much more favourable than in most Russian regions. On the whole, however, these are the results of the same factors as for the trends in all of Russia. After a significant fall in the level of mortality in the country during the anti-alcohol campaign, by the late 1980s its slow growth had already begun. This growth accelerated in the early 1990s, when the campaign was completely stopped and there was a significant drop in life expectancy, the lowest point of which was recorded in 1994. By 1998, the level of mortality in the country had decreased, but remained significantly higher than in 1990. Then, against the backdrop of the 1998 financial crisis, there was renewed growth, which lasted until 2003. Increased mortality after 1998 is usually associated with the financial crisis, but there is no widely accepted explanation of the reasons for its decline between 1994 and 1998 and its growth between 1998 and 2003 [Vishnevsky 2006: 293-323; Shkolnikov et al. 2014]. After 2003, a steady decline in mortality across the country began and continues to the present time, though it has slowed down considerably in the new economic crisis [Andreev and others in 2015; Shkolnikov et al. 2014; Andreev, Kvasha, Kharkova 2013].

The main difference between the dynamics of mortality in Moscow and trends in other Russian regions (Figure 1) is that, after the peak in 1994, the subsequent falls in mortality were quite moderate; since 2001, that is, three years before the rest of the country, a steady decline began.

However great Moscow's success may look in the Russian context, relative to EU-15[2] megacities mortality in Moscow remains high, although in the last twenty years it has come closer to theirs, especially for women. In 1995, relative to the average for the EU-15 countries, the SDR in Moscow was 2.2 times higher for men and 1.9 times for women, and in 2013 it was 1.5 and 1.1 times higher, respectively. A different picture is observed when comparing the average SDR in Moscow with that of the "new" EU member states[3]. Until 2010, the SDR in Moscow was higher than in the 12 new EU countries, especially in the periods 1993-1995 and 2000-2003, when the

[2] Member state of the EU before May 2004: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.
[3] Member state of the EU after May 2004: Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia.

differences for men were 42-53% and 21-23%, and the differences for women were 20-25% and 16-17%. However, since 2011, mortality in Moscow among both men and women has become somewhat lower than in the 12 new EU countries.

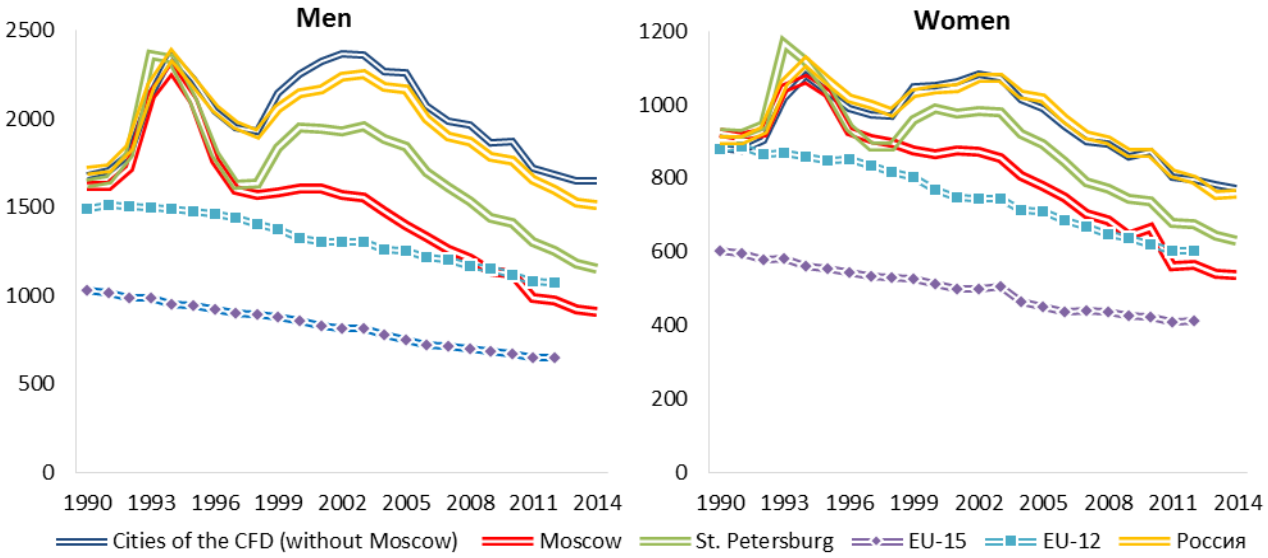

Figure 1. Standardised death rates from all causes of death in Moscow, the urban population of the CFD without Moscow, St. Petersburg and the EU-15, 1990-2014, per 100,000

Moscow is not only the capital of Russia, but also one of the largest cities in the world [UN 2015]. In 2014, Moscow ranked 21st among the largest metropolitan areas of the world, so it was logical to compare the mortality rate in Moscow with mortality in other major metropolitan areas.

DATA

In selecting cities for comparison, priority was given to population size and the availability of high-quality statistical and demographic data. In particular, the choice of cities for comparison was determined by the availability in open sources of standardised death rates or distributions of numbers of deaths by age, sex and cause of death. The resulting selection included metropolitan areas located in different parts of the world, as well as Russia's second biggest metropolis after Moscow – St. Petersburg (Table 1).

We compare the data over 4 years: 1990 (or the first year following it for which data are available), 2000, 2010 and 2013 (or the latest year for which data are available).

A comparative analysis is carried out both by major classes of causes of death and by certain important groups of causes within the classes that determine the main changes in overall mortality.

Unfortunately, data on all causes of death under consideration are not available for all selected cities (megacities). Therefore, for several cities only certain causes will be analysed.

Table 1: Megacities selected for comparison with Moscow

City	Evaluation date	Population size, million persons	Source	Internet address
Berlin	31.12.2014	3.5	The Information System of the Federal Health Monitoring	http://www.gbe-bund.de/gbe10/pkg_isgbe5.prc_isgbe?p_uid=gast&p_aid=0&p_sprache=E
Hong Kong	2013	7.2	WHO Mortality Database	http://www.who.int/healthinfo/mortality_data/en/
London	Average annual population 2012	8.3	GBD Compare – Public Health England | Viz Hub	http://vizhub.healthdata.org/gbd-compare/england
Los Angeles	2014	3.9	Los Angeles County Department of Public Health	http://www.publichealth.lacounty.gov/index.htm
Moscow	Average annual population 2014	12.2	Rosstat*	http://www.gks.ru/
New York	2013	8.4	New York State Department of Health Vital Statistics	http://www.health.ny.gov/statistics/vital_statistics/index.htm
St. Petersburg	Average annual population 2014	5.2	Rosstat*	http://www.gks.ru/
Singapore	2013	3.8	WHO Mortality Database	http://www.who.int/healthinfo/mortality_data/en/
Tokyo	01.10.2014	13.4	Tokyo Statistical Yearbook for 1990, 2000, 2010 and 2013 Portal Site of Official Statistics of Japan: Population by Age (5-Year Age Group) and Sex for Prefectures - Total Population, October 1, 2013	http://www.e-stat.go.jp/SG1/estat/ListE.do?lid=000001118081

Note: We present the population size of the city itself, rather than the urban agglomeration. References to the sources indicated in the table hereinafter are not repeated.

**Rosstat – Russian Federal State Statistics Service.*

GENERAL TRENDS IN MORTALITY AND STRUCTURE OF MORTALITY BY CAUSE OF DEATH

Until the late 1990s, mortality dynamics in Moscow and St. Petersburg were similar (Figure 2), although fluctuations in mortality in St. Petersburg were great. But since the beginning of 2001, the differences in dynamics have been quite significant. Figure 2 shows that mortality indicators for inhabitants of Moscow barely responded to the economic crisis of 1998, while in St. Petersburg the increase in mortality was considerable. In Moscow, the SDR for men from 1998 to 2000 increased by 38 per 1,000 persons, and in St. Petersburg by 312. In Moscow, the SDR for women in general fell by 31 per 1,000, while in St. Petersburg there was an increase of 104 per 1,000.

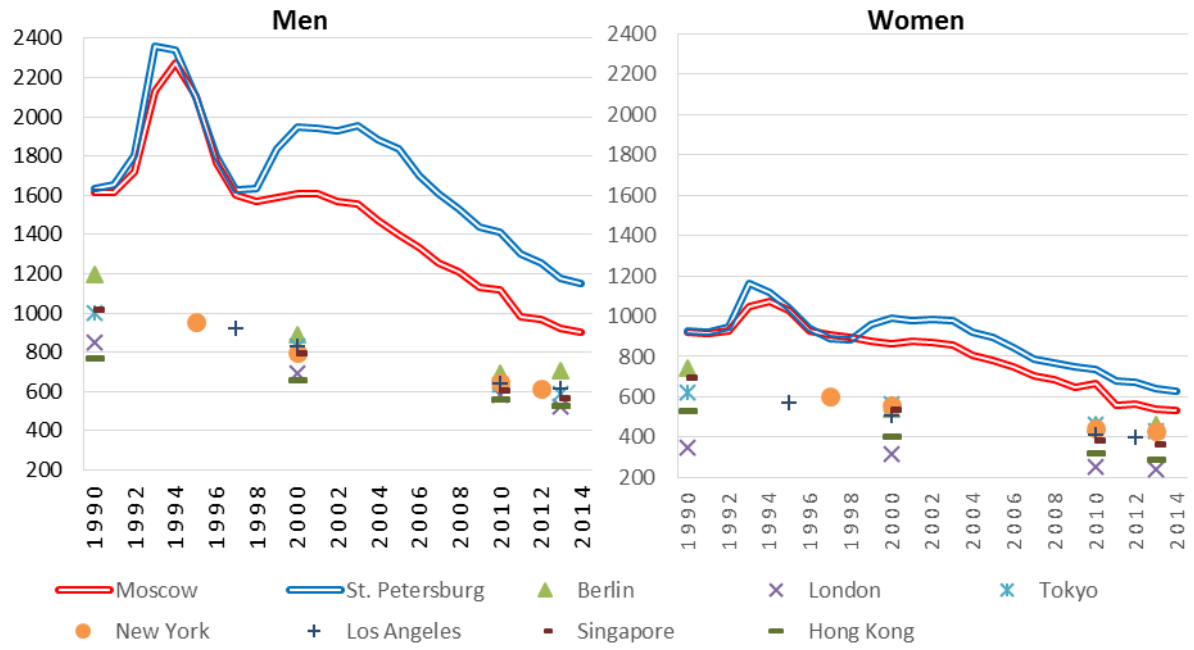

Figure 2. Standardised death rates in metropolitan areas 7 megacities, 1990-2014, per 100,000

As a result, over almost a quarter of a century (1990 to 2014) the SDR in Moscow decreased 1.8 times for men and 1.7 times for women. In St. Petersburg, the decline was 1.4 and 1.5 times, respectively. Is this a lot or a little, and how did Moscow's place in terms of its SDR level change in comparison with the other megacities examined here?

In Table 2 and Figure 2, it is evident that the level of mortality in Moscow at the beginning and end of the period lags far behind all the foreign cities considered. The standardised death rate in Moscow exceeds the corresponding figures of other megacities by 1.5-2 times. After 2000, the gap began to shrink. In 2013, compared to 1990, the gap in mortality rates between Moscow and other megacities (except Singapore) had slightly decreased for both men and women, although in the early 2000s it even slightly increased and still remains quite high (Figure 3).

Table 2. Standardised death rates in some megacities, 1990, 2000, 2010, 2013, per 100,000

Megacity	Men				Women			
	1990*	2000	2010	2013**	1990*	2000	2010	2013**
Berlin	1197.6	890.4	696.1	707.6	744.8	538.1	463.9	460.4
Hong Kong	852.7	690.7	580.9	523.3	531.1	405.1	325.4	293.6
London	1001.6	833.5	635.7	589.0	348.0	315.6	253.8	240.6
Los Angeles	956.0	798.5	649.3	614.4	570.7	510.2	411.2	398.2
Moscow	1617.2	1605.3	1120.5	922.2	922.9	864.4	664.7	541.0
New York	918.6	833.5	642.4	611.5	603.8	561.3	446.3	433.1
St. Petersburg	1632.4	1947.2	1409.0	1176.2	924.0	988.7	738.7	642.9
Singapore	1017.0	797.0	609.8	566.0	699.3	538.3	385.6	366.3
Tokyo	770.9	657.9	562.9	528.5	619.0	562.6	460.8	428.3

Note: Los Angeles 1995, New York 1997, Los Angeles 2012.

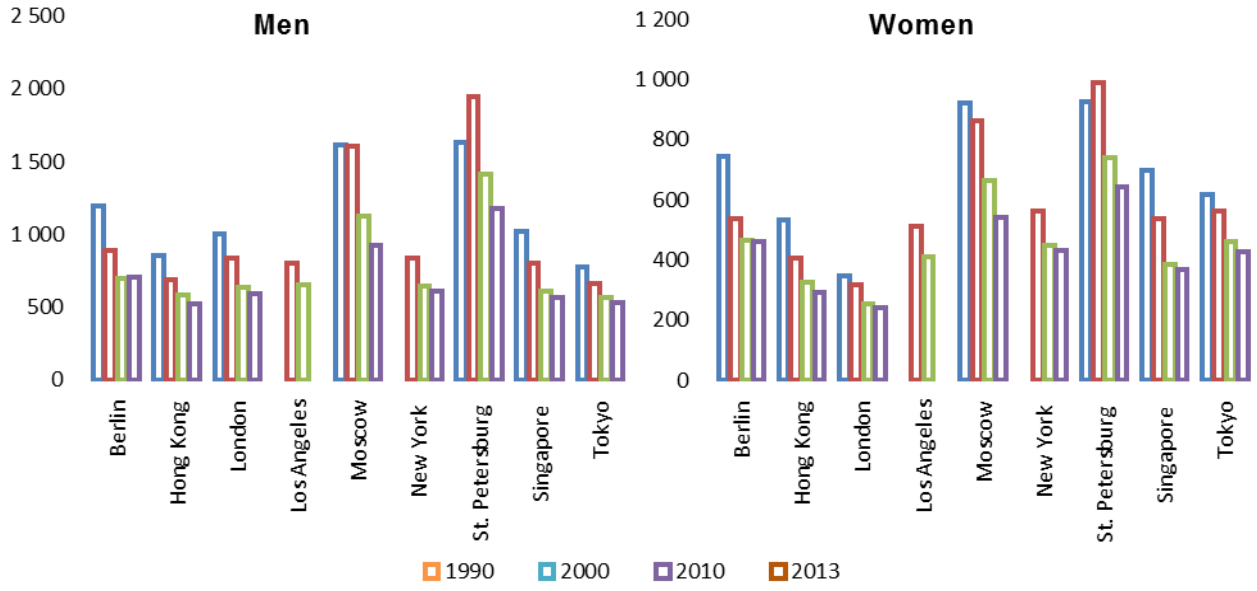

Figure 3. Standardised death rates in 7 megacities, 1990, 2000, 2010, 2013

Note: Los Angeles 1995, New York 1997, Los Angeles 2012.

So which causes of death distinguish mortality in Moscow from that of other megacities, which causes in the last 25 years have determined the reduction in mortality in Moscow, and due to what causes has mortality in other megacities been falling?

On the whole, for the period under consideration the main classes of causes of death in Moscow, as well as their ranking in importance, have not changed (Figure 4).

Throughout the entire period, the largest contribution to mortality in Moscow among both men and women came from diseases of the circulatory system (DCS). Over 25 years, the share of this class decreased somewhat (by 7.5 percentage points for men and 7.3 points for women). Second place among both men and women belongs to neoplasms. Moreover, for women the contribution of this class to total mortality increased by 3.8 percentage points by 2014. In third place in Moscow comes "external causes of death", whose share remained fairly stable. Calling for special attention is the collective group of causes "Other causes", which includes all other classes not detailed on Figure 4. The contribution of this group of causes to the SDR grew 2 times for men and 1.5 times for women. A significant proportion of the group, especially in Moscow and Berlin, is represented by the class "symptoms, signs and ill-defined conditions", including such causes of death as senility, sudden infant death syndrome, death from unknown causes and other symptoms and ill-defined conditions. Beginning in 2012, in Moscow the diagnosis "symptoms and ill-defined conditions" came to be more widely used when coding the cause of death; as a result, in 2013-2014 the SDR from unidentified causes among both men and women became even greater than from external causes. Given the level of pathological anatomical service in Moscow, we are inclined to assume that such a relationship can only be explained by the fact that the category "symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified" is often replaced by another, usually "injuries with unknown intent".

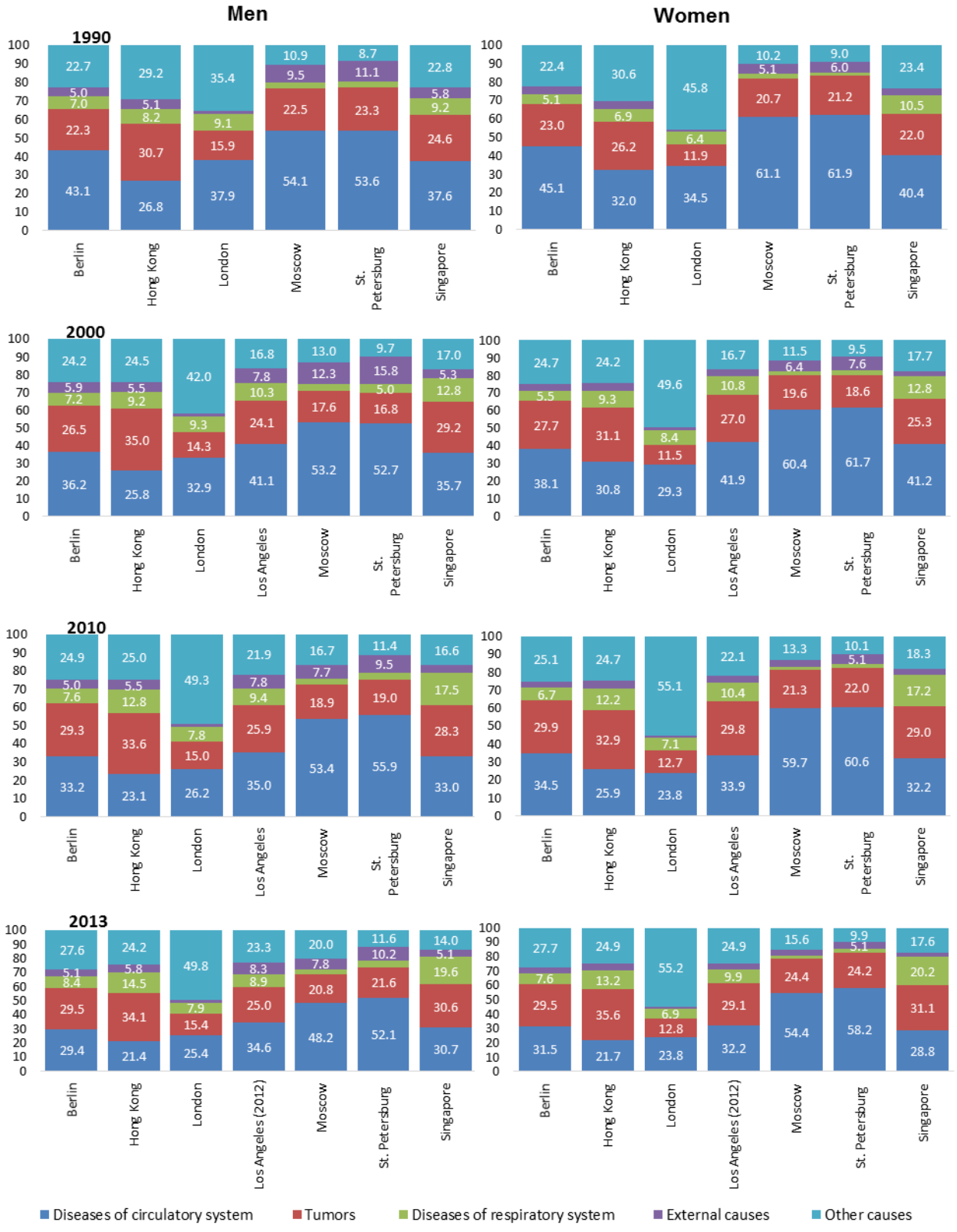

Figure 4. Structure of the standardised death rates by cause of death in 7 megacities, 1990, 2000, 2010, 2013, %

A comparison of mortality patterns by cause of death in Moscow and in selected megacities makes it clear that there are both similarities and differences among them (Figure 4). Everywhere, except in Hong Kong, most of the deaths are attributable to diseases of the circulatory system, with

neoplasms coming in second place. Moreover, the proportion of DCS is gradually decreasing, and that of neoplasms increasing. But there is not a single foreign megacity where the share of DCS has ever exceeded 50%. In all the foreign megacities examined here, however, in third place comes not external causes, but diseases of the respiratory system.

MORTALITY BY CAUSE OF DEATH

Diseases of the circulatory system

The overwhelming majority of deaths in Moscow are attributable to deaths from diseases of the circulatory system. Although the share of this class of causes in the standardised death rate from all causes has been decreasing, by 2014 it accounted for more than half the SDR among women (54%) and slightly less than half among men (47%). Over the last quarter century, the SDR from diseases of the circulatory system in Moscow has decreased among men by 2.1 times, and among women by 2 times. The decline has not, however, been constant over the whole period. In the 1990s, there was a jump in mortality from DCS – rather sharp among men and milder among women (Figure 5) – and it was precisely this jump which led to the growth of total mortality in Moscow in the early 1990s. In subsequent years a slow decline was observed. The exception is 2010, when the rise in mortality, triggered by intense heat and smog in the summer months, caused a spike in the indicator for the whole year [Shaposhnikov et al. 2014].

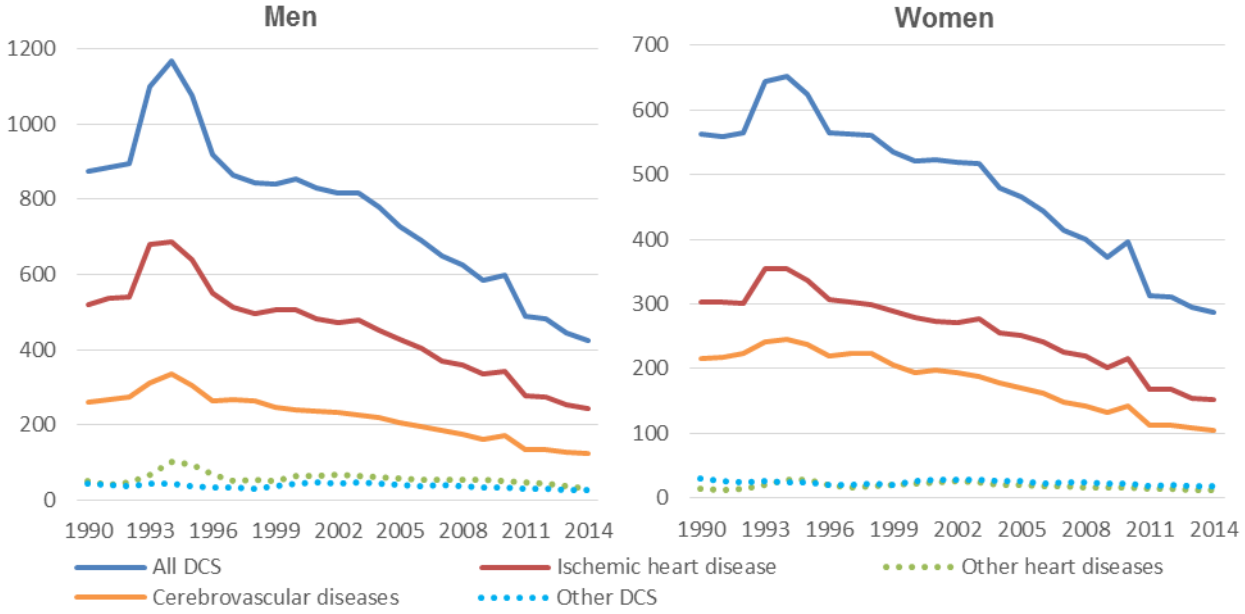

Figure 5. Standardised death rates by individual groups of diseases of the circulatory system and DCS in general, in Moscow, 1990-2014, per 100,000

Note: DCS – Diseases of the circulatory system.

The main contribution to mortality from diseases of the circulatory system comes from ischemic heart disease (Figure 5). Mortality from this cause has declined by about a factor of 2 over the last 25 years, but its contribution to total mortality from DCS has changed little and is 57-58% in men and 53-54% for women.

The second main group of causes of death from DCS is cerebrovascular diseases (strokes). From 1990 to 2014, mortality from strokes decreased by 2.1 times, but its contribution in mortality from DCS has not changed the structure of mortality from DCS in Moscow, which remains relatively stable. In addition to the groups "ischemic heart disease" and "cerebrovascular disease", the cause "other heart diseases" is often singled out. It sometimes happens that a reduction in mortality from ischemic heart disease is accompanied by a simultaneous increase in mortality from other diseases of the heart, but most often this simply indicates a change in the diagnosis of the cause of death, rather than a real change in the balance of causes. In Moscow, mortality from "other diseases of the heart" has changed little since 1990.

In Russia as a whole and in most of its regions, including St. Petersburg, changes in mortality from DCS were less favourable. Its decrease in St. Petersburg began only after 2003, and was preceded by a notable increase in the SDR. In contrast to Moscow, the reduction in mortality from coronary heart disease was accompanied by an increased SDR from other heart diseases (Figure 6).

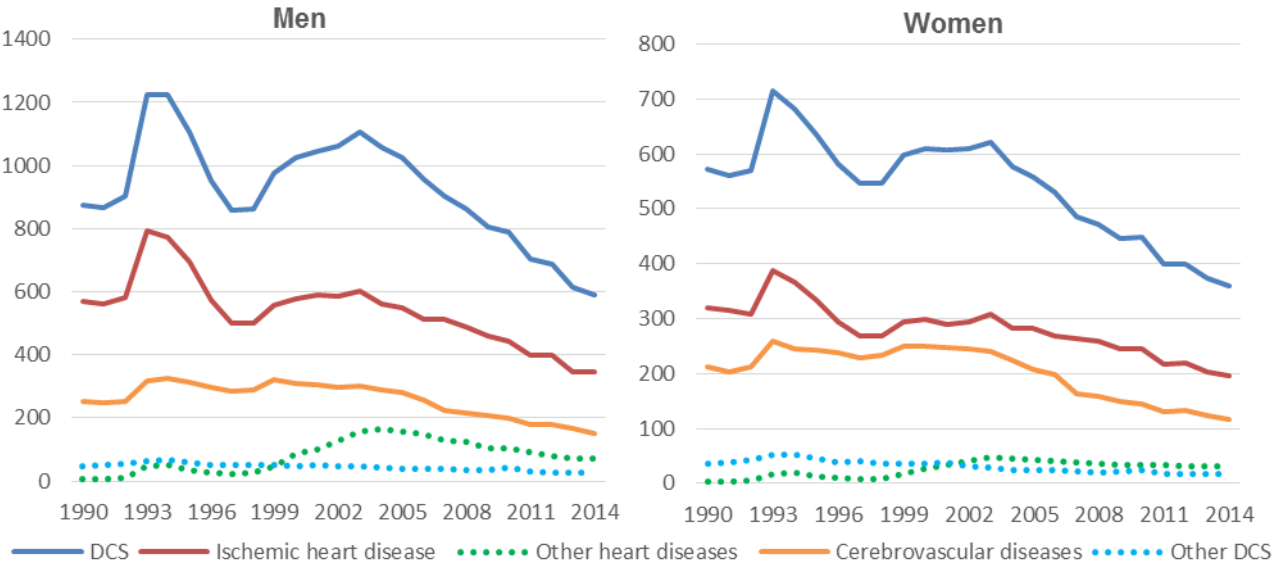

Figure 6. Standardised death rates by selected groups of diseases of the circulatory system and DCS in general in St. Petersburg, 1990-2014, per 100,000

Note: DCS – Diseases of the circulatory system.

Diseases of the circulatory system are the leading cause of death in all the selected megacities, but the level of mortality from DCS and from the causes included in this class is much lower than in Moscow, and even more so than in St. Petersburg and in Russia as a whole. At the same time, the pace of decline in mortality from DCS in Moscow has recently been comparable to other metropolitan areas under consideration, as shown in Table 3. So, for the period after 2000, the death rate from DCS among men in Moscow fell by 52%, and in other megacities by 54-65%, with the corresponding figures for women being 56% and 48-71%. For coronary heart disease, the reduction in the SDR for men in Moscow was 50%, and in other megacities 52-75%, with the figures for women being 55% and 41-72%, respectively. Finally, the reduction in mortality from cerebrovascular disease in men in Moscow was 52%, and in other metropolitan areas 54-68%, while for women it was 56% in Moscow and 47-78% in other megacities.

Table 3. Standardised death rates from all diseases of the circulatory system, ischemic heart disease and cerebrovascular disease, in 9 megacities, 1990, 2000, 2010, 2013, per 100,000

Megacity	Men				Women			
	1990*	2000	2010	2013**	1990*	2000	2010	2013**
Diseases of the circulatory system								
Berlin	516.1	322.2	231.0	207.9	335.8	205.1	160.2	144.9
Hong Kong	228.8	177.9	134.3	112.2	170.2	124.8	84.1	63.8
London	379.8	274.5	166.5	149.4	213.6	164.6	109.6	101.9
Los Angeles	No data	327.9	227.5	212.4	No data	214.0	139.4	128.2
Moscow	874.8	853.3	597.9	444.1	563.5	521.8	397.0	294.4
New York	No data	No data	No data	No data	No data	No data	No data	No data
St. Petersburg	875.5	1026.0	788.3	613.4	571.9	610.4	447.8	374.0
Singapore	382.8	284.7	201.2	173.7	282.7	221.7	124.3	105.6
Tokyo	No data	No data	No data	No data	No data	No data	No data	No data
Ischemic heart disease								
Berlin	219.1	150.3	105.9	90.2	107.6	76.8	57.2	44.2
Hong Kog	91.5	72.1	64.0	50.9	57.5	43.5	31.6	22.2
London	268.4	188.2	109.5	97.7	127.8	97.1	58.7	54.0
Los Angeles	269.4	217.0	137.1	126.1	164.8	129.9	72.7	63.7
Moscow	518.7	504.6	342.7	252.9	303.4	279.5	216.4	154.5
New York	355.0	321.1	212.7	189.3	246.1	220.9	146.3	130.6
St. Petersburg	569.4	579.1	442.9	348.1	319.6	298.8	244.5	203.1
Singapore	214.7	166.7	121.9	97.7	132.4	111.5	64.1	46.1
Tokyo***	143.9	93.6	77.6	70.2	92.2	56.4	45.0	40.7
Cerebrovascular diseases								
Berlin	90.0	45.0	34.7	29.7	72.5	32.9	27.9	24.3
Hong Kong	78.6	64.1	40.6	35.2	67.0	48.0	28.2	23.1
London	70.0	51.8	33.8	30.9	60.3	45.9	32.1	30.3
Los Angeles	51.5	48.0	30.6	27.3	43.1	40.7	24.8	23.7
Moscow	261.8	240.0	170.3	125.9	215.7	193.1	142.5	107.9
New York	29.5	24.8	17.5	16.8	24.6	20.9	15.4	16.4
St. Petersburg	254.0	310.5	200.0	166.6	212.9	248.8	145.1	123.4
Singapore	113.1	71.9	45.7	44.2	103.8	73.9	37.7	37.5
Tokyo	100.9	76.4	51.9	43.4	76.5	51.9	29.5	24.4

*Note: *Los Angeles 1995, New York 1997; **Los Angeles 2012; ***For Tokyo indicators are given for those dying from all heart disease, not only ischemic disease.*

What distinguishes Moscow from other megacities of the world is that the level of mortality from cardiovascular disease is still quite significant, which is probably due to the general backwardness of Russian health care. For example, the developed countries have developed and now use everywhere extremely effective but expensive methods of treatment of stroke and post-stroke rehabilitation. These methods, unfortunately, are not used by the Russian public health system, hence the above-noted difference between Moscow (Russian) and Western figures. And, of course, a very important factor is health-care spending, which, as we know, is currently shrinking.

Neoplasms

Mortality from neoplasms (mainly malignant neoplasms) is in second place in the structure of causes of death of Moscow inhabitants (for both men and women). The share of these causes in total mortality in 2014 was 21% in men and 25% women. The share of non-malignant neoplasms in Moscow, as well as in other cities, is small, and amounts to about 1% of all cancers in men and 1.5% for women. Therefore, it is usually mortality from malignant neoplasms that is analysed.

Compared with other causes, the differences in this kind of mortality between Moscow and St. Petersburg and other selected megacities are not so great, and by 2013 these differences had even slightly decreased due to a slower decrease in the indicators in other cities. Also notable during the period under review was the convergence of men's and women's mortality rates due to the faster pace of its decline in men.

Table 4. Standardised death rates from neoplasms in 9 megacities, 1990, 2000, 2010, 2013, per 100,000

Megacity	Men				Women			
	1990*	2000	2010	2013**	1990*	2000	2010	2013**
Berlin	267.2	235.6	203.7	208.6	171.4	149.1	138.9	135.9
Hong Kong	261.5	241.7	195.2	178.3	139.1	126.2	106.9	104.4
London	159.2	119.2	95.6	90.6	73.4	64.8	58.7	54.9
Los Angeles	No data	192.5	168.2	153.5	No data	137.7	122.4	115.9
Moscow	364.0	283.3	212.0	191.7	191.5	169.1	141.5	131.7
New York***	210.7	192.9	161.8	151.2	151.5	140.7	118.7	112.5
St. Petersburg	380.3	328.0	268.1	254.6	196.3	184.2	162.6	155.6
Singapore	250.1	232.8	172.4	173.3	154.2	136.4	111.6	113.9
Tokyo***	229.7	223.2	191.9	181.3	120.4	117.5	100.1	97.0

*Notes: *New York 1997; **Los Angeles 2012; ***Malignant neoplasms.*

Although the standardised death rate from cancer in Moscow is lower than in St. Petersburg and Berlin, it is much higher than in the other megacities taken for comparison (Table 4).

As in other megacities, the structure of mortality from neoplasms in Moscow differs between men and women (Figure 7).

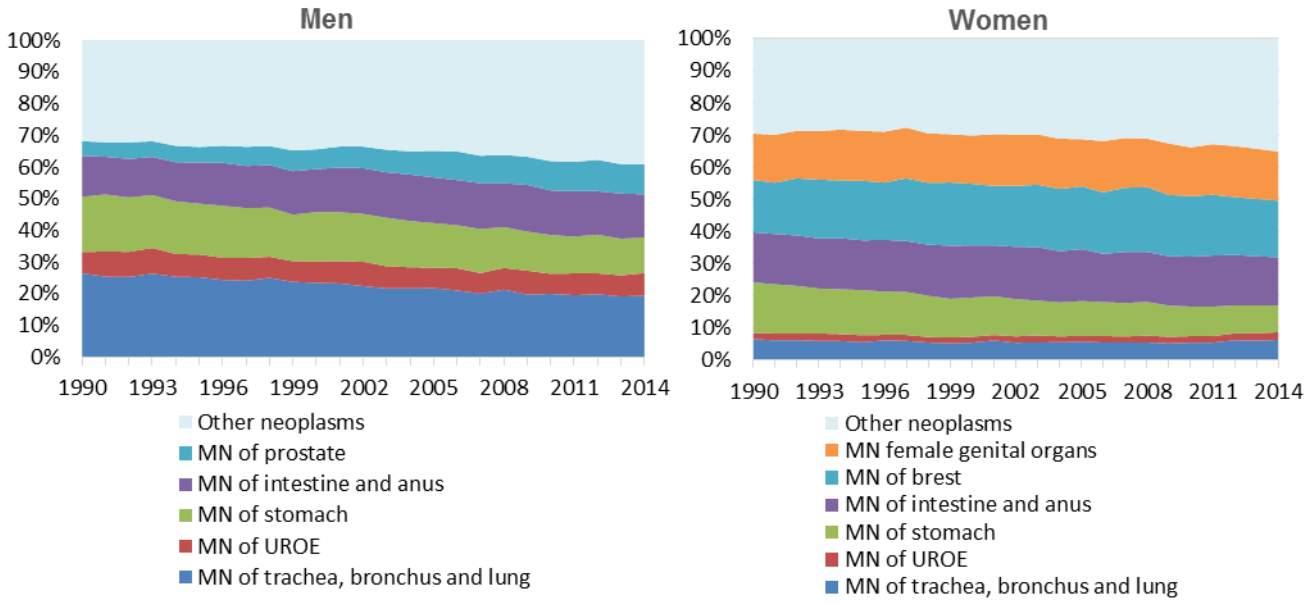

Figure 7. Structure of the standardised death rates from cancer in Moscow, 1990-2014, %

Notes: MN – malignant neoplasms; MT UROE – malignant neoplasms of the upper respiratory organs and the esophagus; other neoplasms also include benign neoplasms.

Over the past 25 years, mortality from neoplasms has declined steadily in Moscow, decreasing by 1.9 times among men, and by 1.5 times among women (Figure 8). St. Petersburg

too has seen a reduction in mortality from neoplasms, but the decline was much lower than in Moscow. As a result, the difference in mortality from neoplasms between the two Russian megacities has increased among both men and women.

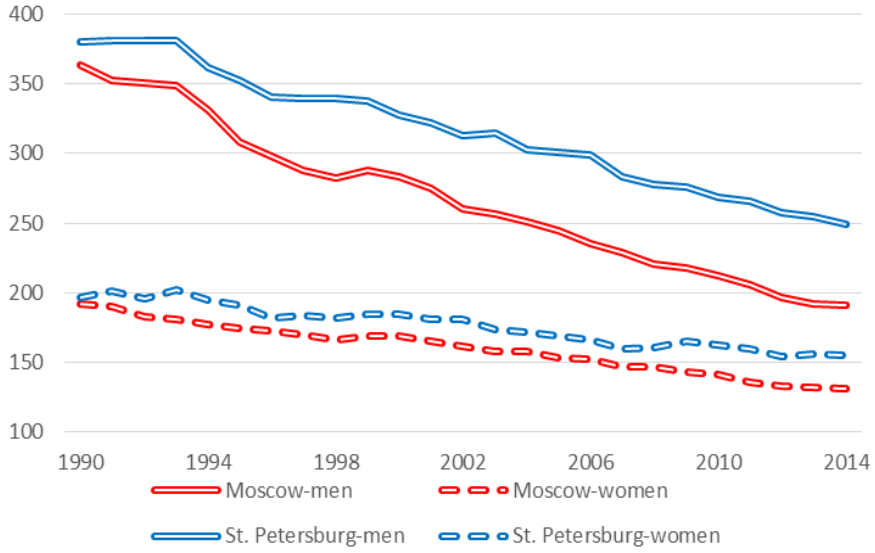

Figure 8. Standardised death rates from cancer in Moscow and St. Petersburg, 1990-2014, per 100,000

Neoplasms of the respiratory organs and the esophagus

Without including residual group of causes "other neoplasms", first place among all causes of male deaths belonging to the class of neoplasms (26.5% in 2014) goes to malignant neoplasms of the respiratory system and the esophagus. Among women, this category is ranked third. In this group we have included two subgroups of causes of death: malignant neoplasms of the trachea, bronchi and lungs, and malignant neoplasms of the upper parts of the respiratory system and the esophagus.

In comparison with the other megacities under consideration, mortality from malignant neoplasms of the trachea, bronchi and lungs among women in Moscow looks favourable (Table 5). For men at the beginning of the reporting period, the death rate from this cancer site was higher than in all foreign megacities. By 2013, its level had dropped by more than 2.6 times and was one of the lowest in these cities. Mortality from malignant neoplasms of the upper parts of the respiratory system and the esophagus does not show such big differences.

Among men, the proportion of deaths from these two cancer sites relative to all neoplasms is gradually decreasing. This is mainly due to the decrease in mortality from cancer of the trachea, bronchi and lungs (Figure 9). Mortality from cancer of the upper sections of the respiratory organs and the esophagus in the last 5 years has not changed. Among women, with a much lower level of mortality from neoplasms of the trachea, bronchi and lungs, it stopped declining in the mid-2010s, and mortality from neoplasms of the upper parts of the respiratory system and the esophagus stabilised at the level of the mid-1990s. In 2014, however, an increase in mortality from these cancer sites was recorded, for both men and women.

Table 5. Standardised death rates from cancer of the esophagus and respiratory organs in 7 megacities, 1990, 2000, 2010, 2013, per 100,000

Megacity	Men				Women			
	1990*	2000	2010	2013**	1990*	2000	2010	2013**
Malignant neoplasms of the trachea, bronchi and lungs (C33.C34)								
Berlin***	74.8	64.1	59.0	58.3	18.4	21.7	27.0	29.6
Hong Kong	88.2	79.9	60.1	54.2	36.2	29.5	24.1	24.2
London	86.7	58.9	43.7	41.0	27.9	25.2	24.1	22.9
Los Angeles	63.5	52.6	39.7	33.5	32.5	28.0	23.8	21.5
Moscow	96.2	66.3	42.3	36.6	12.5	9.2	7.6	8.0
St. Petersburg	104.1	82.9	59.6	56.7	13.8	10.8	10.5	9.5
Singapore	72.8	64.4	47.4	45.7	24.8	20.6	17.4	18.4
Malignant neoplasms of the upper respiratory organs and esophagus (C00-C15)								
Berlin	17.2	17.4	14.0	15.6	3.7	4.6	4.2	3.8
Hong Kong	34.1	24.5	16.3	14.6	7.6	5.6	3.6	3.5
London	14.0	14.1	12.5	11.7	4.9	4.7	4.1	3.9
Los Angeles	No data	10.0	9.0	8.4	…	2.7	2.4	2.3
Moscow	24.7	19.2	13.4	12.8	3.8	3.0	2.9	3.1
St. Petersburg	31.0	28.3	22.7	18.0	6.2	4.4	4.0	3.4
Singapore	31.9	21.8	14.5	14.1	9.6	5.4	3.8	3.2

*Notes: *Los Angeles 1995, **Los Angeles 2012.*** - in Berlin, also includes cancer of the larynx.*

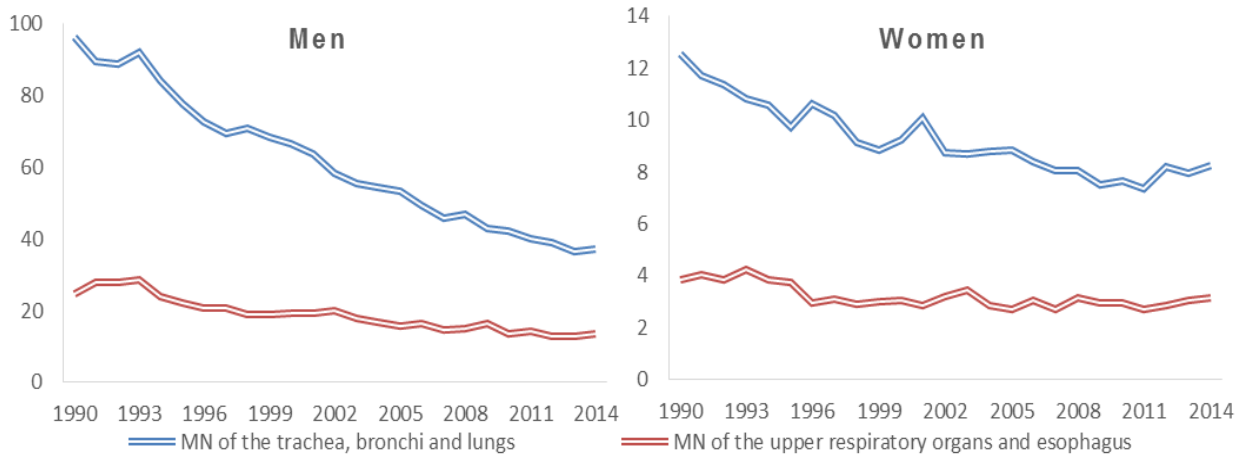

Figure 9. Standardised death rates from cancer of the esophagus and respiratory organs in Moscow, 1990-2014, per 100,000

In order to reduce mortality from cancer, it is important to detect the disease as soon as possible. Unfortunately, in Russia and its regions, including Moscow, almost half of the diagnoses in 2014 were made at stages III and IV of the disease [Kaprin et al. 2015: 23]. For cancer of the stomach, pancreas, liver, respiratory organs and esophagus, the proportion of diagnoses in the late stages was the highest [Kaprin et al. 2015: 60-149]. Our calculations, based on Ministry of Health data[4], show that in 2004 (the first year for which we have relevant data) the proportion of late diagnoses of malignant neoplasms of the trachea, bronchi and lungs was 67%, and by 2014 (the last year for which we have data) it rose to 74%. For cancer of the upper sections of the respiratory

[4] Here and below, data on the prevalence of neoplasms for the period until 2014 are taken from the state medical statistics (Form # 35 "Information on patients with malignant neoplasms for ... year").

organs and the esophagus, the proportion of late diagnoses in 2004 was even higher at 77%, but over the next 10 years decreased to 71%.

Neoplasms of the female breast and genital organs

Malignant neoplasms of the female breast and genital organs take first place in the structure of cancer mortality in women. In 2014 in Moscow, almost 33% of all deaths from cancer among women were due to this cause (18% for breast cancer and 15% for cancer of the genital organs). From 1990 to 2014, the dynamics of mortality from breast cancer among women, despite a tendency to decrease, were not uniform. During all the 1990s and the first half of the 2000s, significant fluctuations were observed in mortality from this cause, and only since the late 2000s has there been a steady decline (Figure 10).

Mortality from malignant neoplasms in both sites has almost always been slightly lower in Moscow than in St. Petersburg, but Moscow loses to foreign metropolises, particularly in mortality from malignant neoplasms of the female genital organs (Table 6). Standing out among all the megacities here considered is London, where the death rate from cancer of these sites, as opposed to malignant neoplasms of the respiratory system and the esophagus, is very low.

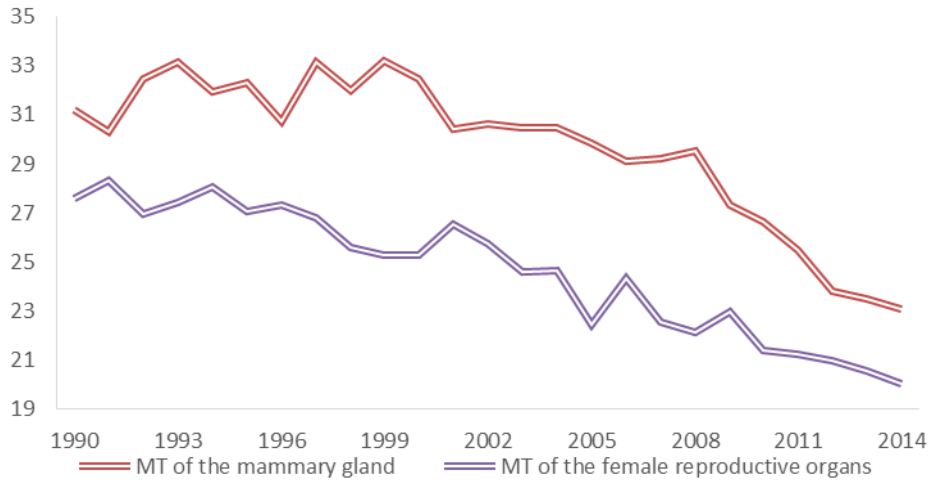

Figure 10. Standardised death rates from malignant neoplasms of the female breast and genital organs in Moscow, 1990-2014, per 100,000

Table 6. Standardised death rates from malignant neoplasms of female breast and genital organs in 7 metropolitan areas, 1990, 2000, 2010, 2013, per 100,000

Megacity	Malignant neoplasms							
	Female breast (C50)				Female genital organs (C51-C58)			
	1990*	2000	2010	2013**	1990*	2000	2010	2013**
Berlin	30.5	27.7	22.5	22.7	20.2	15.4	11.8	13.4
Hong Kong	12.0	11.8	12.2	11.9	12.1	9.3	9.8	9.9
London	11.2	9.3	7.5	6.8	5.6	4.9	4.0	3.8
Los Angeles	28.5	22.8	20.2	20.0	No data	17.0	15.5	14.3
Moscow	31.2	32.5	26.6	23.5	27.6	25.3	21.4	20.6
St. Petersburg	28.6	32.2	30.8	27.4	28.9	27.2	26.5	27.1
Singapore	20.0	18.8	19.0	20.8	16.9	16.1	12.3	12.6

*Notes: *Los Angeles 1995, New York 1997; **Los Angeles 2012.*

Unlike St. Petersburg, where the indicators have barely changed at all, in Moscow mortality from neoplasms of the two groups has decreased by 1.4 times over the last 25 years, with the main decline occurring in the past few years.

In Moscow, the reduction in mortality from breast cancer is accompanied by an increase in the number of diseases of this form of cancer. "These 'scissors' between the number of cases and deaths is definitely positive, and quite rare among the health indicators of the population of Russia" [Revich et al. 2014]. Yet in Moscow a large proportion of cancers of this site are detected only at stages III and IV: in 2014, the figure was 31% (34% in 2004), indicating a lack of effective prevention systems [Kaprin et al. 2015: 10-12]. On the other hand, the number of X-ray preventive breast examinations in Moscow has grown in recent years, rising from 236,000 in 2004 to 557,000 in 2014. Per 1,000 women over the age of 35, the number of such examinations rose from 70 in 2004 to 138 in 2014, almost doubling. These figures are far from ideal, but it is precisely the growth of such prophylactic examinations which became one of the factors of the mortality reduction from breast cancer [Axel 2012].

Mortality from malignant neoplasms of the female genital organs, despite a few swings, decreased slowly during the entire period. For 25 years, the death rate from cancer of the female genital organs, as well as from breast cancer, decreased by 1.4 times (Figure 11) in Moscow.

In most cases in Moscow, malignant neoplasms of the cervix uteri and corpus uteri are detected at their early stages. In 2014, 79% of the cases detected were diagnosed at stages I-II of the disease. But from 2004 to 2014 this proportion changed little (76% in 2004). While malignant neoplasms of the cervix uteri are detected in the early stages (69% in 2014 and 65% in 2004), ovarian cancer is mainly detected only in stages III and IV (66% in 2014 and 62% in 2004, i.e. there was no growth in the proportion of early diagnoses), resulting in high mortality from cancer of this site. Check-ups and ultrasound examinations play an important role in the diagnosis of malignant neoplasms of female genital organs, but, according to experts, the proportion of patients with cervical cancer detected in this way is increasing very slowly [Axel 2009].

About a quarter of the deaths from malignant neoplasms of the female genital organs in Moscow are due to cervical cancer. Meanwhile, in contrast to other malignant neoplasms, cervical cancer mortality can be reduced to minimum levels. Most developed countries have recently begun using a vaccination against human papillomavirus (HPV) to prevent deaths from this cause. Several types of this virus are considered to be the cause (to provoke the development) of the absolute majority of cases of cervical cancer; in the absence of HPV, cervical cancer does not occur. Modern doctors consider it necessary to vaccinate all girls and young women, starting at age 12, who have not yet become sexually active. In many developed countries in Europe and North America, these vaccines have become mandatory for girls in recent years. In developed countries, such vaccines can also be given to boys [WHO 2015; WHO 2014].

In Russia too, such vaccinations can be given, but in most regions the procedure costs money. Moscow is one of just a few regions in which the vaccine (optional) can be given for free. Since the late 2000s, the vaccine "Vaccination (girls) against human papillomavirus" has been

included in the annual regional calendar of preventive vaccinations[5], and is recommended for girls aged 13 years. The results of this vaccination are not immediately noticeable, as most mortality from cervical cancer occurs at the age of 35 and over.

Neoplasms of the digestive system

Second place in the structure of mortality from cancer in Moscow, among both men and women, belongs to malignant neoplasms of the digestive system. This group of causes of death comprises two subgroups: malignant neoplasms of the stomach and malignant neoplasms of the intestines and anal canal. In 2014, these accounted for 25% of all deaths from cancer among men and 23% among women.

As in previous cases, mortality from malignant neoplasms of the digestive system in Moscow is better than in the other Russian megacity – St. Petersburg – but worse than in foreign megacities, particularly when it comes to mortality from cancer of the stomach (Table 7). In 2013, mortality from stomach cancer in Moscow surpassed that in foreign megacities by 3 times on average. Among the megacities here considered, especially noteworthy is London, where mortality from malignant neoplasms of these sites is very low. It is also low in Los Angeles. The difference in the level of mortality from malignant neoplasms of the intestine and anal canal is less, but still quite large. Most likely, this is due precisely to the fact that in these places there have long been established systems of prevention and screening of these diseases.

Table 7. Standardised death rates from cancer of the digestive system in 7 megacities, 1990, 2000, 2010, 2013, per 100,000

Megacity	Men				Women			
	1990*	2000	2010	2013**	1990*	2000	2010	2013**
Malignant neoplasms of the stomach (C16)								
Berlin	20.9	13.7	8.9	8.4	12.0	6.1	4.9	4.0
Hong Kong	17.4	13.8	10.4	8.3	8.5	7.5	5.2	4.3
London	11.9	6.9	4.4	4.0	3.1	2.4	1.8	1.6
Los Angeles	No data	8.0	7.2	6.2	No data	4.4	3.7	3.5
Moscow	63.3	44.1	26.0	22.2	30.0	20.7	13.0	11.4
St. Petersburg	67.5	48.0	33.6	31.2	31.4	22.5	16.3	12.5
Singapore	31.4	20.1	12.1	10.9	15.1	12.2	6.3	6.3
Malignant neoplasms of the intestine and anal canal (C17-C21)								
Berlin	28.0	26.8	18.3	20.7	21.9	17.0	14.4	11.6
Hong Kong	25.4	26.4	25.2	24.0	16.7	18.0	15.4	15.3
London	19.4	15.8	13.9	13.5	12.4	10.1	9.1	8.4
Los Angeles	22.6	18.6	14.9	14.5	14.6	13.5	10.4	9.6
Moscow	47.0	38.6	29.9	27.3	29.8	27.4	22.0	20.2
St. Petersburg	48.1	46.2	37.3	34.6	32.4	33.1	24.1	24.7
Singapore	26.0	30.6	26.6	23.6	23.7	24.4	15.9	17.7

*Notes: *Los Angeles 1995, ** Los Angeles 2012.*

[5] Order of the Head of the Department of Health of Moscow from 16.01.2009 №9, "On the calendar of preventive vaccinations and the calendar of preventive vaccinations on epidemiological evidences". http://lawru.info/dok/2009/01/16/n765383.htm

Trends in mortality from the groups of causes considered here show both similarities and differences. What they all have in common is a reduction in the indicators over the period under review. Where they differ is in the rates of decline of these indicators.

Of all the cancer sites examined, mortality from stomach cancer showed the greatest decline – 2.9 times for men and 2.7 times for women (Figure 11). The share of this site in the total number of deaths from all neoplasms in the last quarter of a century has decreased by 6% among men and 7.5% among women.

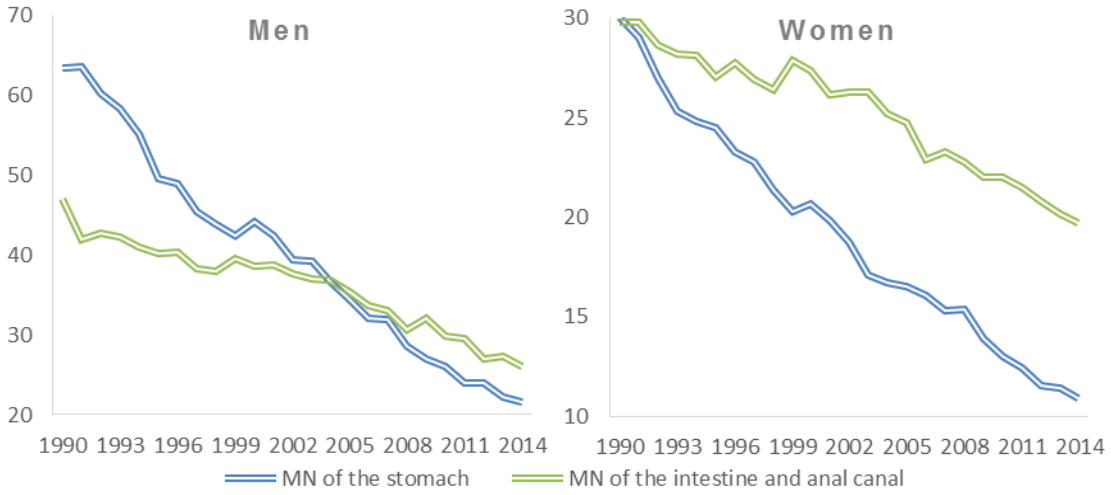

Figure 11. Standardised death rates from cancer of the digestive system in Moscow, 1990-2014, per 100,000

Stomach cancer has among the least favourable prognoses of any cancer site, and is characterised by the difficulty of early detection. The period between diagnosis and the moment of death is short: the median survival period of patients worldwide has for a long time remained at 7 months for both men and women (excluding posthumously diagnosed patients) and 5.7 months when taking into account posthumously diagnosed patients [Merabishvili 2013]. In Moscow, the proportion of cancer diagnoses made at stages III and IV increased from 55% in 2004 to 63% in 2014.

According to experts, the magnitude of the incidence of stomach cancer is linked to diet. The presence in the diet of sufficient vegetables and animal and vegetable proteins significantly reduces the risk of gastric cancer. The most vivid example is the US, where the incidence of stomach cancer has declined several times over in the past 90 years of healthy diet campaigns [Merabishvili 2013].

For a long time it was believed that there were no effective programmes for stomach cancer screening, as there is no clearly defined specific factor for this disease. But starting in the late 1980s, the microorganism Helicobacter pylori (HP) came to be considered just such a factor. The presence of this organism in humans dramatically increases the likelihood of stomach cancer [Wroblewski 2010]. Unfortunately, tests for HP are not included in screening programmes and clinical examinations.

One of the criteria for the quality control of cancer care is the indicator of reliability of statistics[6] [Kaprin et al. 2015: 11], which reflects, on the one hand, the level of recording of the disease, and on the other, progress in reducing mortality from specific sites. Since stomach cancer is characterised by a relatively short period between diagnosis and the moment of death, the reliability index also reflects the presence of the undercounting of patients with a given localisation (if the index is greater than 1). In Moscow (Table 8) in the last 10 years, this index has fluctuated around 1. In St. Petersburg, it is much less.

Table 8. Recording reliability index of malignant neoplasms of the stomach, 2004-2013

Year	Moscow		St. Petersburg	
	Men	Women	Men	Women
2004	1.01	0.94	0.86	0.86
2005	0.92	0.91	0.86	0.86
2006	0.94	0.98	0.86	0.86
2007	0.98	0.96	0.86	0.86
2008	0.86	0.92	0.86	0.86
2009	0.85	0.88	0.86	0.86
2010	0.92	0.89	0.86	0.86
2011	0.95	1.01	0.86	0.86
2012	0.99	1.03	0.86	0.86
2013	0.91	1.01	0.86	0.86

Source: Authors' calculations on the data of the Ministry of Health.

Unlike mortality from stomach cancer, mortality from malignant neoplasms of the intestine and anal canal is characterised by a very slow decline (by 1.8 times in men and 1.5 in women; Figure 11). Whereas in 1990 mortality for men from stomach cancer was higher than that from neoplasms of the intestine and anal canal, by 2014 the localisations had been reversed: mortality from cancer of the intestine and anal canal had become higher than from cancer of the stomach.

Prostate cancer

In men, third place in the structure of mortality from neoplasms is occupied by prostate cancer (C61). The death rate from prostate cancer in Moscow and St. Petersburg throughout the whole period remained much higher than in the foreign cities considered, although the latter (except for London and Los Angeles) did show a tendency to increase some in the index (Table 9).

Trends in mortality from prostate cancer in Moscow are not like those from other locations: from the beginning of the 1990s and until 2006, the SDR grew, and then began a slow decline (Figure 12). As a result, by 2014 mortality from prostate cancer was higher than in 1990. Over the period from 2004 to 2014, the proportion of this cancer detected at stages III and IV decreased from 49% to 30%.

[6] The number of patients who died within the first year after diagnosis from the previous year, to the number of patients in whom the tumor process was identified at stage IV after the diagnosis was made from the ones registered the previous year.

Table 9. Standardised death rates from cancer of the prostate in 7 megacities, 1990, 2000, 2010, 2013, per 100,000

Megacity	1990*	2000	2010	2013**
Berlin	5.0	6.9	7.5	7.6
Hong Kong	5.0	6.9	7.5	7.6
London	3.3	3.2	2.9	2.7
Los Angeles	No data	20.0	17.1	14.1
Moscow	17.1	17.6	19.6	17.8
St. Petersburg	14.8	18.3	21.4	22.1
Singapore	8.0	11.4	8.7	11.3

*Notes: *Los Angeles 1995, **Los Angeles 2012.*

Screening for prostate cancer, like for breast cancer, started in Moscow in 2002-2004, after the issuance of the Order of the Health Committee of Moscow №50 dated 06.02.2002, "On the implementation of the programme 'Targeted clinical examinations of the population of Moscow for 2002-2004' (Sub-programme 'Targeted clinical examinations of the male population for the detection of diseases of the prostate')". After that, all mass medical examination programmes came to include similar subprogrammes. Moscow's current targeted Programme, "Capital Health Care", includes the subprogramme "Targeted clinical examination of the male population for early detection of prostate disease". But, judging from the mortality rates, the effectiveness of these programmes is not very high.

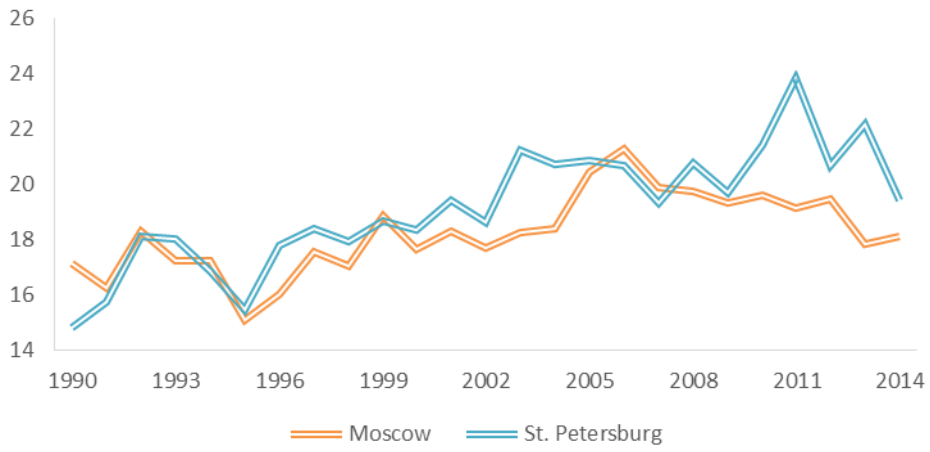

Figure 12. Standardised death rates from prostate cancer in Moscow and St. Petersburg, 1990-2014, per 100,000

In St. Petersburg, trends in mortality from prostate cancer until 2008 were very close to those in Moscow. The difference is in the growth of these indicators in the early 2010s. A number of experts explain such differences in the country's regional mortality by "the age structure and the degree of reporting reliability" [Merabishvili et al. 2014], although it is not clear how the age structure affects the standardised indicators.

External causes of death

External causes rank third in the mortality structure in Moscow. For a quarter century, the dynamics of the SDR from this class of causes were similar for men and women, despite a large difference in mortality. The growth of the SDR in the years 1990-1994 is mainly associated with

the termination of the anti-alcohol campaign, but is also a direct result of the deep economic crisis affecting all post-Soviet countries [Shkolnikov et al. 2001, Andreev 2002].

The "spike" of 1998-2001 is most likely linked to Russia's transition to the 10th revision of the International Classification of Diseases (ICD-10), which was accompanied by the transfer of responsibility for coding causes of death from statistical offices to the physicians (in the case of external causes – forensic experts) establishing the cause of death. Officially, Russia switched to the ICD-10 in 1999, but Moscow really did so only in 2000 [Danilova 2015]. In general, during 1990-2014 mortality from external causes in Moscow declined 2.1 times for both men and women (Figure 13).

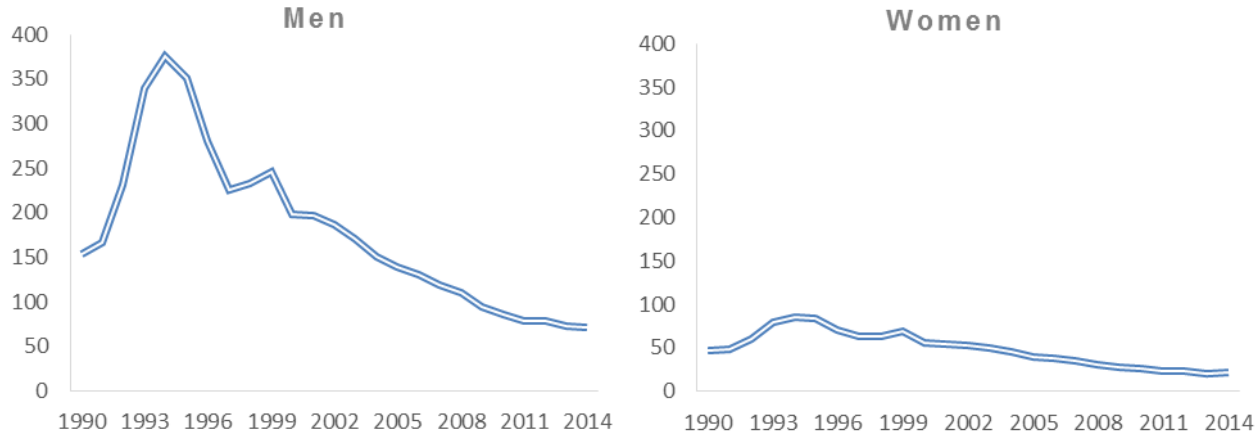

Figure 13. Standardised death rates from external causes of death in Moscow, 1990-2014, per 100,000

Nonetheless, the levels of mortality from external causes in both Moscow and St. Petersburg greatly surpassed and still surpass those in foreign megacities (Figure 14). In the year 2000, the SDR for men was 15 times higher – and in 2013, 8 times higher – than the minimum levels for these megacities, while for women the differences were 8 and 4 times, respectively.

The structure of mortality within the class of external causes of death in foreign megacities is very different from that in Moscow and St. Petersburg (Figure 15, Table 10). The main contribution to mortality from external causes in many of them, as in Moscow, comes from other external causes, but in general, pairwise comparisons reveal a rather mixed picture.

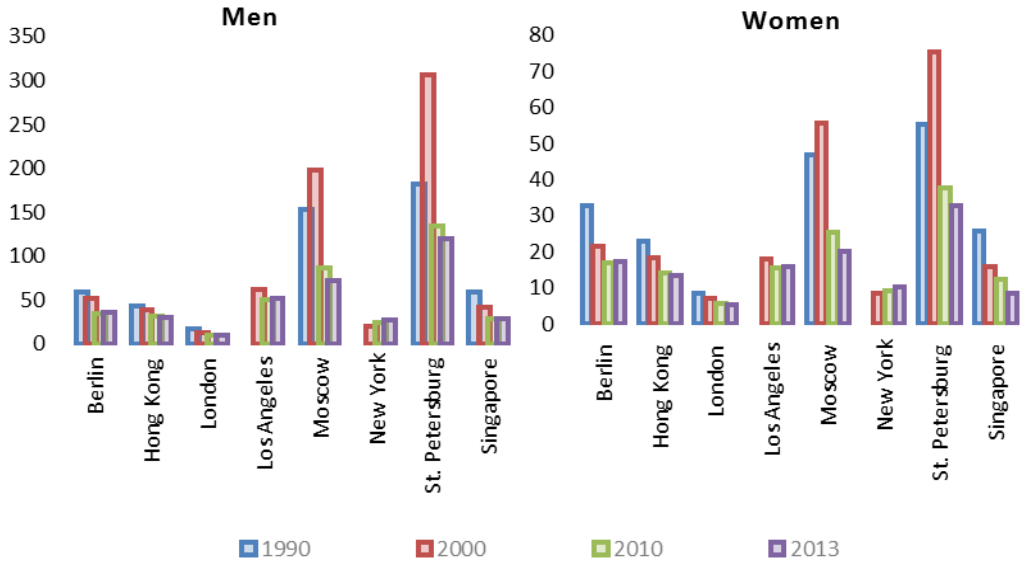

Figure 14. Standardised death rates from external causes of death in 8 megacities, 1990, 2000, 2010, 2013, per 100,000

Note: Los Angeles – 2012.

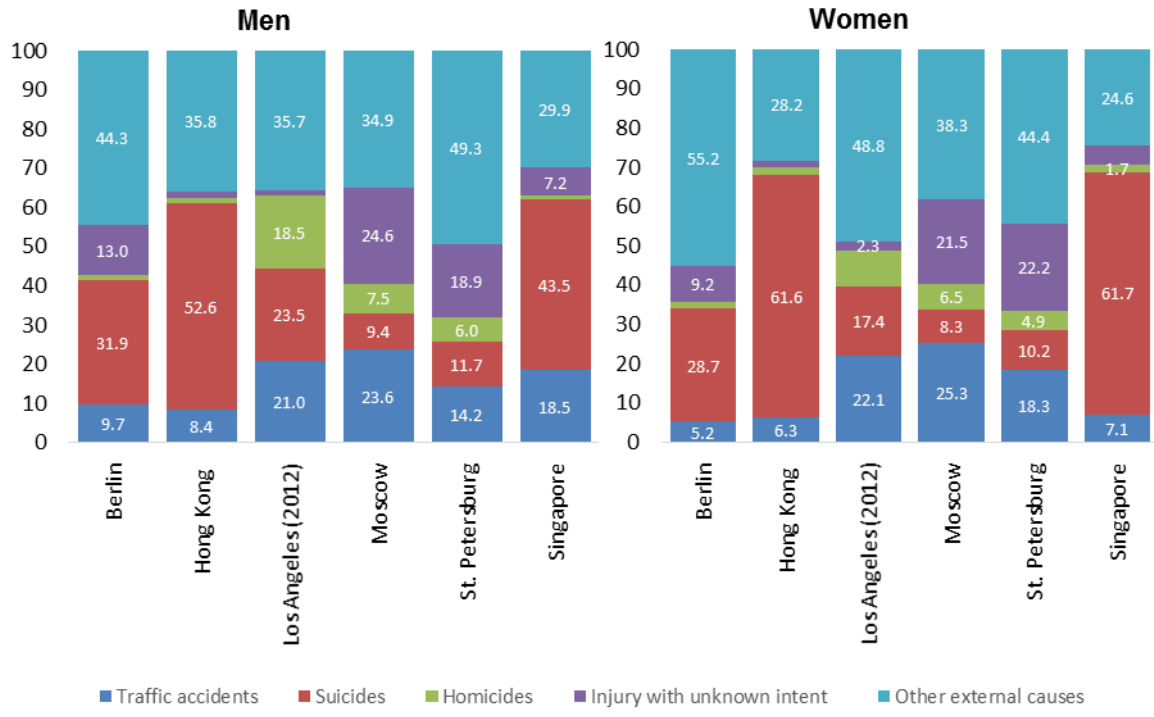

Figure 15. The structure of the standardised death rates of external causes of death in groups of causes in some megacities, 2013, %

Moscow and St. Petersburg clearly surpass other megacities in mortality from road traffic accidents, but are far from the worst in terms of mortality from suicide and homicide.

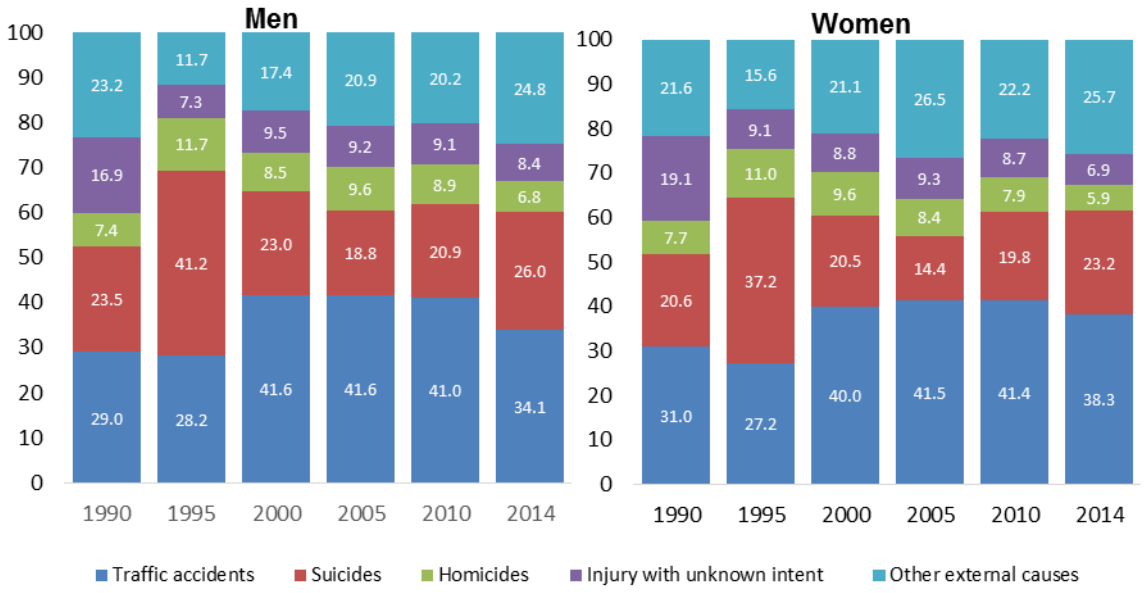

Figure 16. Structure of standardised death rates from external causes in Moscow, 1990-2014, %

Table 10. Standardised death rates from road traffic accidents, homicides and suicides in 8 megacities, 1990, 2000, 2010, 2013, per 100,000

	Men				Women			
Megacity	1990*	2000	2010	2013**	1990*	2000	2010	2013**
				Traffic accidents				
Berlin	13.7	7.1	2.7	3.5	5.2	3.0	2.2	0.9
Hong Kong	9.1	3.9	2.9	2.6	5.1	1.9	0.9	0.8
London	6.6	4.5	3.3	2.8	1.9	1.3	1.0	0.8
Los Angeles	17.5	13.4	9.0	10.9	6.8	5.6	3.8	3.3
Moscow	35.5	34.5	17.3	17.0	10.1	11.7	5.7	5.1
New York	10.1	6.8	4.8	5.1	4.3	3.2	1.9	2.0
St. Petersburg	33.7	38.5	16.9	17.0	10.9	13.4	6.4	6.0
Singapore	16.5	10.0	6.4	5.3	4.7	2.1	2.1	0.6
				Suicides				
Berlin	20.4	18.5	13.6	11.5	9.9	6.7	4.6	5.0
Hong Kong	15.0	16.1	16.5	15.9	10.8	10.0	8.4	8.3
London	6.0	4.2	2.9	2.5	4.2	2.8	1.8	1.5
Los Angeles	18.6	12.7	12.5	11.9	3.8	3.0	2.9	2.1
Moscow	25.8	18.7	7.8	6.7	8.9	4.9	2.2	1.7
New York	10.5	8.6	8.7	8.9	3.5	2.2	2.6	3.0
St. Petersburg	30.8	29.0	16.6	14.0	8.5	7.0	3.7	3.3
Singapore	17.8	13.7	10.4	12.5	12.6	6.6	4.9	5.2
Tokyo	17.4	28.1	25.5	22.6	9.8	11.4	11.4	11.1
				Homicides				
Berlin	1.9	1.1	0.4	0.4	1.5	0.8	0.4	0.3
Hong Kong	2.6	0.9	0.5	0.5	1.3	0.9	0.6	0.3
Los Angeles	18.2	16.5	9.9	9.7	4.9	2.9	1.9	1.4
Moscow	11.3	16.9	7.6	5.4	3.6	5.3	2.0	1.3
New York	17.3	14.5	10.5	6.5	3.4	2.7	2.0	1.3
St. Petersburg	12.2	29.3	11.1	7.1	4.2	9.0	3.3	1.6
Singapore	1.7	1.6	0.6	0.3	1.1	0.6	0.1	0.1

*Notes: *Los Angeles 1995, New York 1997: **Los Angeles 2012.*

The structure of mortality from external causes has changed over time in Moscow. But the essential has remained constant: the main contribution is made by two groups of causes, "Events of undetermined intent" (EUI) and the residual group of causes "other external causes" (Figure 16).

In third place in Moscow are transport accidents, accounting in 2014 for 24.8% of mortality from external causes among men and 25.7% among women. The bulk of the deaths due to transport accidents in Moscow and other megacities is associated with road accidents. Over 25 years, mortality from transport accidents has decreased by a factor of 2 for men and 1.8 for women (Figure 17). This decrease occurred in waves. The first wave ended with a minimum in 1998, followed by a new rise and a new fall. In 2007, the 1998 level was reached, after which the decline continued until the early 2010s, when the indicators stabilised. Trends in mortality from road accidents in Moscow differ little from those nationwide [Fattakhov 2015].

Despite the reduction, the mortality rate from transport accidents in Moscow and St. Petersburg is much higher than in foreign megacities (Table 9), where mortality from this cause is decreasing much faster than in the two Russian cities. As a result the gap between Moscow and St. Petersburg and other megacities considered here has grown over the last quarter century.

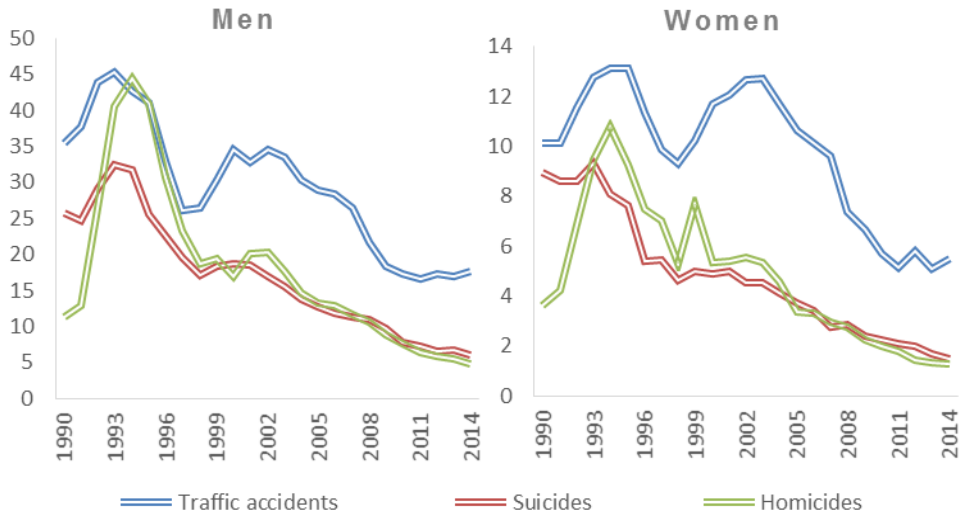

Figure 17. Standardised death rates from road traffic accidents, homicide and suicide in Moscow, 1990-2014, per 100,000

In Russia as a whole and in many regions, programmes are being set up to reduce mortality from a number of causes. A large part of these programmes is aimed at reducing mortality from traffic accidents. So, to implement the measures of the first phase of the Conception of Demographic Policy of the Russian Federation for the period up to 2025 (2007-2010), by order №170-r of the Russian Government of February 14, 2008, an action plan was approved for 2008-2010, including a set of measures for the prevention, diagnosis and treatment of cardiovascular disease, as well as for ensuring the provision of timely and high-quality medical care for victims of traffic accidents. In recent years, the rules of road safety have changed somewhat. At the end of 2013, D.A. Medvedev signed the Russian Federation Government Resolution №864 dated October

3, "On the federal target programme 'Improving traffic safety in 2013 – 2020'"[7], which is included in the list of priority federal programmes for 2015.

This programme, it is declared, will by the year 2020 result in "8,000 fewer deaths (28.82%), including children, due to road accidents than in 2012"[8]. But, judging by the dynamics of mortality from traffic accidents, in Moscow these programmes have not been achieving visible results in recent years.

The next most important cause of death contributing to overall external mortality is suicide. In Moscow, the share of this cause in 2014 accounted for 8.4% of all deaths from external causes of death for men and 6.9% for women. Over 25 years, the SDR from suicide in Moscow decreased by 4.3 times among men and by 6.1 times among women. The decline began after the rise of the SDR in the early 1990s and went on evenly until the end of the period. Perhaps this is the highest rate of decline over the years considered. However, according to experts, the number of deaths due to suicide in Russia is underestimated. Some of these deaths are categorised as other causes, but more often are attributed to events of undetermined intent; it is estimated that some 20% of all suicides in Russia are put into this group [Andreev et al. 2015]. Analysis of the death certificates of working-age Moscow men and women who died from injuries and poisoning also showed that Moscow is no exception [Semenov, Antonova 2007]. However, this phenomenon is not only a Russian problem, but a worldwide one [Vasin 2015].

It may be due precisely to significant underreporting that mortality from suicide in Moscow and St. Petersburg is often lower than in foreign megacities; in contrast, the proportion of deaths and the standardised death rate from causes of unknown intent are also significantly higher in Moscow (Figures 15 and 16, Table 9).

Unfortunately, unlike for road accidents, Russia has no programmes aimed at reducing mortality from suicide. Moscow's prospects from this point of view look better. According to the State Programme of the City of Moscow for 2012-2016, "Health care development in the city of Moscow (Capital Health Care)", by the end of 2016 suicidological consulting rooms are to be opened in outpatient clinics and mental clinics.

Like the number of suicides, the number of deaths resulting from *homicide* is also underreported. Some homicides are likely to be classified as accidents, but more often they are coded as events of undetermined intents. It is estimated that these account for approximately 35-40% of all homicides in Russia [Andreev et al. 2015].

According to official figures, between 1990 and 2014 mortality from homicide in Moscow, having ended its period of expansion, decreased 2.3 times in men and 2.8 times in women (Figure 18). After the spike in mortality from homicide in the early 1990s, further decline was almost linear. Mortality from homicide in Moscow is lower than in Los Angeles and New York, but significantly higher than in all the other foreign megacities. In the EU-15, the level of mortality as a result of homicide is almost 9 times higher for men and 5.5 times lower for women than in Moscow.

[7] http://www.rg.ru/2013/10/08/bezopas-site-dok.html
[8] http://fcp.economy.gov.ru/cgi-bin/cis/fcp.cgi/Fcp/ViewFcp/View/2015/409/

Almost a quarter of male deaths due to external causes and more than 21% of female deaths are classified as injuries with unknown intent. According to the principles of ICD-10, this group includes cases where the available information is insufficient for experts to conclude whether the event happened as the result of an accident, self-harm or violence. The main difficulty is to correctly assess the available information. An analysis by S.A. Vasin of publications on the subject showed that, for various reasons, in all developed countries there are cases where the available data are sufficient to classify them as suicides or accidents, yet which are nonetheless classified as EUI [Vasin 2015: 91-92]. In Russia, where mortality from homicide is already high, homicides too are classified as EUI [Ivanova et al. 2013].

The proportion of deaths from EUI in Moscow is significantly higher than in all foreign megacities, and the SDR for all deaths classified as EUI is about three times higher. Comparison with the EU-15 countries showed that the SDR for all deaths classified as EUI in Moscow is 9 times higher for men and 6 times for women. This may be linked to the fact that the data for mortality in Moscow include virtually no repeated medical certificates of death "instead of a preliminary one" and "instead of a final one" which are meant just to clarify the initially established cause of death.

In Moscow, the SDR for EUI grew significantly in the early 1990s, and then in the mid-1990s began its slow and inconsistent decline. In the early 2000s, along with the transition to the ICD-10 and the handing over of coding the cause of death to the doctors establishing the cause of death, the proportion of EUI in Russian mortality fell sharply, but the proportion of deaths of unknown cause also suddenly and inexplicably increased [Ivanova et al. 2013]. S.A. Vasin has shown that if we sum up EUI and all unknown causes of death except for the cause "old age", it turns out that mortality from this group in Moscow hardly reacted at all to the transition to the ICD-10 [Vasin 2015: 103-104].

We conducted a similar calculation for Moscow, taking the EUI and the entire ICD class of "Symptoms, signs, abnormal clinical and laboratory findings, not elsewhere classified" (hereafter: ill-defined causes; Figure 18). The sum of EUI and ill-defined causes in men shows no tendency at all to decrease from 2000 to 2008, but afterward it decreases slightly; in addition, the number of deaths from just ill-defined causes again begins to grow after 2008.

The group called "other external causes of death" consists essentially of non-transport accidents. The estimated number of deaths from non-transport accidents in Russia is under-reported by 15-20% as a result of their being classified as EUI [Andreev et al. 2015].

Mortality from other external causes in Moscow is more than 2 times lower for men, and 1.6 times lower for women, than in St. Petersburg. For women, this level is about the same as in foreign megacities, while for men it is 1.4-3 times higher. But in its contribution to overall mortality from external causes, Moscow does not stand out from other cities for either men or women (Figure 15 and 16).

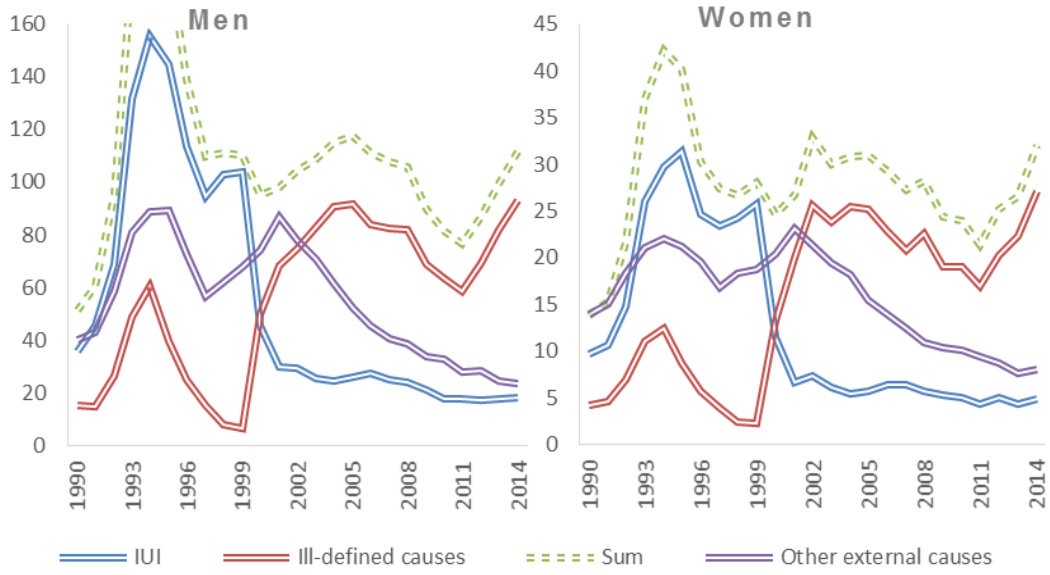

Figure 18. Standardised death rates from injury with uncertain intent, ill-defined causes and "other external causes" in Moscow, 1990-2014, per 100,000

Note: EUI – Injury of unknown intent.

After 2000, among other external causes in both Moscow and foreign megacities, the most common have been accidental falls – a fairly noticeable cause in the structure of causes of death among elderly persons.

In Moscow, such an important cause of death as accidental alcohol poisoning goes practically unregistered [Andreev 2016], a fact which undoubtedly distorts the real structure of mortality from external causes.

Diseases of the respiratory system

Diseases of the respiratory system occupy fourth place in the structure of causes of death in Moscow (Figure 24), whereas in foreign megacities these causes are in third place.

The standardised death rates from respiratory diseases in Moscow and St. Petersburg have been and remain below those in other megacities (Figure 19); this in itself is not an advantage, because in Russia the average age of death from this cause is fairly low, whereas in developed countries it is often higher than from diseases of the circulatory system.

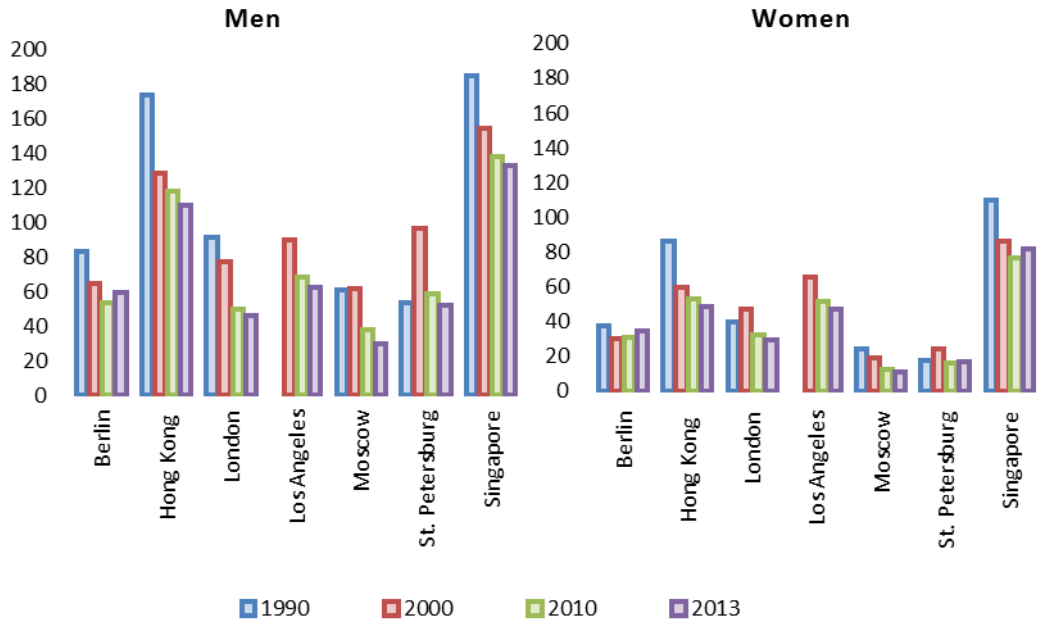

Figure 19. Standardised death rates from respiratory diseases in 7 megacities, 1990, 2000, 2010, 2013, per 100,000

Note: Los Angeles – 2012.

The main contribution to mortality from respiratory diseases until the mid-2000s came from deaths from pneumonia and bronchitis. After 2005, Moscow succeeded in reducing mortality from bronchitis to a minimum, but pneumonia now accounts for almost 60% of all deaths from respiratory diseases. From 1990 to 2014, the SDR from respiratory diseases in Moscow decreased 2.1 times among men and 2.5 times among women (Figure 20). In its dynamics, the same periods stand out as in the dynamics of the SDR from diseases of the circulatory system and most external causes: a rise in the early 1990s, a peak in 1994, a reduction and trough in 1998, a new rise and – after 2003 – a steady decline. The only variation is in the last maximum point: 2001 for men and 2002 for women.

Deaths from pneumonia in all megacities examined constitute no less than 35% of all deaths from respiratory diseases. In Singapore, the proportion of pneumonia was 74% among men and 91% among women, and deaths from respiratory diseases account for more than 20% of all deaths. New York statistics do not include data for the whole class of diseases of the respiratory system, only data on pneumonia and chronic obstructive pulmonary disease. Compared to these megacities, the mortality rate from pneumonia in Moscow is the lowest (Table 11), but one must take into account that, in developed countries, those who die from pneumonia are mostly elderly people (very elderly, one might say), who almost always suffer from more than one disease at the time of death. What cause will be listed on the death certificate as the main one and thus fall into the statistics depends on the rules for selecting the underlying cause of death in that particular country and region.

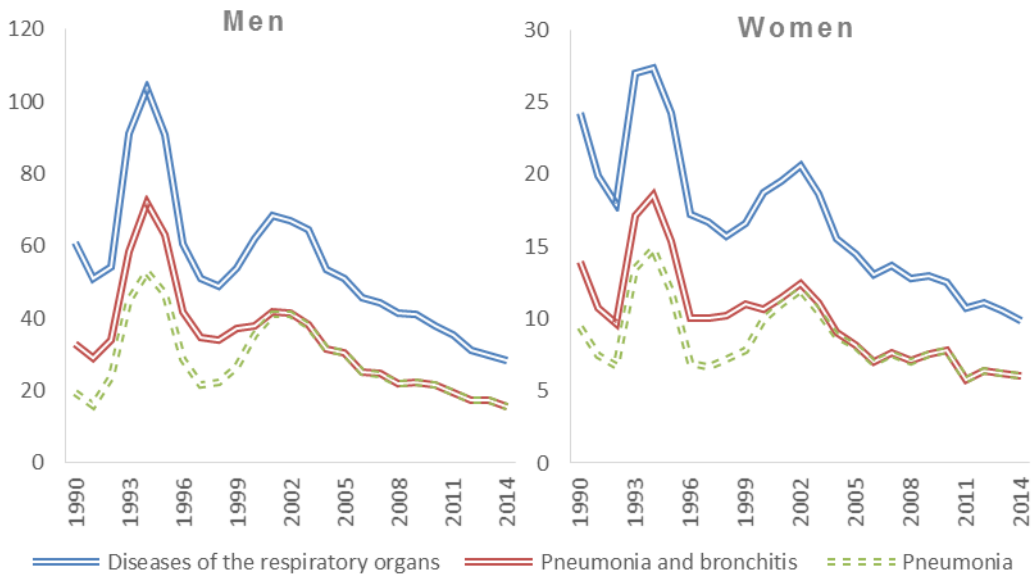

Figure 20. Standardised death rates from respiratory diseases in Moscow, 1990-2014, per 100,000

Table 11. Standardised death rates from pneumonia in 8 metropolitan areas, 1990, 2000, 2010, 2013, per 100,000

Megacity	Men				Women			
	1990*	2000	2010	2013**	1990*	2000	2010	2013**
Berlin	24.8	22.2	20.8	20.6	13.8	10.4	10.7	11.3
Hong Kong	69.6	63.4	73.3	75.3	36.5	37.5	39.3	38.7
Los Angeles	No data	39.1	27.8	26.9	No data	33.6	22.9	21.2
Moscow	19.5	35.4	21.5	17.2	9.4	10.0	7.8	6.2
New York	35.8	29.6	28.9	28.4	23.8	19.8	19.8	17.7
St. Petersburg	16.8	59.3	34.2	31.4	6.9	14.7	9.4	10.6
Singapore	92.9	102.2	106.2	111.0	72.9	68.6	66.2	73.8
Tokyo***	84.6	58.0	46.8	43.8	40.4	28.7	22.1	19.9

Notes: New York 1997; **Los Angeles 2012; ***pneumonia and bronchitis.*

Digestive system diseases

In Moscow in 2014, 4.3% of all male deaths and 4.2% of all female deaths resulted from digestive diseases. Over 25 years, the contribution of this class of causes of death to the SDR increased by 1 percentage point for men and 1.3 percentage points for women. The death rate from diseases of the digestive system from 1990 to 2014 decreased by 1.3 times among men and 1.2 times among women, and the actual decrease in the mortality rate from this class only began in 2008 (Figure 21). In St. Petersburg, the share of this class is no different from that of Moscow, and the mortality rate is slightly higher. In Berlin, the death rate from diseases of the digestive system is a little lower than in Russian cities. In other megacities, 2-4 times fewer people die from this class of causes of death (Table 12).

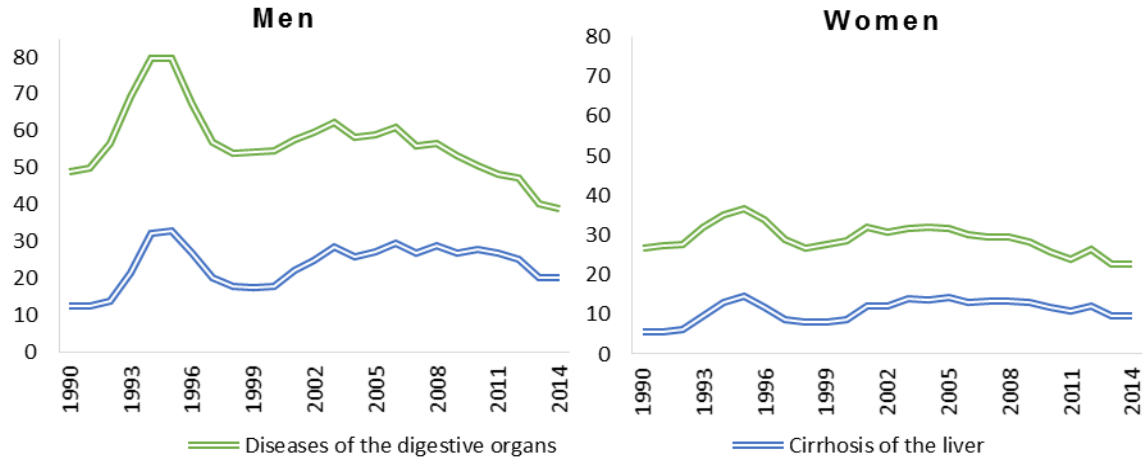

Figure 21. Standardised death rates from diseases of the digestive system and cirrhosis of the liver in Moscow, 1990-2014, per 100,000

The main contribution to mortality from digestive diseases comes from *cirrhosis of the liver*, whose mortality dynamics also determined the dynamics of the whole class. During the period from 1990 to 2014, the SDR from cirrhosis of the liver in Moscow grew by 40% among both men and women. Due to this, the contribution of cirrhosis increased from 26% to 52% for men and from 21% to 43% for women over 25 years. Mortality from cirrhosis of the liver in Moscow and St. Petersburg is several times higher than in foreign cities.

Table 12. Standardised death rates from diseases of the digestive system and cirrhosis of the liver in 7 megacities, 1990, 2000, 2010, 2013, per 100,000

Megacity	Men				Women			
	1990*	2000	2010	2013**	1990*	2000	2010	2013**
Diseases of the digestive system								
Berlin	59.6	47.0	36.7	36.8	36.4	28.0	25.1	20.3
Hong Kong	36.3	28.5	20.9	16.6	20.6	17.5	10.9	9.3
London	9.4	13.5	12.6	10.4	4.9	5.9	5.3	4.6
Los Angeles	No data	31.9	25.4	26.6	No data	18.4	14.1	14.1
Moscow	48.8	54.7	50.6	40.3	26.7	28.5	25.7	22.8
St. Petersburg	46.6	59.5	61.3	48.7	27.1	31.8	30.7	25.3
Singapore	30.5	15.0	13.4	11.4	14.9	10.6	9.9	8.2
Cirrhosis of the liver								
Hong Kong	10.3	10.5	4.4	3.4	4.2	5.0	2.1	1.5
London	8.8	13.0	12.1	10.1	4.8	5.8	5.2	4.5
Los Angeles	No data	4.7	2.7	3.3	No data	3.6	3.2	3.8
Moscow	12.5	17.8	27.8	20.1	5.5	8.6	11.9	9.5
New York	17.3	12.0	9.1	9.4	5.1	3.6	3.4	3.5
St. Petersburg	11.7	15.4	27.4	21.6	4.8	8.9	12.7	9.6
Singapore	11.6	5.3	4.3	3.0	3.5	2.8	2.4	2.2

*Notes: *New York 1997; **Los Angeles 2012.*

Certain infectious and parasitic diseases

The contribution of infectious and parasitic diseases to the standardised death rate from all causes in Moscow in 2014 was 1.7% for men and 1.1% for women. In 1990, these shares were even smaller – 1.1% and 0.5%, respectively. Since 1990, the SDR from infectious and parasitic diseases among men has barely changed, but among women it has grown, a growth which (albeit at a slow pace and in spurts) has continued since the beginning of the 2000s (Figure 22).

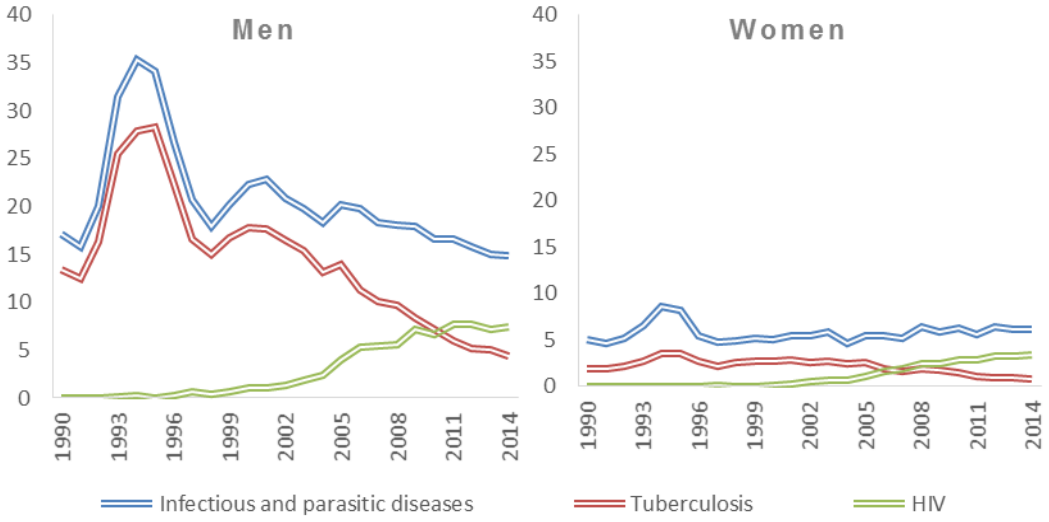

Figure 22. Standardised death rates from infectious and parasitic diseases, tuberculosis and HIV in Moscow, 1990-2014, per 100,000

Among men before the 2000s, the main contribution to mortality in this class came from *tuberculosis* (79% in 1990). Then mortality from tuberculosis began to fall, as well as its contribution, which in 2014 came to 29%. Among women, the proportion of tuberculosis was initially lower (37% in 1990), but the decline in its contribution was also significant (up to 14% in 2014).

Deaths from the disease caused by the human immunodeficiency virus (HIV) have been recorded in Moscow since the early 1990s. The mortality level began to increase in 2000 among men and in 2005 among women. In 2014, the mortality rate from this cause in Moscow came to 7.4 per 100,000 for men and 3.4 for women, versus 11.3 and 4.9 nationally for men and women, respectively. The experts say that there are problems in the recording of morbidity and mortality from HIV infection [Pokrovsky 2004]. The rapid increase in mortality from HIV and the reduction in mortality from tuberculosis led to mortality from HIV exceeding mortality from tuberculosis among women in 2007 and among men in 2011. Now it is HIV which is the main contributor to mortality from infectious and parasitic diseases (in 2014, 50% for men and 56% for women).

The highest level of mortality from infectious and parasitic diseases among the megacities considered is observed in St. Petersburg, the lowest in Singapore (Figure 23).

As in Moscow, in St. Petersburg, Singapore and Hong Kong mortality from tuberculosis in 1990 contributed significantly to mortality from all infectious and parasitic diseases. By 2013, the contribution of this cause of death and mortality from it was at a low level in all megacities. As for mortality from HIV, the highest rate was observed in New York in 1997 (50 and 18 per 100,000 men and women, respectively). In other metropolitan areas, mortality was much lower. By 2013, the highest mortality rate from HIV among non-Russian megacities was also in New York City (9.6 and 4.0 per 100,000 men and women, respectively), which is higher than in Moscow. But in New York, in contrast to Moscow, the mortality rate from HIV is constantly decreasing. The situation is also alarming in St. Petersburg, where over a period of 14 years the level of mortality from HIV rose to 14.7 per 100,000 for men and 5.4 per 100,000 for women.

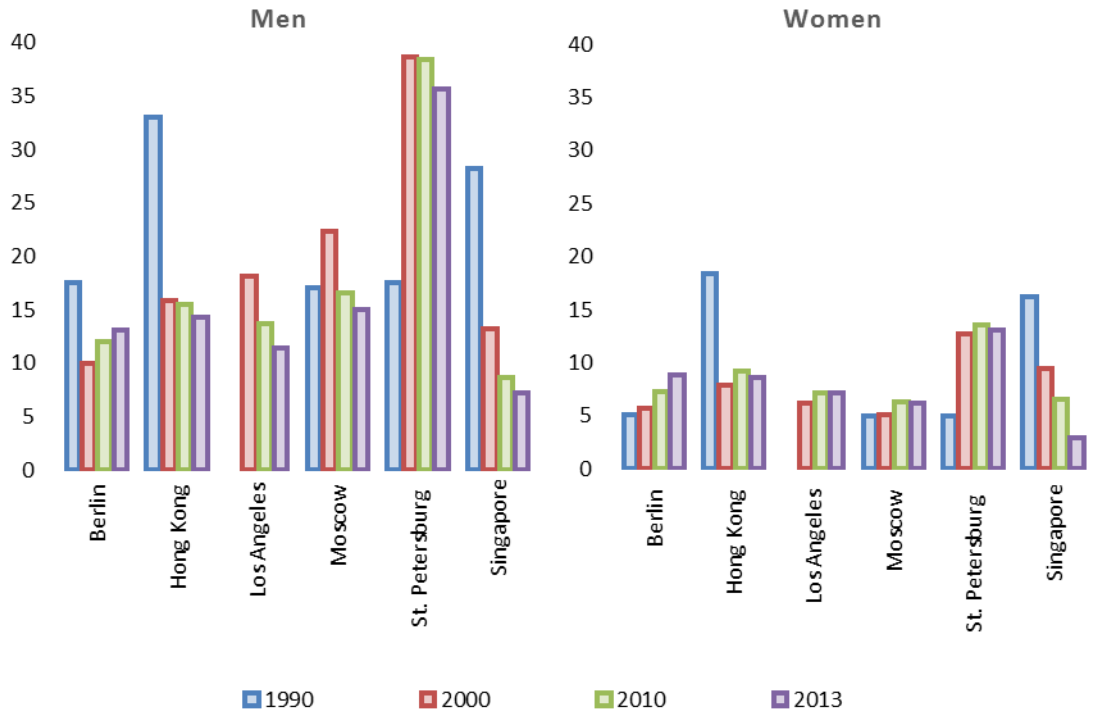

Figure 23. Standardised death rates from infectious and parasitic diseases in 6 megacities, 1990, 2000, 2010, 2013, per 100,000

Note: Los Angeles 2012.

Diabetes

Another cause to which special attention is paid in developed countries is diabetes. This is especially true in the USA, due to a strong growth in the number of people diagnosed with diabetes and to mortality from this cause. In Moscow, SDR from diabetes declined for almost two decades (Figure 24). But in the last three years for men (and the last two years for women) statistics have recorded an increase in mortality from this disease. Until 2011, mortality from this cause was higher among women, but starting in 2012 the men took the "lead". Higher mortality from diabetes among women is not particular to Moscow. It has also been observed in other megacities (Figure 25). After 2011, the death rate from diabetes (all forms) in Moscow increased slightly, the SDR rising among men by 1.3 times, among women by 1.1 times. In Russia as a whole, there is a more than twofold increase in the SDR from diabetes.

Mortality from diabetes in foreign megacities is much higher, and the proportion of deaths from this cause in some of them accounts for up to 4% of all deaths (Los Angeles, New York).

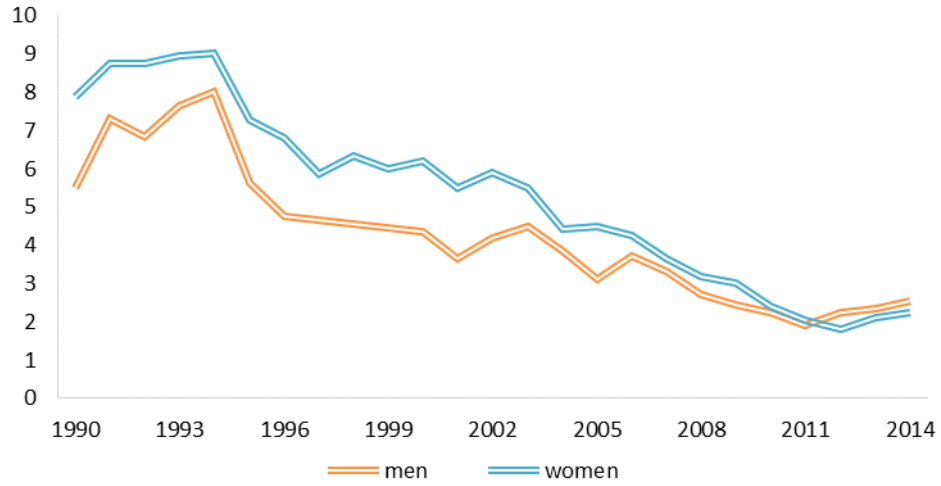

Figure 24. Standardised death rates from diabetes in Moscow, 1990-2014, per 100,000

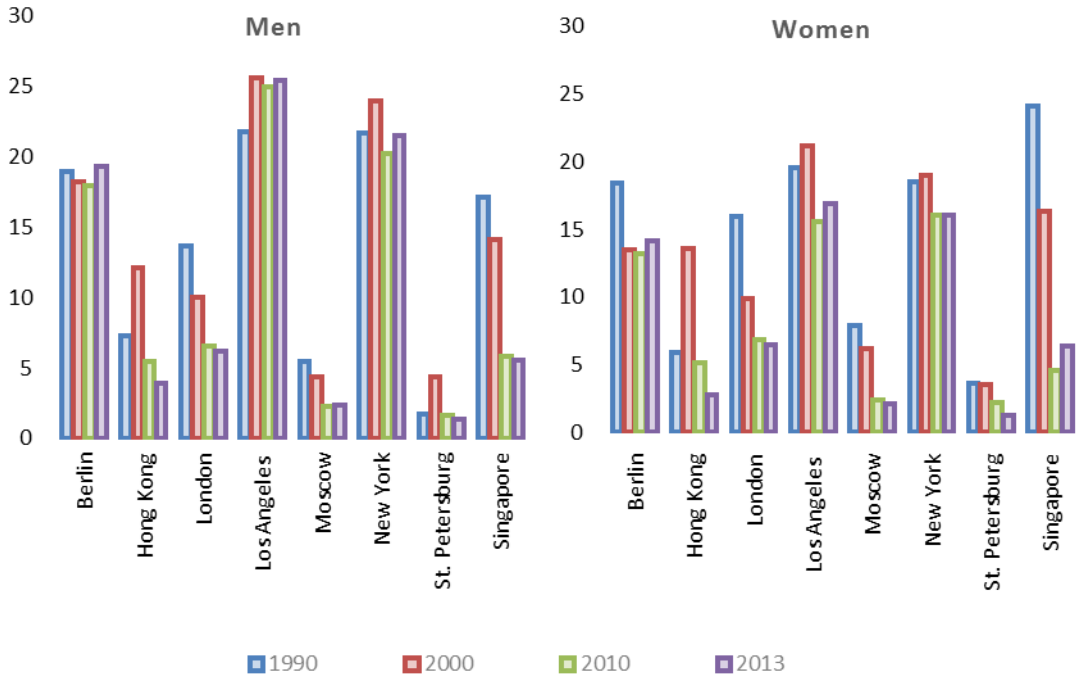

Figure 25. Standardised death rates from diabetes in 8 metropolitan areas, 1990, 2000, 2010, 2013, per 100,000

Note: New York 1997; Los Angeles 2012.

Most deaths from diabetes are among the elderly; they tend to have more than one disease. As in the case of pneumonia, the choice of the main cause of death depends on the practices prevailing in the country and region.

PERINATAL MORTALITY AND CONGENITAL ANOMALIES

The vast majority of deaths from this group of causes are among children up to the age of 1 year, although congenital anomalies can also cause death among children over 1 year, as well as among the elderly. But the main share of deaths occurs in infancy. The proportion and level of mortality

in this group of causes are an indirect indicator of maternal and child health, as well as of the availability and quality of health services for them. In Moscow, the mortality rate from these causes is the highest of all the cities examined, although in 1990 St. Petersburg was in first place (Figure 26). But in the mid-1990s, St. Petersburg managed to reduce this type of mortality. Now the level of mortality from causes of perinatal death and congenital anomalies in St. Petersburg is on a level comparable with US megacities, so that, in terms of infant mortality, St. Petersburg has for many years been the region with the lowest indicator.

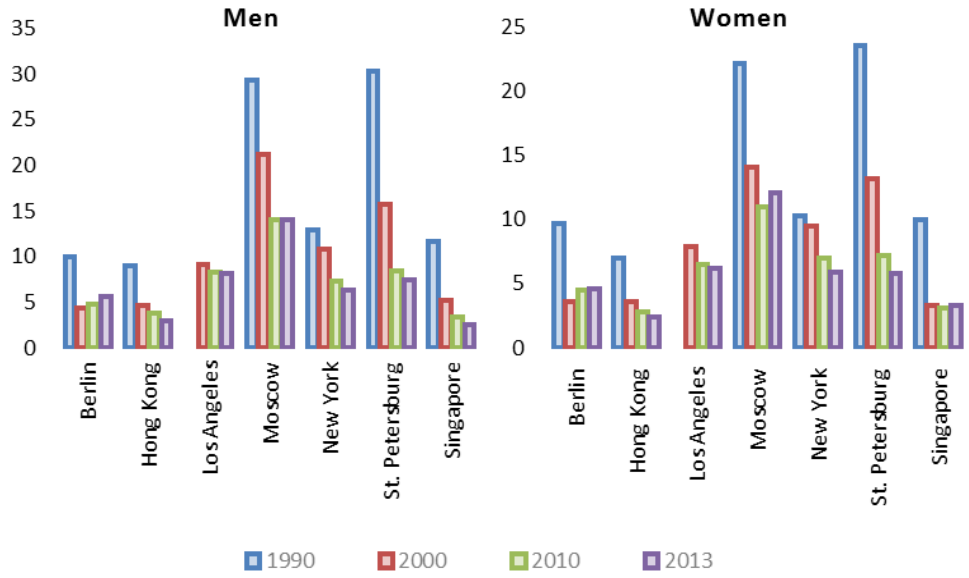

Figure 26. Standardised death rates by cause of perinatal mortality and congenital anomalies in 7 megacities, 1990, 2000, 2010, 2013, per 100,000

Note: New York 1997; Los Angeles 2012.

CONCLUSIONS

On the whole, from 1990 through 2014 the standardised death rates from all causes in Moscow have decreased by 44% for men and 42% for women (for 1990-2013, by 43% and 41% respectively). The rate of the indicator's decline was higher than in many foreign cities, both overall and from some of the major causes of death (Table 13), largely due to a higher initial level of mortality.

However, the situation in Moscow in the first half of the 1990s was very unfavourable, so that, despite the relatively high rate of decline, the lag behind the other megacities remains, a slight decrease notwithstanding. As has been shown (Table 2), the SDR from all causes in Moscow in 2013 was significantly higher than in all the selected foreign cities. Moreover, for men it was higher than in those cities in 2000, and even than in some of them in 1990, which gives grounds to speak of a twenty-year lag in Moscow. For women, the results of such comparisons are only slightly better.

Table 13. The reduction of standardised death rates of the most important classes of causes of death in 7 megacities of the world, 2013, in % relative to 1990

Megacity	All causes	Including		
		Cardiovascular diseases	Neoplasms	External causes
		Men		
Berlin	59.1	40.3	78.1	60.9
Hong Kong	61.4	49.0	68.2	69.5
London	58.8	39.3	56.9	92.9
Moscow	57.0	50.8	52.7	47.1
St. Petersburg	72.1	70.1	66.9	66.1
Singapore	55.7	45.4	69.3	48.9
Tokyo	68.6	46.4	78.9	54.0
		Women		
Berlin	61.8	43.2	79.3	52.9
Hong Kong	55.3	37.5	75.1	58.4
London	69.1	47.7	74.8	98.9
Moscow	58.6	52.2	68.8	43.0
St. Petersburg	69.6	65.4	79.3	59.3
Singapore	52.4	37.4	73.9	32.8
Tokyo	69.2	38.6	80.6	61.1

Particularly unfavourable for Moscow is a comparison with foreign megacities of the levels of mortality from diseases of the circulatory system (Table 3). Here, not only is the current gap quite large, but Moscow's mortality level has not yet come close even to the level observed in foreign megacities in 1990, especially for men. The only city exceeding today's Moscow in mortality from cardiovascular diseases is Berlin in 1990, but at that time Berlin was still experiencing the lingering effects of the socialist way of life. The differences in mortality between the eastern and western parts of Germany had been almost entirely eliminated only by the end of the 1990's.

The differences in standardised death rates from cancer between Moscow and St. Petersburg, on the one hand, and foreign metropolises, on the other, are not so great (Table 4), but Moscow is the loser across the board. However, the gap in demographic losses between Moscow and foreign cities due to Moscow's higher death rate from cancer has not reached the same magnitude as in the case of cardiovascular diseases and external causes of death.

The situation with external causes of death is similar in many ways to that of diseases of the circulatory system. In Moscow, mortality from external causes affects a younger part of the population than in foreign megacities; as a result, its adverse effect on life expectancy is particularly high. Although the reduction in mortality from this (in large part preventable) cause was quite significant in Moscow after 2000, compared with foreign megacities the achievements of our capital to reduce this type of mortality seem rather paltry. For men, and sometimes women, it is several times higher than in London, New York, Tokyo or Berlin (Figure 14).

The standard of living and access to quality health care are greater in Moscow than in neighbouring areas, and the population of Moscow has significantly higher levels of education. It is therefore not surprising that Moscow is markedly different from the nearest Russian regions in terms of mortality from cardiovascular diseases and external causes. But the lower mortality from neoplasms, which is relatively stable over time and differs little between the regions of the country, prompts a search for possible explanations of the relatively low level of the capital's mortality [Andreev, Kvasha, Kharkov 2006]. However, even if we consider Moscow's mortality statistics

reliable, compared with foreign megacities Moscow's success looks quite modest. As for similarities and differences in mortality between Moscow and foreign megacities, it must be admitted that there are as of yet more differences than similarities.

Nonetheless, Moscow's success in reducing mortality in the 2000-2014 period inspires a certain optimism, and the goal of getting close to the mortality rates of foreign megacities does not seem unattainable. The difficulty is in predicting just how events will develop in the deteriorating economic situation. It is useful to recall that during the crisis of the first half of the 1990s, Moscow completely lost all pre-existing advantages in mortality over neighbouring regions.

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MORTALITY IN RUSSIA IN LIGHT OF THE REDUCTION IN ALCOHOL CONSUMPTION*

ALEXANDER NEMTSOV

In the contemporary history of Russia, there have been three significant reductions in alcohol consumption associated with a decrease in mortality. The first, resulting from the anti-alcohol campaign of 1985, lasted 3 years, and the second, resulting from the impoverishment of the population and death of a large part of heavy drinkers, 4 years (1995-1998).

In 2004 began the third decrease in consumption, often inexplicably linked with the anti-alcohol laws of 2005. However, the history of this decline goes back to the year 2000. It started with the creation of Rosspirtprom (RSP) and the anti-beer campaign, with Rosalkogolregulirovanie (RAR) taking over in 2009. The main activities of RSP and RAR involved the bankruptcy of several hundred enterprises of the alcohol industry. This and many other actions of the RSP and the RAR resulted in the instability, sometimes disruption, of the alcohol market. This could be a significant cause of the decrease in consumption and mortality in 2004. In fact, in 2000 the second anti-alcohol campaign started. The object of the first one had been the consumer, of the second - the alcohol market. The aim of the first campaign was to decrease consumption and improve the economy. The aim of the second was to fill the budget by suppressing the illegal market and moving consumers into the legal market. The methods of the first campaign consisted of a reduction of production and trade restrictions; the methods of the second one changed in the course of the campaign. The main goal was to squeeze small and medium-sized players out of the market, on the assumption that they were the principal suppliers of illegal products. The methods of the second campaign included the introduction of a Unified State Automated System, the growth of excise taxes and a minimum price for alcohol, as well as tough, sometimes criminal competition. The tool of the first campaign was administrative pressure. The main instruments of the second one were RSP and then RAR.

As a result, there was neither an economic recovery in the first campaign, nor a filling of the budget thanks to alcohol in the second. The decrease in consumption and mortality in the first campaign was short-lived. The second campaign was in this regard more effective, due to the economic crisis and the growing budget deficit. Both campaigns led to increased consumption of illegal alcohol.

***Key words**: alcohol consumption, mortality in Russia, anti-alcohol campaign, illegal alcohol.*

INTRODUCTION

In Russia, alcohol consumption plays a significant role in the lives of individuals and society as a whole. This role is multifaceted, as are the interests related to the production and consumption of alcohol, with private interests often intertwined with the interests of the state. In the complex conglomerate of relationships that have taken shape around alcohol, it is often difficult to identify cause and effect, and this concerns the question of alcohol's effect on mortality, too.

The complexity of the relationship generates myths around alcohol or primitive interpretations of the effects of consuming alcoholic beverages. One of these myths is the high toxicity of moonshine and other illegal alcohol. It has been repeatedly shown that the toxicity of moonshine differs little from that of legally produced alcoholic beverages [Nuzhny, Rozhanets, Savchuk 2011].

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In addition, over the past two decades, there has been a change in the composition of illegal consumption. In contrast to moonshine, which dominated until the mid-1990s and whose role has recently intensified, most illegal consumption consists of cheap, strong beverages which have avoided excise taxation and yet are of satisfactory quality and are produced by legal enterprises [Nemtsov 2009].

The main users in Russia of cheap alcohol from illegal sources are the poor (Figure 1). Accordingly, as long as there is a significant stratum of the poor in Russia, there will be both a demand for illegal alcohol and a high level of its consumption. The main alcohol problem of our country, both in the recent past and in the present, is not so much the quality of alcoholic beverages as their excessive quantity. This quantity determines the precise dependence of life expectancy on the magnitude of alcohol consumption (Figure 2). Without being too statistically rigorous, one can argue that an increase in consumption of 1 liter per person per year (l / person / year) in the range of 10-18 liters "takes away" 1 year for men and 4.6 months for women. The linearity of the ratios of life expectancy or mortality with the level of alcohol consumption makes it possible to calculate the losses of the population of the country connected with alcohol. For the period 1980-2001 this comes to, on average, 426,000 people a year: 272,100 men and 153,900 women [Nemtsov, Terekhin 2007].

It should be emphasized that alcohol consumption fulfills many social functions [Nemtsov 2009], but the main one is personal, consisting of a temporary and, of course, imaginary escape from everyday misfortunes, both material and psychological. For a fleeting moment the pleasant effect of alcohol allows us to bear up against everyday difficulties of differing kinds and degree. It is difficult to imagine what would happen to our country if it were completely “dry”.

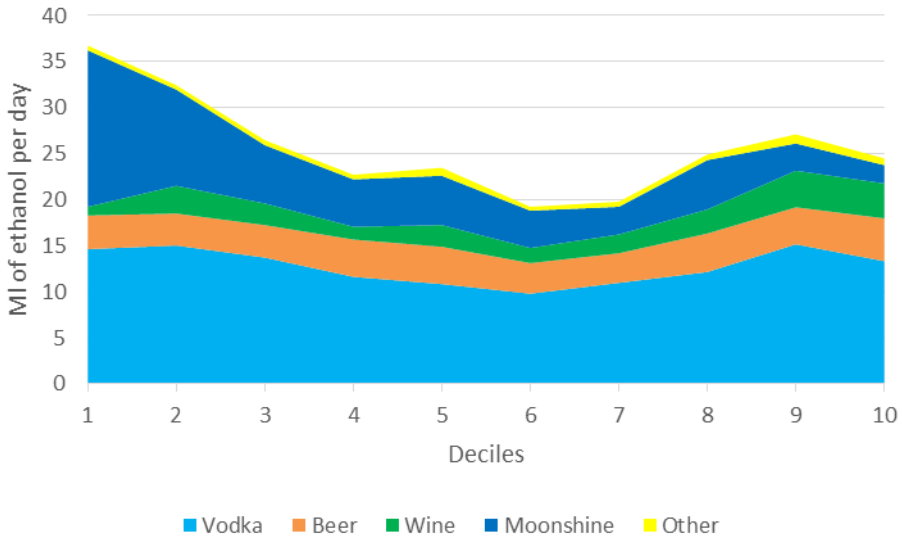

Figure 1. Structure of consumed drinks depending on income (RLMS, 11th round). The x-axis represents the ranking of consumers by income, with 1 being the smallest, and 10 the largest income

Source: [Andrienko, Nemtsov 2006].

In this context, drunkenness can be an indicator of general unhappiness. Hence, in Russia as in the West, the highest consumption is among people with the lowest incomes (Figure 1).

Having made these introductory remarks, we can now demonstrate the correlation between alcohol consumption and mortality over the past 60 years.

ALCOHOL CONSUMPTION AND MORTALITY IN RUSSIA, 1956-2003

Compared with the current level, alcohol consumption in the RSFSR at the time of the end of the Great Patriotic War was relatively low, but higher than the pre-war level. The 100-gram daily ration of vodka at the front and the bonus rations in the rear [Takala 2002] gave a push to alcohol consumption as well as to home distillation. In addition, alcohol remained a significant source of budget revenues, with its official production doubling from 1960 to 1984. Accordingly, there began a rapid increase in consumption and mortality and a rapid decrease in life expectancy (Figure 3). Repeated attempts by the Soviet leadership to reverse the situation (1948, 1958, 1960, 1961, 1967, 1972 and 1974) did not yield a significant result, mainly because alcohol policy was extremely inconsistent.

It is astonishing that in a large and heavily drinking country no one knows exactly the true scale of alcohol consumption, and state bodies do not even try to figure them out so as to build an alcohol policy on a scientific basis. Moreover, it can be said that in Russia there is no alcohol policy as a coherent chain of effective measures leading to a clearly defined goal. There was only one short episode when, in 1980, the State Statistics Committee of the USSR was instructed by the Government to develop a methodology and estimate the consumption of moonshine in the country and the republics.

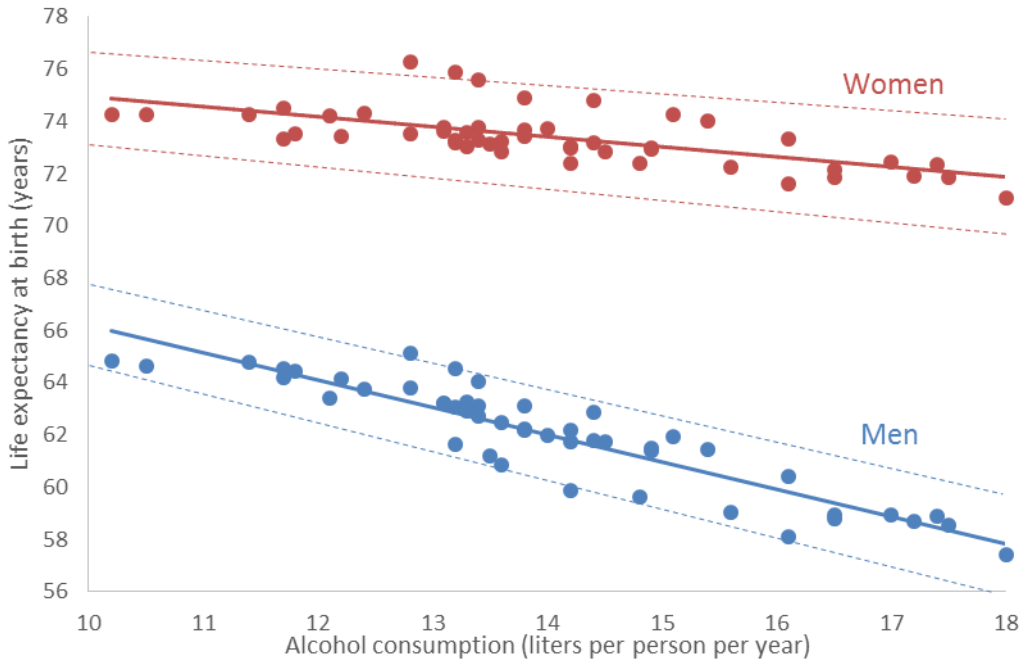

Figure 2. Dependence between life expectancy and alcohol consumption

Note: The solid straight line is the regression line, the dotted line is the boundary of the 95% confidence interval of the forecast.

Source: [Nemtsov, Shelygin 2014].

Such a technique was indeed developed, and on its basis Goskomstat in 1980-1987 estimated the amount of illegal production, based on the unusually high quantities of sugar being purchased. This was Soviet Russia's first dynamic assessment of the real consumption of alcohol (moonshine + sales of state alcohol), albeit classified. In the USA (University of Duke), starting in 1960, calculations of consumption in the USSR and the RSFSR were conducted by the economist Vladimir Treml [Treml 1982], whose book on the subject was kept in a restricted-access repository in Moscow. In 1981, the author of the present article also undertook to make such calculations [Nemtsov 1998; 2002], without knowing anything about his predecessors' work.

During Perestroika, the state released certain classified materials, in particular data on alcohol consumption. In the years 1988-1989 it turned out that the three assessments made independently and on completely different grounds were very close: on the eve of the anti-alcohol campaign (1984), the total consumption in the RSFSR was 14.5 liters / person / year. A later estimate for 1984 was 14.2 liters / person / year [Nemtsov, Shelygin 2014][1].

In 1985, a very tough anti-alcohol campaign began, initiating significant fluctuations in alcohol consumption in direct opposition to fluctuations in life expectancy (Figure 3). This was the beginning of a new stage in the country's alcoholic and demographic history.

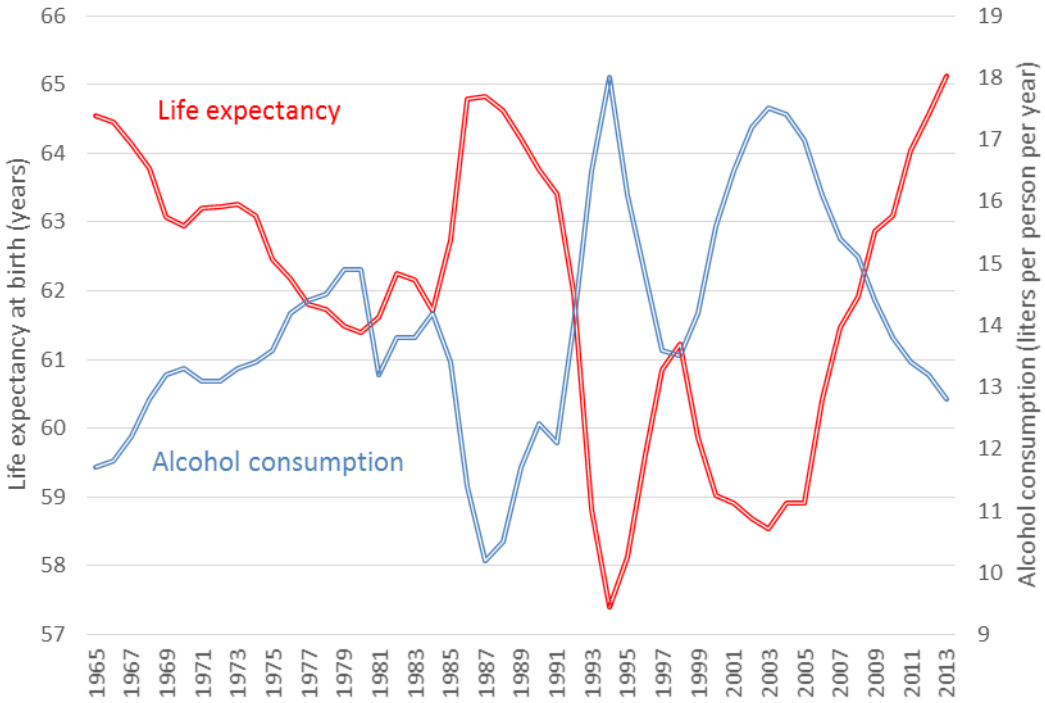

Figure 3. Changes in alcohol consumption and the length of life in Russia in 1965-2013

Sources: Rosstat data [Nemtsov, Shelygin 2014].

[1]The new estimate of alcohol consumption was calculated on the basis of an analysis of deaths from alcohol poisoning from 1956 to 2013. To the calculated values was added the alcohol in beer, which does not lead to fatal poisoning and therefore is not reflected in the calculations. The growth of its sales from 1998 to 2007 was, in terms of pure alcohol, almost fivefold.

World history has known significant falls and rises in alcohol consumption, for example, in the USA [Room 1991] and in the United Kingdom [Spring, Buss 1977]. But these and many other fluctuations in consumption lasted for decades ("long waves of alcohol consumption" [Holder, Edwards 1995]). In contrast, in Russia after 1984 a new consumption pattern emerged, which can be designated as cyclical (Figure 3), consisting of two and a half fluctuations (decrease + growth): 1) 1985-1994; 2) 1995-2003; 3) 2004-2013. The reason for the first sharp decrease in consumption is the 1985 anti-alcohol campaign. The assumptions and motives of the campaign as a whole are clear [Nemtsov 2009]. As for its results, it is important to emphasize that this campaign did not lead to a significant reduction in consumption by either size (up to 10.2 l / person / year in 1987) or duration (1985-1987, figure 4). The population responded to it with unprecedented unanimous resistance - the powerful production of moonshine - despite harsh judicial and administrative persecution. Already in 1987 a reflexive increase in mortality began (Figure 3), and in 1988, an increased consumption of alcohol resulting from home distilling and the expansion of state sales due to a significant budget deficit. In 1992, the initial (1984) consumption level was reached, and with the onset of market reforms and the vagaries of the new leadership of the country, alcohol consumption and mortality began to increase by leaps and bounds (Figure 3).

In 1994, Russia set an historical and, for the twentieth century, world record for alcohol consumption: 18 liters / person / year [Nemtsov, Shelygin 2014]. It had been higher only at the end of the 19th century in Germany, more precisely in Prussia (22 liters per person per year), and in France in the first half of the 20th century (19.8 liters per person per year) [Simpura 1995]. Along with the record for alcohol consumption in 1994, a record was also set for mortality in the post-war period.

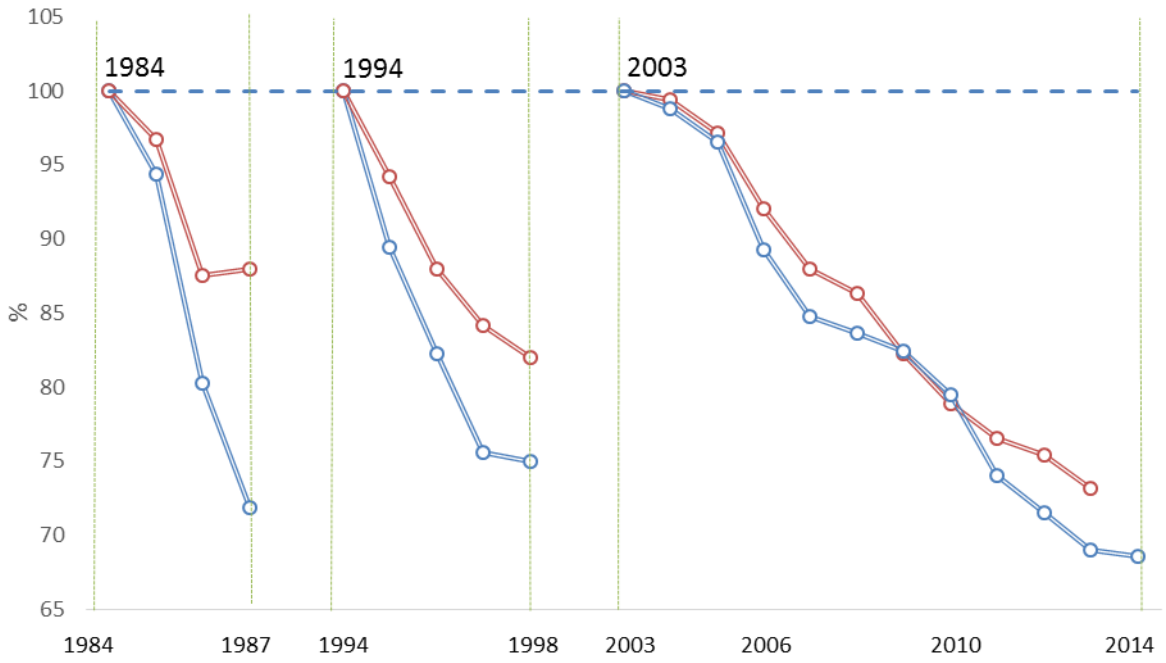

Figure 4. Changes in the standardised death rates of men (red lines) and alcohol consumption (blue lines) in 1984-1987, 1994-1998 and in 2003-2013

Note: Indicators for 1984, 1994 and 2003 are taken as 100%.

Sources: Rosstat data, [Nemtsov, Shelygin 2014].

In 1995 began the second rapid decline in alcohol consumption and mortality, lasting until 1998, when, by the beginning of the default, consumption had fallen to 13.5 l / person / year, i.e. by 4.5 l / person / year over 3 years - exactly the same as during the anti-alcohol campaign. Most likely, two factors played a decisive role. The first is the dying off of a large cohort of major alcohol consumers in 1991-1994 (1995) as a result of easy access to alcoholic beverages. It is known that heavy drinkers and alcoholics absorb about half the alcohol from total consumption [Holder, Edwards 1995]. Perhaps in the mortality of 1995-1998 two cohorts of heavy alcohol consumers converged: one which, thanks to the campaign, had lived beyond it, but succumbed to the risk of alcohol-related death starting in 1991 (1992) as a result of free access to alcohol; and a second cohort consisting of new heavy drinkers formed during the anti-alcohol campaign due to a relatively high level of consumption (10.2-13.4 l / person / year).

Another circumstance which led to a decrease in alcohol consumption and mortality is a sharp impoverishment of the population as a result of market reforms that caused inflation and a tenfold increase in prices. To this were added unpaid wages, which became a widespread phenomenon. The incomes of the population were almost equal to their expenses, and purchasing power decreased dramatically [Nemtsov 2009]. Most likely this affected the consumption of alcohol, too. Due to financial difficulties and a budget deficit, significant efforts were also made by the state in the fight against illegal alcohol, which were especially evident on the border with North Ossetia. All this and some other circumstances [Nemtsov 2009] could explain the decline in consumption in 1995-1998. The last year in this period was marked by a default which, due to the depreciation of the ruble and the equilibrium of the balance of payments, the recovery of the economy, growth in output and GDP, caused an increase in the incomes of the population and, accordingly, of its purchasing power. Just a year after the crisis, the pre-crisis standard of living and level of alcohol consumption had been restored. Rapid growth in consumption continued until 2003. [Nemtsov, Shelygin 2014] (Figure 3). Unfortunately, the opportunities created by the default and devaluation were exhausted by 2003, when the authorities began learning to deal with business, and oil prices rose and began to replenish the budget. However, the budgetary problems were very far from being resolved.

ALCOHOL CONSUMPTION AND MORTALITY AFTER 2003

In 2004, the third reduction in alcohol consumption and mortality began (Figure 4). However, the history of this decline began in 2000, together with the arrival of a new president and the beginning of a new alcohol policy.

It should be said that, as a result of the mistaken alcohol policy of the 90s, the alcohol market came under the control of criminal structures. By 1997 the legal share of this market had decreased from 80% in 1992 to a mere 15%, while the share of alcohol excises as a part of GDP, already low, fell from 0.72 to 0.30% [Kosmarskaya 1998]. Naturally, this situation needed to be reversed.

The beginning of the new alcohol policy was marked by the creation of Rosspirtprom (RSP) in March 2000, and in December of the same year began the anti-beer campaign initiated by Russia's Chief Sanitary Doctor, G. Onischenko. The main activity of RSP was the bankruptcy

of several hundred enterprises of the alcohol and vodka industry, as well as the sale of these enterprises at a lower price to the owners of powerful oligopolies. It was assumed that small enterprises were the source of production and distribution of illegal alcohol, and that their elimination or concentration in the hands of a few monopolists would paralyze the flow of illegal products to the market, at the same time leading to an increase in sales of legal products and a replenishing of the budget. RSP existed until 2009, bringing huge losses to the state and, to the alcohol market, extreme instability due to the redistribution of assets and unreasonable rigidity of RSP measures in relation to the legal industry.

The bankruptcy of many enterprises, their liquidation or transfer to other owners upset production and product flows, thereby disorganizing the alcohol market and leading to a decrease in the availability of alcohol and its consumption, with all the ensuing consequences. As a result, the activity of RSP became, paradoxically, the cause of the beginning of a decrease in alcohol consumption in 2004, and after that, of a reduction in mortality related, primarily, directly to alcohol (Figure 5). These consequences were particularly pronounced in 2006-2007 (see below).

Such administrative activity preceded (!) the legislative initiatives of the country's leadership in the form of two laws in 2005. The first, among other things, prohibited as of January 1, 2006 the use of the previous excise stamps, which had to be replaced with new ones. However, new stamps were printed only in late January - early February 2006, and only on half-liter bottles of vodka. Stamps for other beverages and containers were printed during 2006. This became the first factor of additional disorganization of the alcohol market and, as a result, a decrease in alcohol consumption (Figure 4) and mortality (Figure 5).

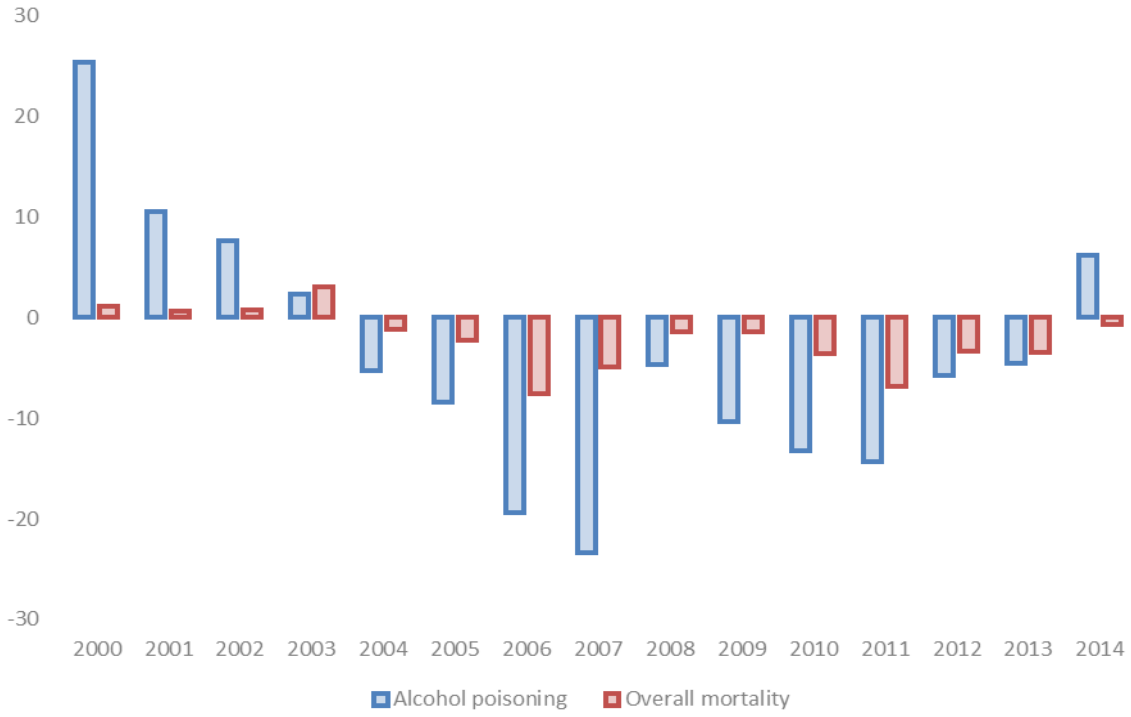

Figure 5. The annual increase of overall mortality (red bars) and mortality from alcohol poisoning (blue bars) in 2000-2014, by the previous year, per 100,000 persons

Source: Author's calculation based on Rosstat data.

The second law sharply increased, as of July 1, 2006, the authorized capital of producers and sellers of alcoholic beverages. This measure was taken in order to remove small and medium participants from the market. A plausible pretext for this was the difficulty of controlling them in the fight against illegal alcohol. The real reason was most likely to further clear the way in the market for large producers, a process which had begun in 2000 and led to market disorganization as a result of inconsistent and sometimes criminal actions of RSP (raider actions, for example, against the Moscow plant Kristall [Boyarina 2010]). In 2006, to this was added the chaos resulting from the launching on January 1, 2006 of the United State Automated Information System (USAIS), which was intended to exercise state control over the volume of production and turnover of ethyl alcohol, as well as alcohol and alcohol-containing products. However, due to the complete unreadiness of both business and state, the USAIS did not start working. By 2008, the situation on the alcohol market had normalized and the decrease in consumption and mortality had slowed dramatically (Figure 5), returning to the same pace as in 2004-2005. [Nemtsov, Shelygin 2015]. But, most importantly, the laws of 2005 did not fulfill their purpose: sales of legal strong alcohol continued to decline (Figure 6), and budget revenues also decreased.

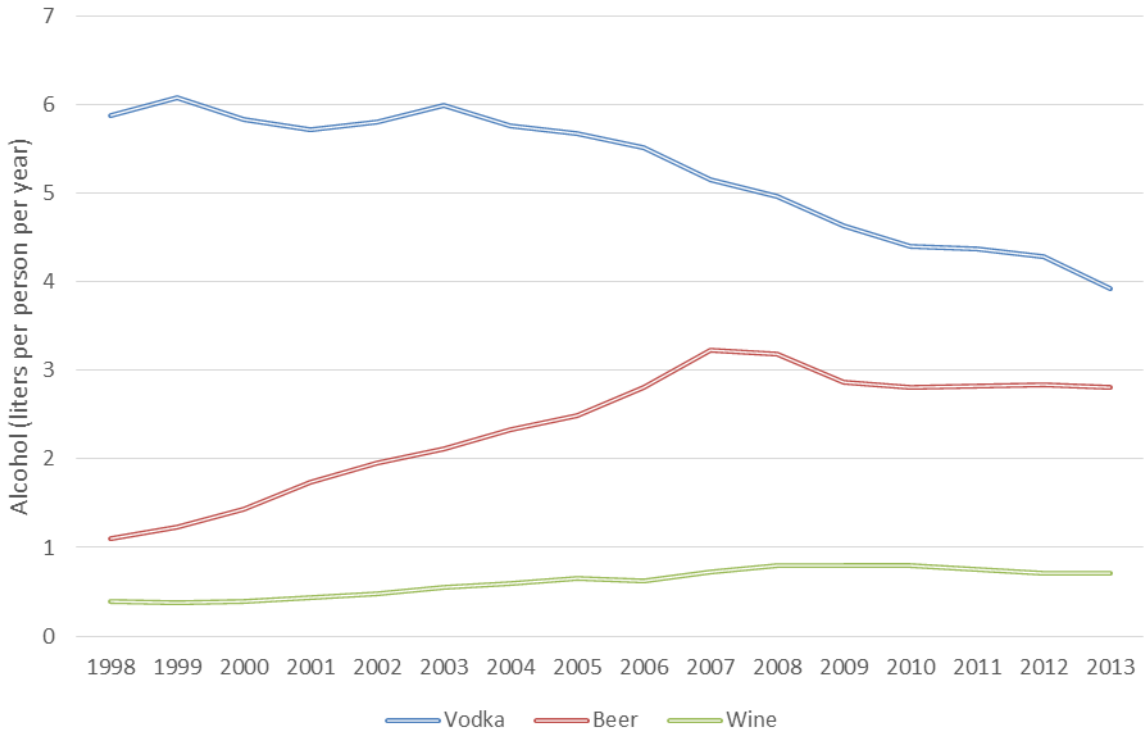

Figure 6. Registered sales of vodka, beer and wine in terms of pure alcohol

Source: The author's calculation based on Rosstat data and indicators.

The second law introduced, as of July 1, 2006, an important measure for our topic: new denaturing additives, more toxic and less organoleptically sensitive. The result was an "epidemic" of acute hepatitis with subsequent mortality from liver disease, which caused a 6-7-year decline in this indicator (Figure 7 [Nemtsov, Shelygin 2015]) with a decrease in consumption that began in 2004.

After 2008 the decrease in alcohol consumption and, as a result, mortality, was the result of increasing pressure on the alcohol market (see the table in the Appendix). One such mechanism

was the USAIS. Since 2006, there have been several attempts to implement the USAIS, each starting with a new project, a new executor, new budget allocations. The cost of each further development of the USAIS (2011) has been, according to various estimates, about 600 million rubles [ALCOHOL.RU]. It is important that each attempt at implementation has been accompanied by a destabilization of the market. The last and final date for the full implementation of the USAIS was January 1, 2016. In other words, the history of the implementation of the USAIS has been going on for 10 years - so far, to no avail. Meanwhile, some Western researchers have repeatedly written that the decrease in alcohol consumption, the increase in life expectancy and the reduction in mortality are partly due to the notorious USAIS, the world's only technical market regulation system.

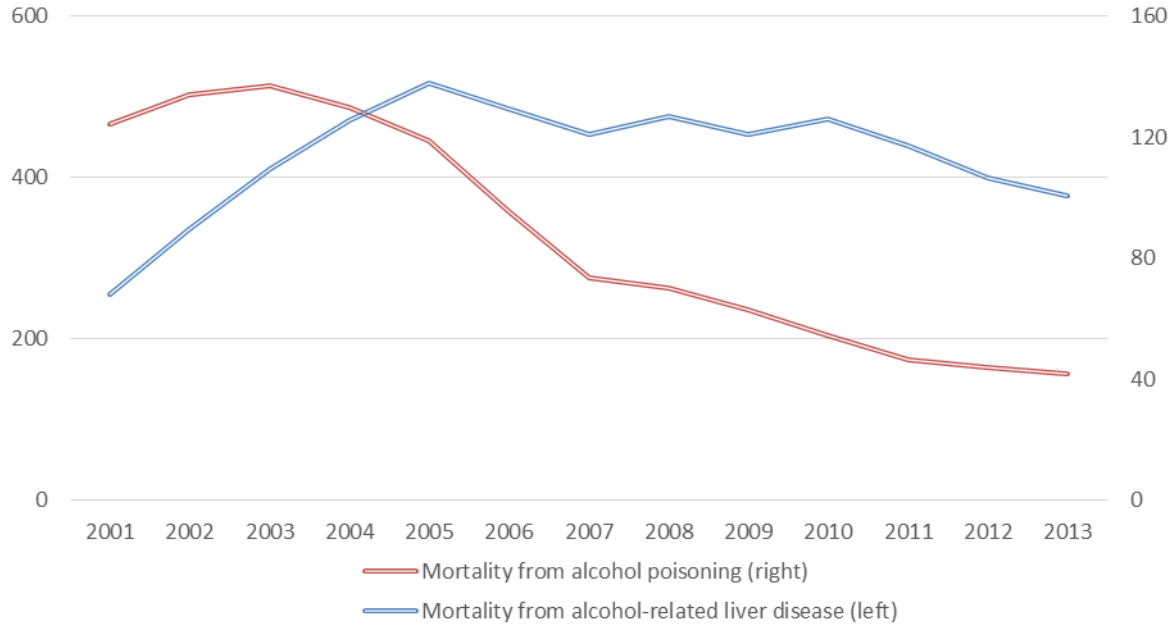

Figure 7. Mortality from alcohol poisoning and liver disease in 2001-2013, per 1,000,000

Source: [Nemtsov, Shelygin 2015].

Unlike the USAIS, more effective were a significant increase in excise taxes and an increase in the minimum price for a half-liter bottle of vodka (Figure 8). But this measure led to a further reduction in state sales and a sharp decline in revenues to the budget. All these measures hampered the availability of legal spirits and caused consumers to switch to illegal alcohol. For example, the rate of collection of excises on strong alcohol in 2007-2011 was 46.3-55.9%, whereas for beer it was 88.2-94.9% [Sokolov 2013]. On June 25, 2015 the Chairman of the Federation Council V.I. Matvienko said at a chamber meeting that "the budget loses about 290 billion rubles a year because of the production of illegal products" and called budget losses “catastrophic". On November 26, V.I. Matvienko returned to this topic and added that "the share of legally produced alcoholic products in the current year has fallen to a record 35% while maintaining the overall volume of consumption."

The illegal alcohol market over the last 6 years has increased from 40 to 64%, of which 30% is sold in a legal licensed retail network, and the remaining 34% in illegal outlets. The main illegal production is concentrated in Kabardino-Balkaria, North Ossetia, Dagestan and the

Moscow region [ALKOHOL.RU]. Most of the illegal production and sales outlets are bankrupt enterprises that are deprived of licenses, which is precisely why they are not controlled by the Russian Alcohol Regulation Agency (RARA).

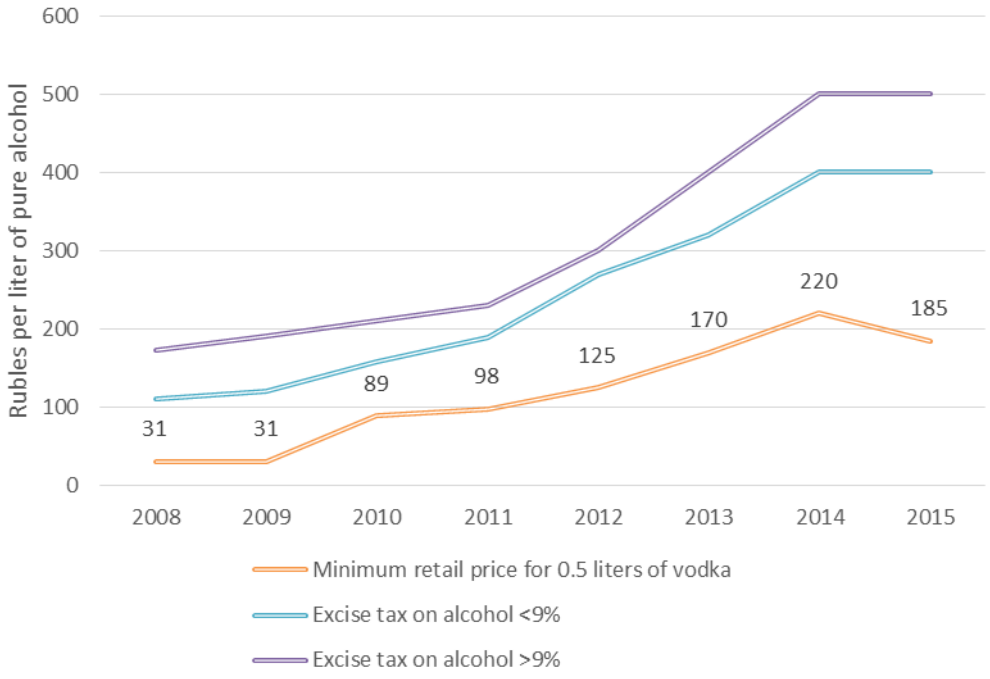

Figure 8. Excise taxes on 1 liter of pure alcohol and the minimum price for 0.5 liters of vodka, rubles

Source: Rosstat data.

Various sources testify to the growth of illegal production and estimate it at 60-64%. This means that an increasing number of consumers are moving from the official market to the illegal market. But this redirection of buyers and consumers requires a certain time to organize new production and new product flows. As a result, the restoration of the usual norms of alcohol consumption occurs with a lag, which probably contributed to a decrease in consumption lasting 10 years, until 2013. In 2012-2013, the decrease in alcohol consumption and related mortality indicators slowed down (Figure 5), and in 2014 there was a 6.2% increase in mortality of men from alcohol poisoning compared to 2013 (Figure 5). This type of mortality, as shown by the 1985 anti-alcohol campaign, responds most dynamically to changes in alcohol consumption [Shkolnikov, Nemtsov 1997; Nemtsov 1998; 2002; Shkolnikov et al. 2004]. It can be assumed – for now *only* assumed - that in 2014 there was a halt to the decrease in alcohol consumption and a return to its growth. From 2003 to 2013, the decrease in alcohol consumption was 4.7 liters / person / year [Nemtsov, Shelygin 2014]. This is close to the rate of decline during the anti-alcohol campaign - 4.0 liters / person / year from 1984 to 1987 - although in a shorter period (3 years against 10 years). In other words, the decline in recent years has been continuous, but 3 times slower: 0.47 liters / person / year versus 1.60 in 1985-1987. So, it is possible to estimate, very approximately, the difference in the effectiveness of anti-alcohol measures during the two periods of decreasing alcohol consumption. The decline of the standardized mortality rate in 2003-2013 was 31.0% for men and 29.4% for women, versus 12.1 and 7.0% in 1984-1987.

An important and encouraging trend of the past 10-15 years is a change in the composition of alcoholic beverages in official sales (Figure 6). This is due to the fact that in the mid-1990s large international beer companies started operating in Russia, and a powerful production of relatively good beer appeared. Starting in 1998, the growth of its consumption began: the population spontaneously began to choose the lesser of two evils (vodka or beer): beer, being a weaker drink, does less harm to health. By 2007, beer consumption had increased almost fivefold (81.3 liters/ person / year), although this is still far from the European leaders (Czech Republic - 156.9, Germany - 115.8 liters/ person / year [WHO 2014]).

Growth in beer consumption has occurred throughout the world. By the time when, in 1982, WHO urged governments to reorient the population of their countries to the weak alcoholic beverages wine and beer, the process of changing consumption patterns had already taken place in developed countries. The shift of alcohol consumption to beer also occurred in "wine" countries. In the post-war period, this was due to a change in the stereotype of life, a growth of mobility, and a growth of the value of health, all of which are hampered by strong drink. The emphasis on beer in Russia's increased consumption of weak alcoholic drinks comes from the fact that we have never had a wine tradition. We are making quite sensible attempts to develop and stimulate winemaking, but because of our climate, the production of wine will always be limited, and therefore it will remain expensive and inaccessible. If we don't include attempts to promote the consumption of energy drinks, against which an active battle has already begun, the only remaining weak alcoholic beverage is beer.

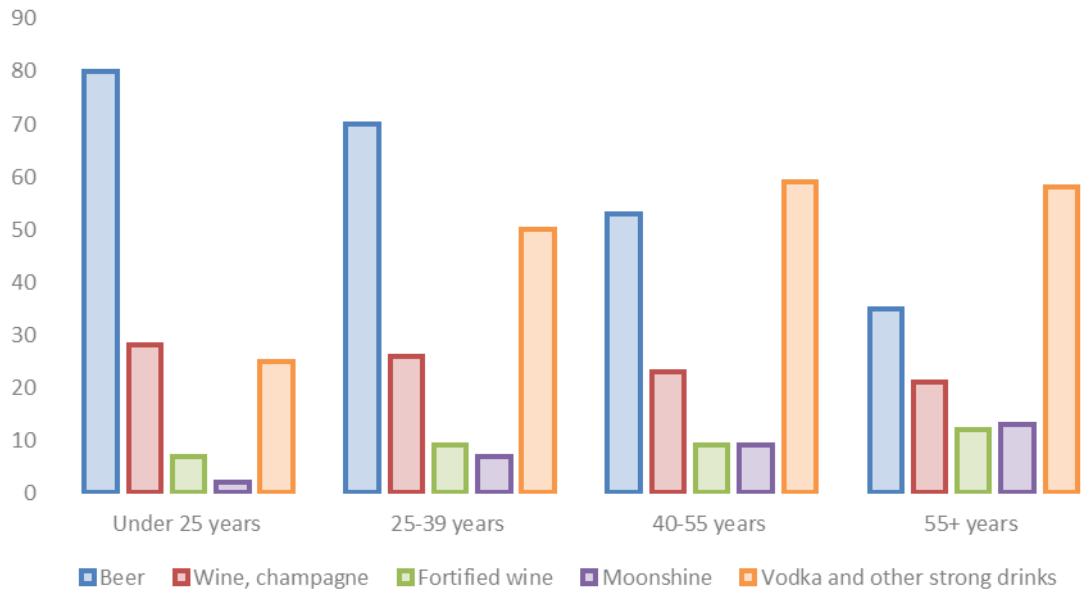

Figure 9. The structure of consumption of alcoholic beverages depending on the age of consumers

Source: [Denisova, Kartseva 2012].

The structure of alcohol consumption has changed dramatically among people under 40 [Denisova, Kartseva 2012], for whom beer has begun to dominate consumption (Figure 9), while vodka continues to dominate among those over this age. At the same time, it has been shown how, as consumers grow younger, the share of beer increases, and the share of vodka falls [Kueng,

Yakovlev 2014]. From a historical perspective, which can be expressed by the maxim, “They drank, drink and will drink”, this phenomenon should be considered good, as not a single fatal poisoning by beer has ever been recorded. In parallel with the increase in beer consumption, official sales of vodka are declining (Figure 6), and these two processes may be one of the reasons for the decrease in total alcohol consumption in 2004-2013.

Figure 6 shows that, since 2008, the growth in beer consumption has been suspended as a result of legislative actions and a number of administrative measures, some of which can be attributed to the activities mainly of the vodka lobby, but also of the glass manufacturers, fighting for the abolition of plastic bottles (PET) as a container for beer and their replacement with glass containers. The tough competitive activity of the vodka business against the beer industry can slow down the transition of consumers from vodka to beer and thus affect demographic processes.

CAUSES OF THE REDUCTION OF MORTALITY AFTER 2003

First an important remark. From the point of view of demographic indicators, the main problem associated with alcohol abuse is not, as is often said and written, alcoholism, but frequent heavy drinking. Alcoholism or pathological dependence is a medical phenomenon. In terms of registered chronic alcohol-related disease, this affects 1.4% of the country's population [Key indicators ... 2012], and the total number of patients is presumably not more than 4-5% of the population [Nemtsov 2009]. As for alcohol abuse – that is, heavy drinking not clinically diagnosed as alcoholism - nobody knows its true dimension. Moreover, it is not always easy to draw a line between frequent alcohol consumption and alcohol abuse or to recognize a true drinking problem, due to the gradual nature of the increase in alcohol consumption. The distribution of alcohol problems in the consumer cohort is also unknown. However, a few studies show that about 40% of men of working age and 15% of women abuse alcohol [Bechtel 1986]. It is this part of the population that makes the main contribution to the alcoholic harm to the country: in studies of men up to age 55, the risk of death among those who drink 3 or more half-liter bottles of vodka per week is 35% [Zaridze 2014]. The Organization for Economic Cooperation and Development (OECD) estimates alcohol-related mortality in Russia at 30.5%, and considers our country the world's leader in this indicator [OECD 2015]. The author's estimates for 1980-2007 put the figures at 24% for men and 15% for women [Nemtsov, Terekhin 2007; Nemtsov 2009]. Razvodovsky estimates the losses to be higher - 41 and 28% respectively [Razvodovsky 2012] - while David Leon and co-authors associate dangerous alcohol consumption with 51% of deaths of men aged 25-54 years against 13% in the control group [Leon et al. 2007].

When comparing the indices of different authors, one should keep in mind that alcohol indicators tied to certain periods of time reflect the state of problems precisely in these periods, since the alcohol situation in Russia is very dynamic. This was reflected in the high speed and amplitude of the change in mortality: for men, 43.3% of the average over 30 years (for women - 37.2%). Mortality fluctuations after 1985 composed 2.5 cycles (1 cycle = decrease + increase), almost synchronous with consumption cycles (see above, Figure 3). The third cycle can be considered incomplete, because for 10 years (2004-2013), the decrease in mortality, as well as the increase in life expectancy, occurred at a variable rate. However, 2014 gave some grounds to

foresee the beginning of the completion of the third cycle, too, although one year is not decisive - we will wait for the next, or better yet even another one, to firmly judge what is happening.

The main feature of the third reduction in mortality is its duration: 11 years against 3-4 years for the two previous ones. This period is of particular interest precisely because of the reasons for its duration.

A major social phenomenon in a large country is difficult to ascribe to one cause. Rather, there were several. At the same time, one cannot help but recall that there was a state program for the development of health until 2020, for which 2.04 billion rubles had been allocated.

Grigoriev and Andreev [Grigoriev, Andreev 2015] believe that the contribution of policy measures to the reduction of mortality in Russia after 2003 was small, and link this decline to the fluctuations in mortality in previous years. They make an exception only for 2006-2007, as do other authors [Neufeld, Rehm 2013], who, however, noted an important fact: the new alcohol policy went into effect in 2000. Pridemore and co-authors [Pridemore et al. 2014] connect the effect of the laws of 2005 with the reduction of mortality all the way up until 2010 (the end of the period of research). Khalturina and Korotaev [Khalturina, Korotaev 2015] went even further. These authors took their analysis up to 2013, and found that the effect of the laws of 2005, introduced in 2006, continued in all subsequent years.

Analysis of the causes of death and life expectancy between 2003 and 2012 led Shkolnikov and co-authors [Shkolnikov et al., 2014] to the conclusion that the greatest contribution to the increase in life expectancy was made by the reduction in adult mortality from diseases of the circulatory system and external causes most closely associated with alcohol consumption. It should be recalled that a decrease in mortality from diseases of the circulatory system, especially coronary heart disease, was also observed during the 1985 alcohol campaign (Shkolnikov et al. 2004]. Then the other main types of mortality also decreased (Figure 10, [Nemtsov 1999]). It is significant that at that time almost the only reason for the decrease in mortality was a reduction in alcohol consumption; the many claims about the contribution to this process of the spiritual growth and hopes caused by perestroika cannot be considered proven. According to Radaev, the decrease in alcohol consumption in the 2000s, even before the first political intervention in 2006-2007, is more realistically associated with GDP growth and real income of the population, and the pause in the decline in 2011-2013 - with the crisis of 2008-2009. [Radaev 2015]. Yet he rightly believes that it is difficult to determine the exact role of political intervention. The same should be said about subsequent calculations of this article.

The explanation offered by Grigoriev and Andreev [Grigoriev, Andreev 2,015] seems tempting, especially when you look at Figure 3. One might think this a continuation of the inertia of the fluctuations instigated by the anti-alcohol campaign in 1985, but such an explanation needs to be supplemented with a discovery of the mechanism supporting these fluctuations after 2003. Hypothetically, such a mechanism could be the different rates both at which the main consumers of alcohol (problem-drinkers and alcoholics) die off and at which this cohort recovers. To put it another way, it is possible that, as consumption increases, such dying out takes place faster than the increase in the cohort of new heavy drinkers and alcoholics. Unfortunately, it is extremely difficult to test this hypothesis, due to the destruction in the 1990s of that part of the narcological service responsible for the monthly recording of registered alcoholics and problem-drinkers from

the risk group. In addition, the assumption of an oscillatory process is hampered by the 10-year decline in mortality after 2003.

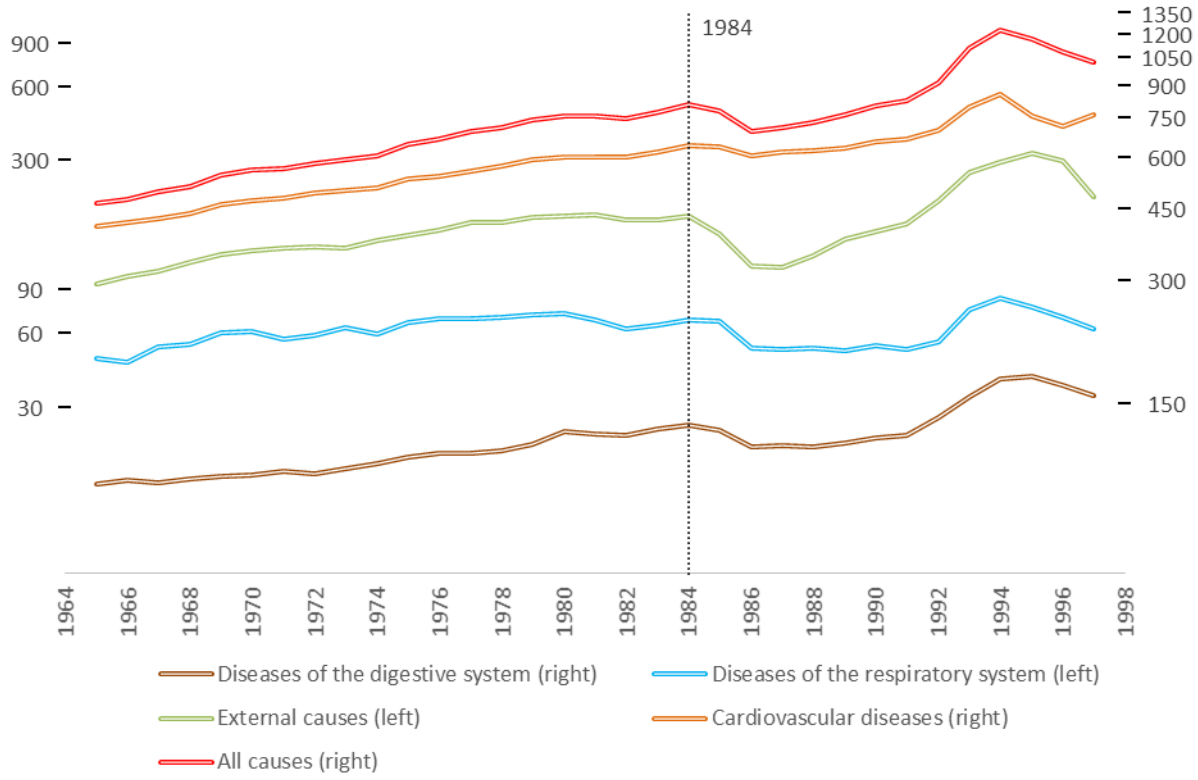

Figure 10. The number of men dead from certain classes of causes of death in 1965-1995, thousands

Note: Logarithmic scale.

Source: [Nemtsov 2002].

It is difficult to agree with Pridemore and co-authors [Pridemore et al. 2014] that the effect of the laws of 2005 led to a prolonged decline in mortality and delayed the recovery period: the decrease in mortality in 2006 and later was preceded by a decline in 2004-2005. The introduction of the laws did indeed accelerate the decline, but it lasted 2 years [Nemtsov, Shelygin 2014], and later returned to the initial rates of 2004-2005, with a subsequent and gradual slowdown. This was particularly evident with regard to deaths from alcohol poisoning (Figure 11), the number of which, after a long decline, first increased in 2014 compared with 2013 (6.2% for men and 1.7% for women).

Nevertheless, the prolonged decline in mortality in 2004-2014 is an indisputable fact, and it requires an explanation.

It is surprising that the discussion of alcohol policy in connection with the reduction of mortality usually starts from 2006-2007, whereas RSP, often referred to as the *market regulator*, was created in 2000, and the mortality reduction began in 2004. In fact, in their explanations of the phenomenon of mortality after 2003, the authors mentioned above and some others rely on detailed demographic indicators and general considerations about their connection with a decrease in alcohol consumption, although this relationship is assessed in different ways. It is important to

note that alcohol consumption, or, to put it more simply, drinking, is a watershed between the multiple causes leading to drinking [Nemtsov 2009] and the consequences of this activity, the gravest and most visible of which is death. Therefore, most of the research was carried out on one side of the watershed - on studying the relationship between alcohol consumption and mortality. The other side of this watershed, the causes of alcohol abuse, often goes unstudied. As a result, the cause-effect chain is not closed, or, in the role of causes, random factors are put forth, as was the case with the laws of 2005.

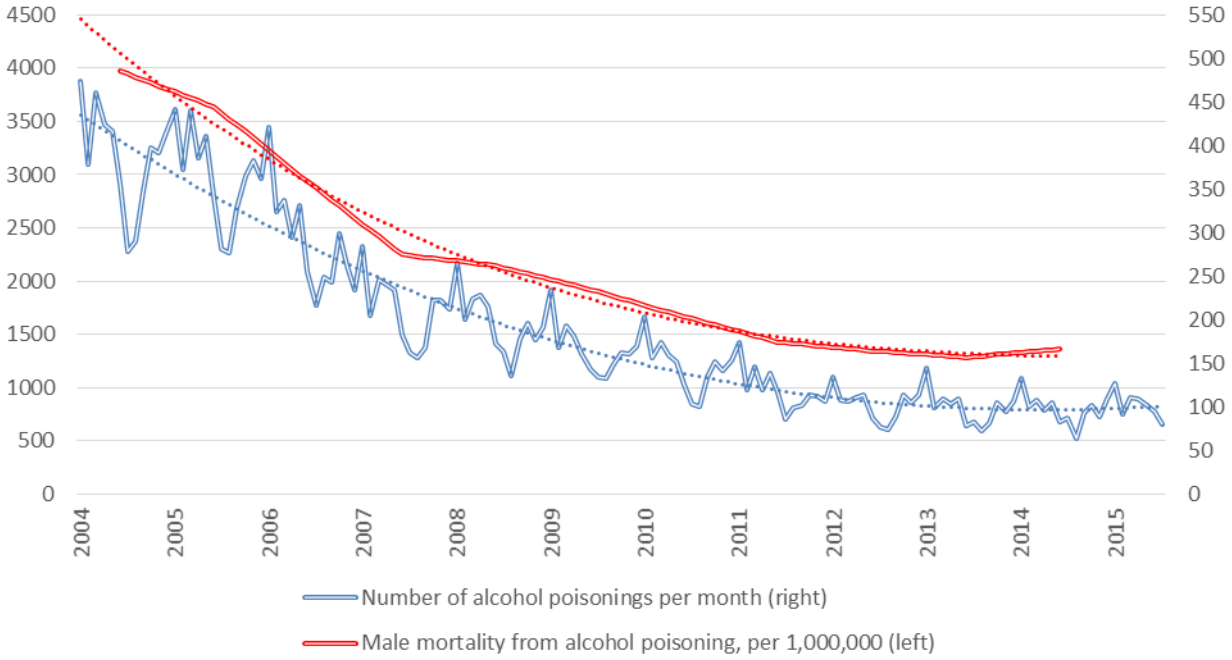

Figure 11. Male mortality from alcohol poisoning in 2004-2015

Note: The blue line represents monthly data (Rosstat); the red line - yearly indicators; and the dotted line is a polynomial of the third degree.

I repeat once again that the decrease in mortality began 2 years before the introduction of these laws, which means that there were reasons for the change in growth to decline. Leaving aside subtle psychological or other factors leading to heavy drinking and its consequences, it seems that the causes of the decline in mortality that began in 2004 are reflected in the table (see Appendix). Never in the recent history of Russia [Nemtsov 2009], including the 1985 anti-alcohol campaign, has political pressure been so long-lasting, albeit inconsistent. This time, pressure was put on the alcohol market to suppress illegal production and replenish the budget.

One of the possible causes of the decrease in mortality due to a decrease in alcohol consumption in recent years is sometimes referred to as the change in the composition of alcoholic beverages consumed (see above). However, this is still unlikely, because the predominance of beer among some consumers began relatively recently, about 15 years ago (Figure 10), and concerned primarily young people, who are still a long time away from realizing their low risk of dying of alcohol in connection with the transition to beer.

Newspapers and speeches of officials name as another cause measures of direct action: restrictions on the sale of alcohol by age (18+), place (school, etc.) and time (nighttime

prohibition). The effectiveness of these measures has been investigated only once, in connection with the nighttime restriction [Kolosnitsina et al., 2015]. The authors found that limiting the time of sales led to their decrease. But this was shown only for one year (2010 versus 2009), not taking into account the fact that the decline in this period occurred against the backdrop of the decline that began in 2004 (Figure 6), and fig. 6 does not detect changes in the sales trend in 2010 and later. So the effectiveness of this measure cannot yet be considered proven.

CONCLUSION

In 2000 began the *second* anti-alcohol campaign. Unlike the first, it was unannounced, and the actions associated with it were neither rational nor consistent. Moreover, alcohol policy in Russia has *no* scientific justification. Despite a significant reduction in alcohol consumption and mortality, this campaign cannot be recognized as being aimed at improving the health of the population.

The object of the first campaign was the consumer, of the second - the alcohol market, primarily the manufacturer.

The purpose of the first campaign was to reduce consumption, and, with the help of this, to reinvigorate an ailing economy, for which purpose other equally naive economic measures were implemented. The main goal of the second campaign was to fill the budget, which had seriously shrunk at the end of the Soviet regime and during the "Wild 90s", by suppressing the illegal market and shifting consumers along with their cash into the lap of the legal market.

The methods of the first campaign were a decrease in production and a restriction of trade. The methods of the second were more diverse, and changed during the course of the campaign. The main thing was still to force small and medium-sized producers of spirits, who were supposed to be the main suppliers of illegal products, out of the market. At the same time, there was an intensive redistribution of assets in favor of their large holders, who were supposed to be able to monopolize the market and restore order there. The methods of the second campaign include the USAIS, the creation of other difficulties for the participants of the alcohol market, the raising of excise taxes and a minimum price for alcohol. Among the methods was tough, sometimes criminal, competition, which occasionally influenced legislative decisions, as had happened with the legislative infringement of the beer industry, competing with the producers of vodka for the consumer.

The instrument of the first campaign was administrative pressure from the local bodies of the Communist Party. The main tools of the second were the RSP and the RAR, with their ever-expanding fiscal powers.

As a result, there was no recovery of the economy in the first campaign, or replenishment of the budget at the expense of alcohol in the second. The beneficial reduction in alcohol consumption and mortality in the first campaign was short-lived. The second campaign in this respect was more effective in connection with the coming economic crisis and budget deficit, while the reduction of alcohol consumption and mortality was a by-product of the search for budget

funds in the alcohol market. Both of these campaigns caused an increase in the consumption of illegal alcohol.

The causes of the failure of both the first and the second campaign were unskilled leadership, the lack of scientific development of alcohol policy, the poverty of the population, and the underestimation of the fact that alcohol is a part of the needs of much of the population. The second campaign differed from the first in its more powerful component of corruption. One can't bring order to a local sector of the economy when corruption has become a systemic factor in the country as a whole.

The failure of the first campaign was marked by the return of alcohol sales in 1988. The end of the second campaign, more precisely the end of its first stage, was marked "with an action plan ("a road map") for stabilizing the situation and promoting competition in the alcohol market," approved on November 26, 2015. The "map" revealed that the 15-year campaign had not produced the desired results, and that new efforts were needed to achieve the goals set in 2000. But it didn't stop there. On January 15, 2016, the President signed a decree subordinating the RAR to the Ministry of Finance and transferring to the ministry functions for the development and implementation of alcohol policy. Thereby, the true goals of the second anti-alcohol campaign were finally revealed and the beginning of its *second* stage was set.

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ROAD TRAFFIC ACCIDENTS AND MORTALITY IN RUSSIA: 1956-2014*

TIMUR FATTAKHOV

This article presents for the first time an analysis of the continuous statistical data series on deaths from road accidents in Russia since 1956. The total number of deaths for 1956-2012 exceeded 1.4 million. The increase in mortality from traffic accidents started in the 1970s; since the beginning of the 1990s, the lag behind most developed countries has been growing. At 2012 mortality levels, about 85-95% of Russia's deaths from road accidents were excessive compared with the number of deaths that would have occurred at age-specific mortality rates from this cause in selected European countries. Both the current characteristics of the general level of motorisation and the main indicators of traffic injuries, such as the number of deaths per 100 thousand persons, per 10 thousand vehicles or per number of kilometres traveled, show that in terms of transport development Russia lags 40-50 years behind Western countries.

The article also examines the history of the inclusion of mortality from road accidents in the International Classification of Causes of Death (ICD) and the problems of reflecting this mortality in Russian mortality statistics.

Age and sex-specific patterns and trends in Russian mortality from traffic accidents are analysed, as well as the differences in mortality for different categories of road users (e.g. drivers, passengers and pedestrians) for the longest period possible. International comparisons that allow for understanding the extent of Russian backwardness and seeing the long-term unsustainable trends in mortality from road accidents are presented.

The author points out the necessity of further scientific research into road and transport safety problems and the development of effective safety improvement programmes in Russia aimed to overcome the lag.

***Key words**: motorization, traffic accidents, history of traffic accidents, deceased in an accident, ICD, external causes of death.*

THE HISTORY

Road traffic accidents constitute a relatively new cause of death. Unlike homicide, suicide, poisoning and drowning, which have always existed, traffic accidents are a product of a new technological era [Vishnevsky, Fattakhov 2012].

However, the first mentions of the dangers of road transport go back to the days of antiquity. The ancient Greek myth of Phaeton, who lost control of his father's chariot, speaks to the fact that people have long known about the risks associated with the use of wheeled vehicles. There is speculation, albeit disputable, that the 19-year-old pharaoh Tutankhamun, who ruled Egypt in the 14th century BC, died from injuries caused by a fall from his chariot while hunting. In the Bible (2 Maccabees 9:7), there is a mention of the fall of Antiochus IV Epiphanes, a Syrian king: "... It happened as he was going with violence that he fell from the chariot, so that his limbs were much pained by a grievous bruising of the body". Martial (c. 40-104 AD), a Roman poet and epigrammatist, tells the story of the Greek chariot racer Scorpus, who won more than 2,000 competitions and perished in a race at the age of 27 [Martial 1968].

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In classical antiquity, people were familiar with the problems of road traffic, and there were many attempts to regulate it. For instance, Julius Caesar in his law for urban improvement (45 BC) forbade entry into Rome of all wagons between sunrise and sunset. Exceptions were made only for carts transporting construction materials for temples and public buildings and removing garbage from the city, as well as for triumphal chariots and carriages participating in ceremonial processions. In the first and second centuries, this ban was extended to all cities of Italy. Claudius issued an edict forbidding the driving of carriages through Italian cities, and Marcus Aurelius confirmed the prohibition [Sergeyenko 2000]. This nevertheless helped little. Juvenal (c. 60-127 AD) describes in one of the Satires the traffic on the streets of Rome [Juvenal 2015]:

… The endless traffic
In narrow twisting streets, and the swearing at stranded cattle < …>
When duty calls, the crowd gives way as the rich man's litter,
Rushes by, right in their faces, like some vast Liburnian galley,
While he reads, writes, sleeps inside, while sped on his way < …>
Yet, he gets there first: as I hasten, the tide ahead obstructs me,
And the huge massed ranks that follow behind crush my kidneys;
This man sticks out his elbow, that one flails with a solid pole,
This man strikes my head with a beam, that one with a barrel.
Legs caked with mud, I'm forever trampled by mighty feet
From every side, while a soldier's hobnailed boot pierces my toe < …>
Recently-mended tunics are ripped, while a long fir log judders
As it looms near, while another cart's bearing a whole pine-tree.
They teeter threateningly over the heads of those people below.
Now, if that axle breaks under the weight of Ligurian marble,
And spills an upturned mountain on top of the dense crowd,
What will be left of the bodies? What limbs, what bones will
Survive? …

Some medieval lawmakers acknowledged that their roads could be travelled only at a risk to their lives, and in 15th-century letters merchants emphasised that, due to road conditions and other hazards, very few people would return unscathed from a trip [Kulisher 2012]. This problem was also known in Russia. There is mention of the fact that, in the 15th century, the first rules for using postal roads were introduced. At the beginning of the 18th century, Peter I issued a decree imposing rules on how to behave while driving through the city, and the enforcement of the traffic rules was entrusted to the police [Zolotaja kniga... 2006].

By the end of the 19th century in Europe, carriage transportation reached its peak. According to rough calculations, in the last decades of the 19th century the number of animal-drawn vehicles had reached 20 million [Dolmatovsky 1986], which certainly affected the scale of traffic injuries. Thus, in Great Britain in 1875 animal-drawn transport was responsible for the deaths of 1,589 people [Cummins 2003]. In New York City in 1900, 200 people were killed by horses and carriages; in 2012 in the same city, 293 people died in traffic accidents. In 1900, the population of New York City was 3.4 million people; in 2010, it was 8.2 million – that is, mortality from traffic accidents per 100,000 at the beginning of the 20th century was about 40 percent higher than it is now [Morris 2007].

Nonetheless, it was only after the motorcar became ubiquitous that wheeled vehicles became a massive threat to people's life and health. The first car in the world was built in 1886, and the world's first traffic accident involving a car (hitting a pedestrian) happened in 1896, a decade later. The recording of road traffic accidents involving a car and leading to fatality began in 1899.

Since then, the number of traffic accidents has, unfortunately, been constantly growing. When cars crash, injuries are commonplace and people are often killed. In terms of the number of victims, traffic accidents are considered to be one of the most dangerous external causes of death in the world. In addition, they are a major cause of disability, since for every case of death from a road accident there are many times more injured survivors [Vishnevsky 2010]. In 1974, the World Health Assembly (WHA) adopted resolution WHA 27/59, which declared road traffic accidents to be a major public health problem.

In Russia, the process of motorisation began at a time when there were already hundreds of thousands of cars in the West. The first cars appeared in Russia in the early twentieth century. Prior to the 1970s, the number of passenger cars produced was smaller than that of trucks, which was quite unusual for countries with high levels of motorisation. The turning point came only after the commissioning in 1971 of the Volga Automobile Plant (VAZ) in Togliatti. If, in 1970, Russia produced 257,000 cars and 445,000 trucks, by 1975 the ratio had become quite different: 1,066,000 cars and 591,000 trucks. From that point onward, there was a considerable expansion of the car market and of the real motorisation of the USSR and, later, Russia (see Figure 1).

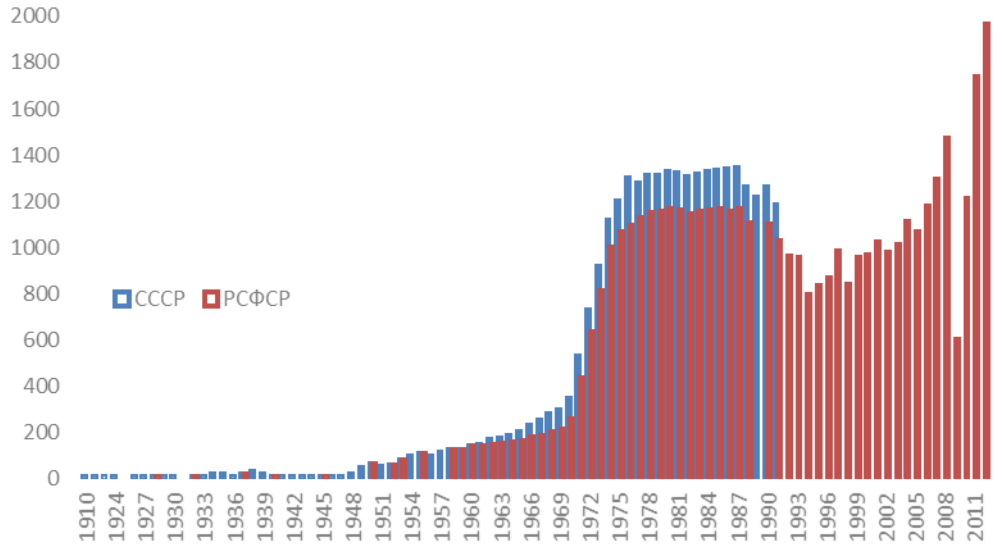


Figure 1. Production of passenger cars in the USSR and Russia, thousands

Source: [Narodnoe khozyajstvo SSSR (1958-1990); Rosstat (1995-2014)]

In 2012, there were 38.7 million passenger cars in Russia. From 2000 to 2012, the share of cars in the structure of motor vehicles increased from 64.6% to 80.9% (Figure 2).

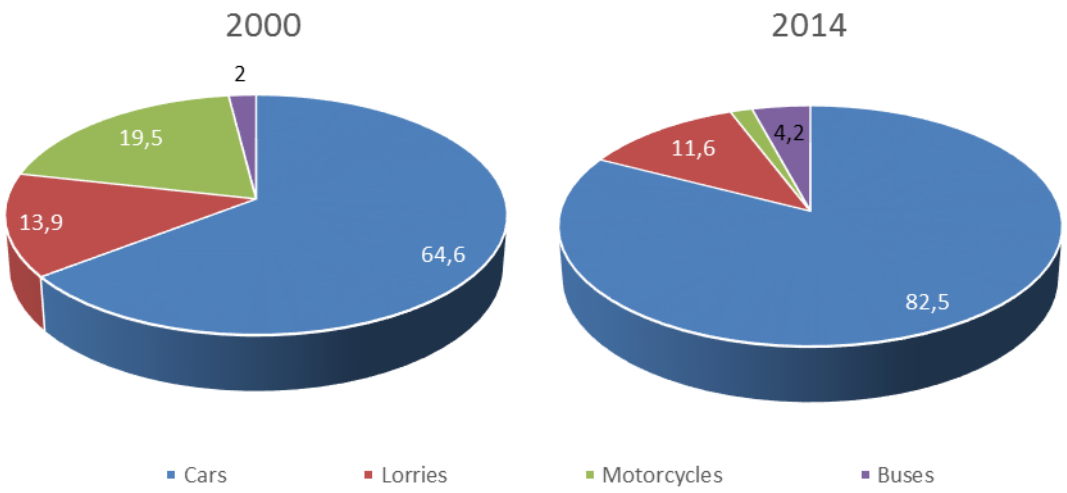


Figure 2. The structure of Russian motor vehicles in 2000, 2014, %

Source: [STSI ...].

The growth of the car fleet in recent decades is largely due to foreign cars. So, if in 1999 there were only 4.2 million foreign cars in Russia, in 2012 there were already 17.7 million (Figure 3). In 1999, only one in every five cars in the country was of foreign origin, in 2012 – almost one in two (45.6%).

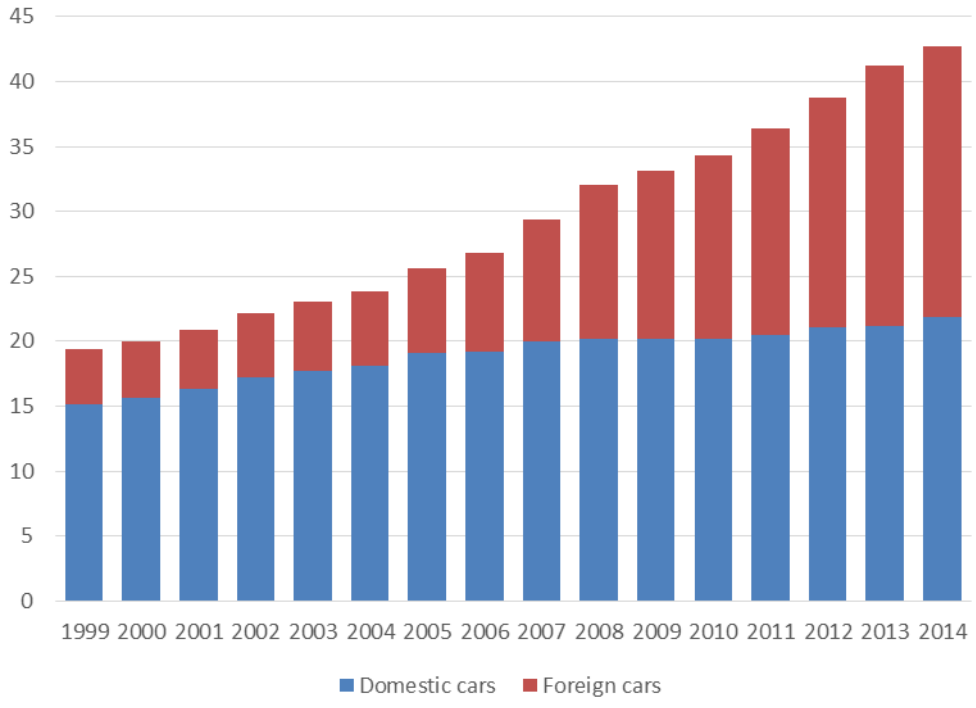


Figure 3. Growth in the number of cars in Russia in 1999-2014, millions

Source: [STSI ...].

Accordingly, from 1999 an increase in the share of road traffic injuries in the overall mortality structure began. Road traffic injuries had, of course, occurred in Russia before, but the

losses associated with it are not comparable with those that happened 20-30 years later, despite the currently relatively low – by world standards – level of motorisation. As the authors of an article on the consequences of traffic accidents in Russia wrote in the early 2000s, while the number of cars per 1,000 inhabitants did not reach even 150, "There is an impression that Russia aims to compensate for the small number of cars with a large number of fatalities per each of them" [Revich, Reshetnikov 2001]. Since then, the number of passenger cars per 1,000 inhabitants in Russia has doubled, and the problem of traffic accidents and their consequences, including mortality due to them, has become even more important.

TRAFFIC ACCIDENTS IN THE INTERNATIONAL CLASSIFICATION OF DISEASES (ICD) AND THE RUSSIAN NOMENCLATURE OF THE CAUSES OF DEATH

Awareness of the importance of road traffic injuries as both a factor affecting health and a cause of death can be traced in the International Classification of Diseases, Injuries and Causes of Death. This awareness did not come immediately. In the first edition of the International Classification of Diseases, Injuries and Causes of Death adopted in 1900, in the category of "violent death", traffic accidents do not stand out and are, correspondingly, included in the group of "other external causes". The role of motor transport as a source of danger to life and limb was still a minor one; people still were dying mostly under the wheels of carriages, coaches and carts (Table 1).

The following editions (ICD-2-3) still identified road traffic accidents not as a separate cause of death, but included them in the category of "violent deaths", together with certain natural disasters: "Injuries and other severe injuries (cars, railways, water transport, landslides, etc.)" [International Statistical ...].

The fourth edition did not include traffic accidents in the main list of causes of disease and death, but recommended keeping separate records of them. It was recommended to record separately rail transport, cars and motorcycles, other means of vehicular transport, water transport and air transport.

Major changes were introduced to the international list of causes of death in the fifth edition (1938). For the first time, a separate category related to traffic accidents appeared in the list. It included nine causes, one of which was designated as "road traffic accidents" [International Statistical ...]:

- Railway accidents (any cause of death except war),
- Motor vehicle accidents (any cause of death except war),
- Collisions with trains,
- Collisions with trams,
- Other motor vehicle accidents,
- Tramway accidents on roads (any cause of death except war),
- Other road traffic accidents (any cause of death except war),
- Water traffic accidents (any cause of death except war),
- Air traffic accidents (any cause of death except war).

Table 1: Classification of traffic accidents in the ICD-1 – ICD-5

	Traffic accidents	Road traffic accidents
ICD-1 (1900)	Not singled out Traffic accidents included in cause 166 "Other external causes"	Not singled out
ICD-2 (1909)	Not singled out Traffic accidents included in cause 175 "Accidental injury by other forms of crushing (road vehicles, on railways, etc.)"	Not singled out
ICD-3 (1920)	Not singled out Traffic accidents included in cause 188 "Accidental injury by other forms of crushing (road vehicles, on railways, etc.)"	Not singled out
ICD-4 (1929)	Not singled out, but there is a recommendation to record such incidents	Not singled out, but there is a recommendation to record such incidents
ICD-5 (1938)	169-173	170-171

Subsequent revisions of the International Classification of Diseases and Related Health Problems, published in the post-World War II period, demonstrated a fairly clear awareness of the car as a serious source of danger to life and limb. In the 6th-9th editions, there is a separate group of causes of death and injuries resulting from traffic accidents, "Car accidents" (Table 2).

Table 2. Classification of accidents in ICD-6 - ICD-9

Revision 6 (1948)	Revision 7 (1955)	Revision 8 (1965)	Revision 9 (1975)
Railway accidents (E800-E802)	Railway accidents (E800-E802)	Railway accidents (E800-E807)	Railway accidents (E800-E807)
Motor vehicle traffic accidents (E810-E835)	Motor vehicle traffic accidents (E810-E835)	Motor vehicle traffic accidents (E810-E823)	Motor vehicle traffic accidents (E810-E825)
Other road vehicle accidents (E840-E845)	Other road vehicle accidents (E840-E845)	Other road vehicle accidents (E825-E827)	Other road vehicle accidents (E826-E829)
Water traffic accidents (E850-E858)	Water traffic accidents (E850-E858)	Water traffic accidents (E830-E838)	Water traffic accidents (E830-E838)
Aircraft accidents (E860-E866)	Aircraft accidents (E860-E866)	Air and space traffic accidents (E840-E845)	Air and space traffic accidents (E840-E845)

In the currently used ICD-10, road traffic accidents occupy a central place in the category "Traffic accidents" (V01-V99) of class XX, "External causes of morbidity and mortality", with eight of the category's 12 groups devoted to it (Table 3).

Groups related to accidents connected with ground transportation (V01-V89) indicate the type of transport and the category of the victim; in addition, they have subcategories for the identification of a different road user or type of accident.

The codes for the majority of traffic accidents are built according to particularly designated characters in the code with a set of features. The letter V represents traffic accidents. The second sign provides information about the victim (0 – pedestrian, 1 – bicyclist, 2 – motorcyclist, etc.). The third code symbol indicates into what the victim ran (01 – bicycle, 02 – two or three-wheeled motor vehicle, etc.). Information about whether the traffic accident took place on or off of a road

is provided in the fourth symbol. For instance, the code V03.1 would mean that there was a traffic accident (V) in which a pedestrian (0) was hit by a car (3) in a road traffic accident (1).

Table 3. Structure of traffic accidents in the ICD-10

V01-V09	Pedestrian injured in a traffic accident
V10-V19	Pedal cyclist injured in a traffic accident
V20-V29	Motorcycle rider injured in a traffic accident
V30-V39	Occupant of three-wheeled motor vehicle injured in a traffic accident
V40-V49	Automobile occupant injured in a traffic accident
V50-V59	Occupant of a pick-up truck or a van injured in a traffic accident
V60-V69	Occupant of a heavy transport vehicle injured in a traffic accident
V70-V79	Bus rider injured in a traffic accident
V80-V89	Other land traffic accident
V90-V94	Water traffic accident
V95-V97	Air and space traffic accident
V98-V99	Other and unspecified traffic accident

Table 4. List of detailed causes of death in traffic accidents in accordance with the concise list in use in the USSR and Russia

Period	Causes
1956-1998	Motor vehicle traffic accident Motor vehicle traffic accident involving collision with a pedestrian Other traffic accident
1999-2005	Pedestrian injured in a traffic accident Automobile occupant injured in a traffic accident Other and unspecified traffic accident
2006-2010	Pedestrian injured in a traffic accident Automobile occupant injured in a traffic accident Other and unspecified traffic accident Pedestrian injured in a collision with motor vehicle, a non-traffic accident Other people injured in a collision with motor vehicle, a non-traffic accident Other traffic accident
2011 onward	Pedestrian injured in a traffic accident (except rail) Cyclist (any), a motorcyclist and a person in a three-wheeled vehicle injured in a road traffic accident Person found in a vehicle injured in a road traffic accident Pedestrian injured in a non-traffic accident (except rail) Cyclist (any), a motorcyclist (any) and a three-wheeled vehicle rider injured in a non-traffic accident Person found in a vehicle injured in a non-traffic accident Pedestrian injured in a collision with a train or other railway vehicle Pedestrian injured in an unspecified traffic accident (except rail) Immersion in water and drowning in an accident on a watercraft Immersion in water and drowning related to water transport not associated with an accident on it Other and unspecified accident in water transport Accident in air transport and space travel Other and unspecified traffic accident

In the practice of Russian public statistics, mortality data are processed with the International Classification in mind, but according to an abbreviated nomenclature which is periodically revised. With the transition of Russia to the ICD-10 in 1999, data on road traffic mortality was no longer assigned to a separate cause. This is primarily due to the appearance of a more detailed list of separate causes of death and a new formulation of a road accident. The World Health Organisation (WHO) has developed specific recommendations as to which transport causes of death (in accordance with the new ICD-10 coding) should be categorised as road traffic accidents. In Russia, unfortunately, this recommendation is not followed. In 2005 and 2011, the

Ministry of Health of the Russian Federation reviewed the list of causes of death in use in Russia. Since 2011, 13 transport causes of death have been identified (codes 256-268).

Table 5. ICD-10 codes recommended by WHO to determine road traffic accidents and codes of traffic accidents used in Russia

WHO recommendation	Recommendations for Form 57 "Information on injuries, poisoning and other certain consequences of external causes"
V02-V04; V09; V12-V14; V20-V79; V82-V87; V89	V01.1; V02.1; V03.1; V04.1; V09.1; V09.3; V83.2; V84.2; V85.2; V86.2; V10.3-9; V11.3-9; V12.3-9; V13.3-9; V14.3-9; V15.3-9; V16.3-9; V17.3-9; V18.3-9; V19.4-9; V20.3-9; V21.3-9; V22.3-9; V23.3-9; V24.3-9; V25.3-9; V26.3-9; V27.3-9; V28.3-9; V29.4-9; V30.4-9; V31.4-9; V32.4-9; V33.4-9; V34.4-9; V35.4-9; V36.4-9; V37.4-9; V38.4-9; V39.4-9; V40-V79 (.4-.9)

Depending on the availability of statistical data on deaths from traffic accidents, a rough division into four periods can be made according to the number of detailed causes of death: 1956-1998, 1999-2005, 2006-2010 and the current period starting in 2011 (Table 4). Table 5 compares the ICD-10 codes recommended by WHO for the classification of road traffic accidents with the codes used in Russia.

MORTALITY FROM ROAD TRAFFIC ACCIDENTS IN RUSSIA AND ITS PLACE IN THE STRUCTURE OF TOTAL MORTALITY AND MORTALITY FROM EXTERNAL CAUSES

As was noted, for Russia there is a high number of deaths from road traffic accidents, as well as from other causes of death, beginning from 1956. From 1956 to 1998, the sum of "accidents related to motorised vehicles" and "traffic accidents on a public road as a result of a collision with a pedestrian" gave the total number of people killed in traffic accidents. Due to repeated changes in the nomenclature of the causes of death, the data for different periods are not quite comparable, and to ensure the comparability of the Russian indicators with each other and with the indicators of other countries, special work was needed to reconstruct comparable time series of deaths (including road traffic accidents). The most famous reconstruction of the time series of deaths by causes of death (including traffic accidents) relates to the 1965-1994 period [Meslé F. et al 1996]. A few years later, the same authors, joined by E.M. Andreev, extended the series back to 1956. For the years 1995-1998 there are the same data, calculated by E.M. Andreev based on official mortality statistics.

Data on road traffic accidents and their consequences in Russia are published in various statistical reports, available in international databases and referred to in various studies (Table 6).

Today, police reports are the main source of information on road traffic accidents in most developed countries (90 percent) [Derriks, Mak 2007], including Russia. Medical reports are an auxiliary source of information.

In almost all countries, there are differences between the data of the Ministry of Public Health and that of the police. The differences are usually minimal and only in rare instances exceed 6-7 percent (Figure 4).

Table 6. Sources of information of traffic fatalities in Russia

Publication or Database	Data Type	Source	Period Covered
[Rosstat (1991-2013)]	Open	State Traffic Safety Inspectorate (STSI)	1991-2013
[Rosstat (1980-2013)]	Open	STSI	1980-2013
[Rosstat (2006-2013)]	Open	Rosstat	2006-2013
[Rosstat (1997-2013)]	Open	STSI	1997-2013
[Rosstat (1990-2013)]	Open	STSI	1990-2013
[Rosstat (2000-2013)]	Open	STSI	2000-2013
[Rosstat (1995-2014)]	Open	STSI	1995-2014
[WHO Mortality Database]	Open	Rosstat	1980-1998
[Database of the United Nations]	Open	STSI	1993-2012
Non-personal data*	Closed	Rosstat	1999-2014
[Form №40]	Closed	Ministry of Public Health	1999-2014
[Meslé, Vallin… 2003]	Open	Rosstat adjusted by E.M. Andreev et all	1956-1964
[Meslé, Vallin… 1996]	Open	Rosstat	1965-1994
[Russian database…]	Open	Rosstat	1995-1998

** Anonymous microdata on all cases of death collected by territorial offices of Rosstat and containing information on sex, exact date of birth, date of death and the cause of death are in accordance with ICD-10*

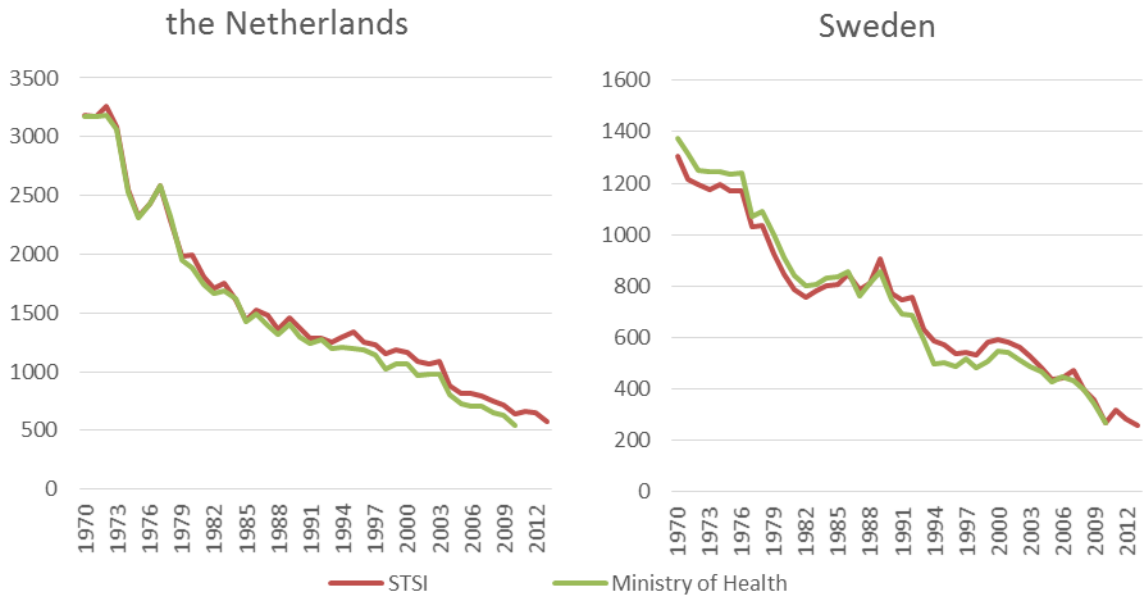


Figure 4. Differences between agency data in Sweden and the Netherlands, 1970-2013, people

Source: [OECD…; WHO Mortality Database]

What distinguishes Russia is the scale of interdepartmental differences (25-30 percent), which is not typical of other countries. The magnitude of underreporting of traffic fatalities allowed by the Ministry of Public Health is striking when compared to the data on fatalities from the Russian Demographic Yearbook and the STSI (Figure 5).

Figure 5. Road traffic fatalities data from Rosstat and STSI, 2006-2014, thousands

Source: [STSI…; Rosstat (2006-2013)]

A reconstruction of the number of fatalities from 1956 to 2012 compiled from all available sources is illustrated in Figure 6. It is evident that the data from the Ministry of Public Health and the STSI coincided until 1998. From 1999 to 2005, the Ministry of Public Health did not publish data on road traffic fatalities (during this period only STSI data were published). Such data appeared only in 2006 in the Russian Demographic Yearbook, and it is precisely in this year that a discrepancy between the data of the two agencies appeared. This discrepancy has never been eliminated. It is also clear what would have resulted if, starting in 1999, Russia had adopted WHO recommendations for defining a road traffic accident according to the ICD-10. In this case, the interagency differences in data on road traffic fatalities would have been reduced to a minimum (non-personalised data line).

Despite the differences in the data, the trend in road traffic mortality is clear. From 1956 to 1980, the number of deaths from traffic accidents grew steadily, went down for a short time during the anti-alcohol campaign and *perestroika* era (1985-1987), and after the end of the campaign resumed growth, reaching a historic high in 1991. This was followed by a decrease and a new resurgence after 1998 which peaked in 2003. This rise turned out to be short-lived, since after 2003 the declining trend (albeit with insignificant fluctuations) resumed.

The dynamics of mortality from road traffic accidents in Russia have been markedly different from those in developed countries, firstly by their extremely high level and secondly by their pendulum-like behaviour. According to the available WHO data, road traffic fatalities in developed countries had been growing until the early 1970s. The reduction of mortality in these countries began in the late 1960s and early 1970s. The ups and downs of traffic mortality observed in Russia are not characteristic of developed countries, where such mortality has been steadily declining.

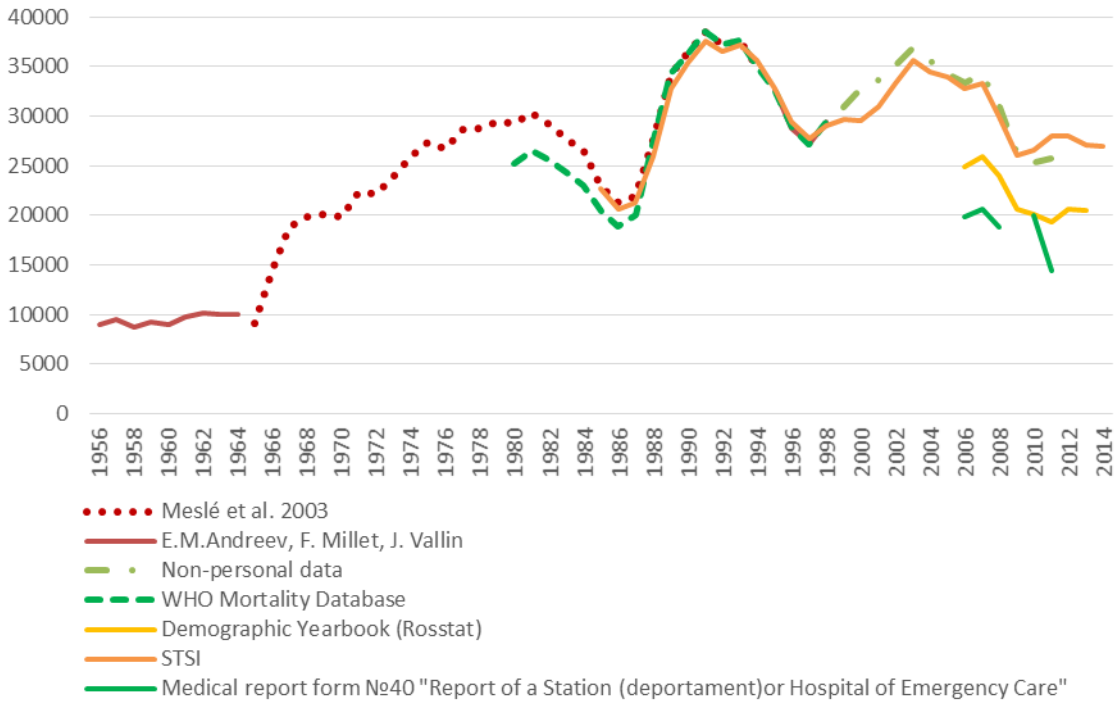


Figure 6. Reconstruction of the numbers of road traffic fatalities in Russia, 1956-2014, people

In the 2000s, the number of road traffic fatalities in Russia resumed its decline, but the gains were smaller than in other countries. At the same time, the number of road traffic accidents and the number of people injured in Russia grew, whereas in most other countries they fell [Vishnevsky, Fattakhov 2012]. Russia, even taking into account the decline observed in recent years, is at a level that had already been reached by developed countries in the 1980s [Fattakhov 2014]. Accordingly, Russia's lag behind other countries remains significant. For instance, in 2010 the difference between Russia and leading economies (e.g. Sweden, the Netherlands, the UK, etc.) was six-fold. It should also be noted that the oscillatory movement of the level of road traffic fatalities observed in Russia during the last four decades does not allow us to determine with certainty whether the observed reduction in mortality will be interrupted by yet another rise or not (Figure 7).

Road traffic accidents and their consequences – the inevitable companions of motorisation – present a serious social and health problem worldwide. But in Russia, when compared with countries of similar levels of development, this problem is particularly acute. In a number of strategic documents, road safety issues are identified as priorities of socio-economic development. In his 2013 address to the Federal Assembly, President Vladimir Putin called the implementation of safety improvement programmes one of the urgent tasks for the country [*Obshhestvennyj doklad* 2014]. This interest in the problem is not accidental. The social and economic costs of traffic accidents and their consequences for the 2004-2011 period are estimated at 8.18 trillion roubles, which is comparable to the total of budget receipts of all regions of Russia in 2012 [*O federalnoy tselevoy …* 2014].

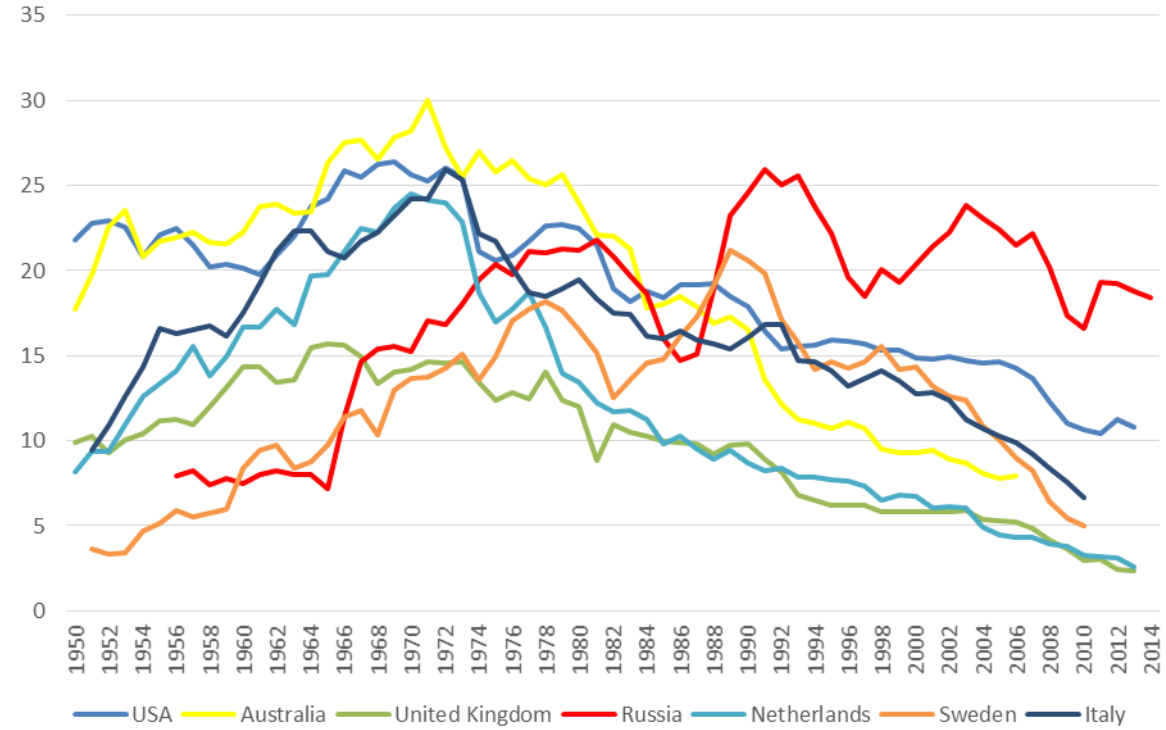


Figure 7. Standardised mortality rates from traffic accidents in Russia and selected developed countries, 1950-2014, per 100,000

Source: the author's calculations based on [WHO Mortality Database] and reconstructed data on mortality from road traffic accidents

According to Rosstat, 1,411,000 people died in road traffic accidents in Russia from 1956 to 2012. According to traffic police data, the cumulative number of road traffic accidents with victims surpassed 5 million in 1985-2012; 856,400 people died and more than 6 million received injuries of varying severity. About 40 percent of these injuries can be considered minor, while the other 60 percent can be classified as serious (e.g. open wounds, concussions, broken bones, internal injuries, burns, etc.) [Form № 57 ... 2011]. As a result of road traffic accidents, 6,000 people per year become disabled (groups I, II and III) [Form № 7 ... 2011]. According to the Russian Ministry of Public Health, overall mortality from traffic accidents is 12 times higher than from injuries resulting from other accidents, the disability rate is six times higher, and the need for hospitalisation is seven times more frequent [O federalnoy tselevoy... 2014].

If Russians died from road traffic accidents at the same rate as, for instance, the Swedes, the number of people killed in 2012 would have been not the actual 27,991, but 3,627 (Table 7). The total population loss between 1990 and 2012 would have been not 744,000, but 194,000. Excess mortality in this case would have reached 550,000 people, or 25,000 per year.

Other methods can also be used for estimating excess losses. Thus, if we use not the number of deaths per 100,000, but the number of deaths per kilometer of roadway, it turns out that by Swedish standards, not 28,000 people would have been killed in road traffic accidents in Russia in 2012, but 1,146 (Table 7).

To complete the picture, we also use the indicator of transportation risks (i.e. the number of deaths per 10,000 cars). If in Russia in 2012 the number of deaths per 10,000 cars had been the same as in Sweden, mortality from road traffic accidents would have come to 1,683 people (see Table 7), and total excess deaths from 1990 to 2012 would have been reduced to 696,000. Table 7 presents such comparisons with three countries – the United Kingdom, the Netherlands and Sweden.

Table 7. Hypothetical number of deaths from road traffic accidents in Russia in 2012 at the mortality level of three developed countries according to selected indicators, and excess deaths due to the higher mortality in Russia

Indicator	Hypothetical number of deaths at mortality levels of:			Excess number of deaths in Russia in comparison with the hypothetical number of deaths at mortality levels of:		
	United Kingdom	Netherlands	Sweden	United Kingdom	Netherlands	Sweden
Fatalities per 100,000	3945	4088	3627	24046	23903	24364
Fatalities per 10,000 vehicles	1930	1965	1683	26061	26026	26308
Fatalities per 1,000 km of roadway	4451	4199	1146	23540	23792	26845

As can be seen in Table 7, different ways of estimating excess Russian mortality when comparing Russia to several countries do not produce exactly the same results, but the differences are not fundamental. With the actual number of deaths from road accidents in Russia in 2012 at about 28,000, the numbers between 23,500 and 26,800 (84-86%) were excessive; at the mortality rates from road accidents typical for Western European countries, these might never have occurred.

Of course, such a comparison is rather conditional; at present, it is hardly possible to achieve such results in Russia. Nevertheless, it points to the huge unused reserves for reducing mortality from road accidents and testifies to the fact that such a reduction is in principle possible.

Road traffic accidents account for 1.5 percent of all deaths in Russia. The proportion of deaths due to traffic accidents in the overall structure of external causes of death varies, sometimes reaching a fairly high value, as was the case, for instance, in the late 1980s and early 1990s (18 percent), but these fluctuations are generally in the range of 10-14 percent (Figure 8).

Mortality from road traffic accidents contributes significantly to mortality from all external causes of death, but traffic accidents do not play the leading role in the structure of mortality from these causes. During the second half of the 20th century, the major external causes of death in Russia were suicide, murder and alcohol poisoning. In recent years, there has been an increase in the number of injuries with uncertain intent [Vasin, Krenev 2012]. On the whole, the dynamics of all the main causes of this class are similar (Figure 9).

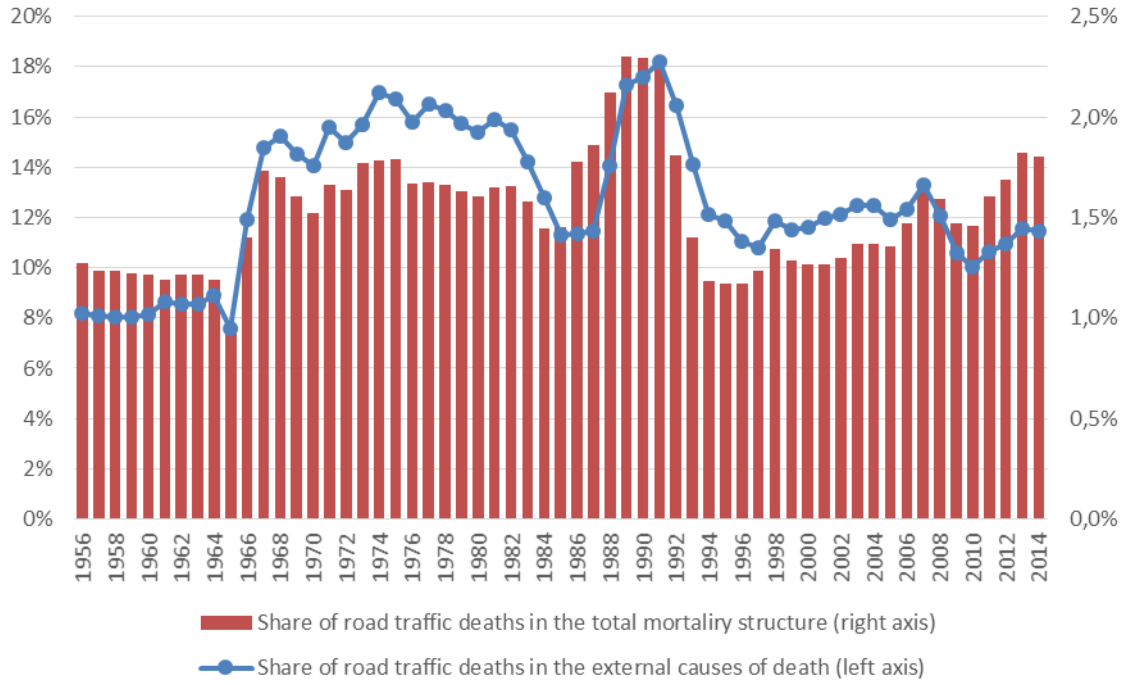


Figure 8. Share of road traffic fatalities in the total number of deaths (right axis) and in the number of deaths from external causes (left axis), 1956-2014, percent

Source: the author's calculations based on the reconstructed data on mortality from road traffic accidents

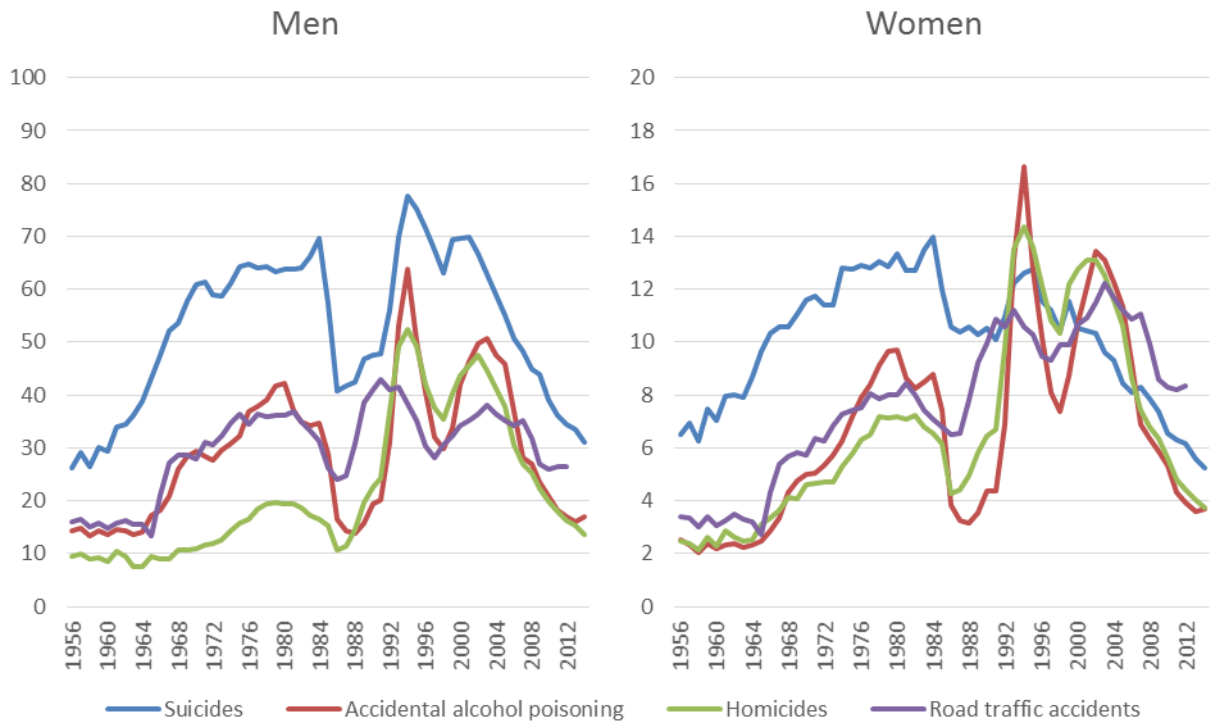


Figure 9. Standardised death rates from selected external causes of death in Russia, 1956-2014, per 100,000

Source: the author's calculations based on the reconstructed data on mortality from road traffic accidents

In 2012, road traffic accidents accounted for 14.4 percent of deaths from external causes. More people died from suicide, injuries with uncertain intentions and accidental alcohol poisoning (Figure 10).

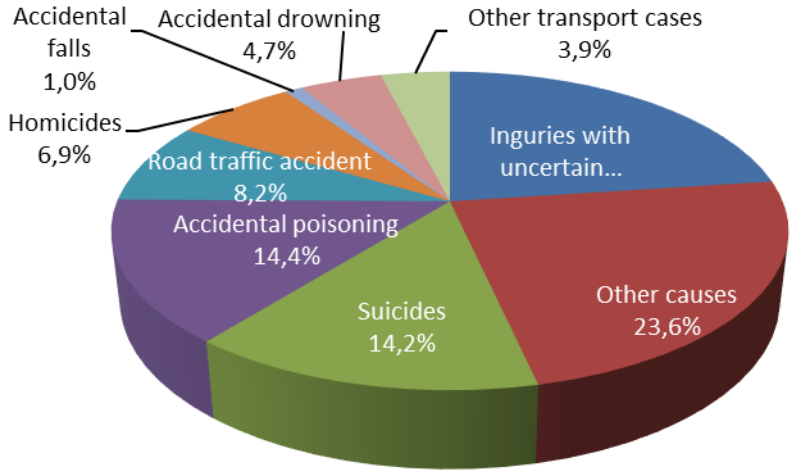


Figure 10. Distribution of the number of deaths from external causes by categories in Russia, 2014, percent

Source: [Rosstat (2006-2013)]

The proportion of deaths from road traffic accidents in external causes of death varies among countries. In Greece, road traffic mortality constitutes nearly 40 percent of all external causes. The lowest proportions are observed in the Scandinavian countries and Japan (Figure 11). On the graph, Russia occupies a middle position, but one must take into account that the overall mortality rate from external causes in Russia is usually much higher than in the countries cited.

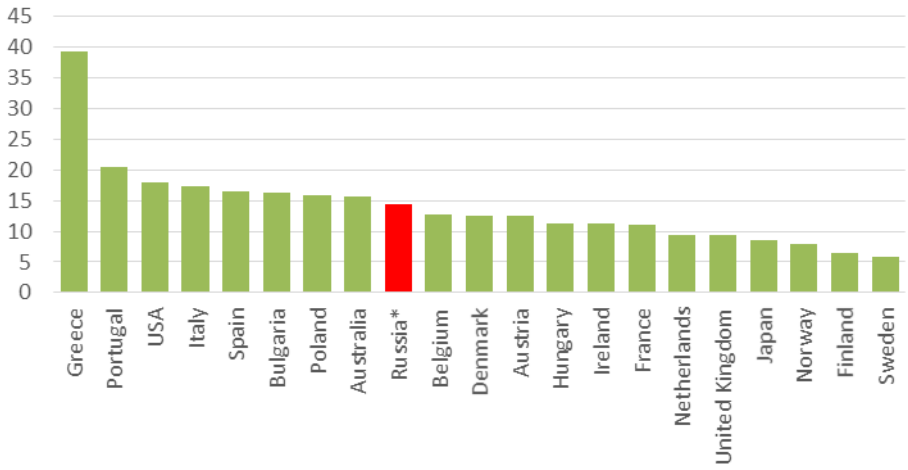


Figure 11. Percentage of deaths from traffic accidents in the external causes of death in selected countries, 2013

*Source: [WHO Mortality Database], * STSI*

Road traffic accidents hold a leading position in the structure of transportation mortality. They account for 80-90 percent of all deaths from traffic accidents, and according to this indicator Russia also does not differ from other countries (Figure 12).

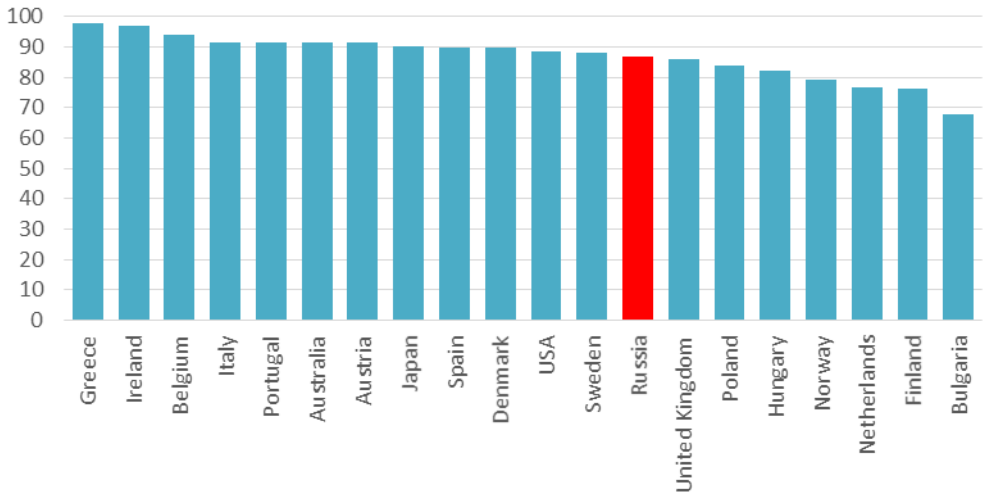


Figure 12. Share of deaths from road traffic accidents in the total number of deaths from traffic accidents in selected countries, 2012, percent

Source: [WHO Mortality Database]

AGE AND SEX DISTRIBUTION OF DEATHS IN ROAD ACCIDENTS

Mortality from road traffic accidents in Russia demonstrates both sex and age differences common to all countries, as well as distinguishing features characteristic only of Russia. Male and female mortality in Russia and Western Europe can be compared using the standardised mortality rate (SMR) from road traffic accidents. In Russia in the early 1970s, the rate was lower than in Western Europe. The decrease in mortality from road traffic accidents in Western Europe and its simultaneous increase in Russia reversed and widened the gap. In the early 1980s, mortality from road traffic accidents in Russia began to decline among both men and women, and by the mid-1980s it reached the European average, after which it rose even more sharply; in Europe, on the other hand, the standardised mortality rates from traffic accidents decreased steadily. In the last decade, the rates have converged somewhat, but this is in fact nothing more than a return to the level of the mid-1990s; the lag behind the countries of Western Europe remains (Figure 13).

In all countries and in all age groups, mortality from traffic accidents among men is 2.5-3 times higher than among women. As might be expected, this difference is not found in infants, but in the age group 1-4 mortality is already higher in boys. Among children aged 5-14, the ratio of the indicators for males and females is about 1.5-2.0 to 1; in the age groups 15-29 and 30-44 the ratio is 3-5 to 1; in the group 45-59, it decreases to 3.5 to 1, and then rebounds in the age group 65 and older. The similarity of the rates in all countries for the age groups 1-4, 5-14 and 65 and older is highly significant (Figure 14).

In Russia, the age profile of mortality has been changing continuously since the 1960s, gradually taking the form of a curve with a pronounced hump in mortality among youth. The mortality curve from road traffic accidents shows steep increases in age groups 15-24 and 75 and over. The maximum values of these indicators are evident in men, but significantly less so in women, especially in the age group 15-24. The age profile of male mortality from traffic accidents

in Russia peaked in the early 1990s, while in women the maximum was reached in the 2000s (Figure 15).

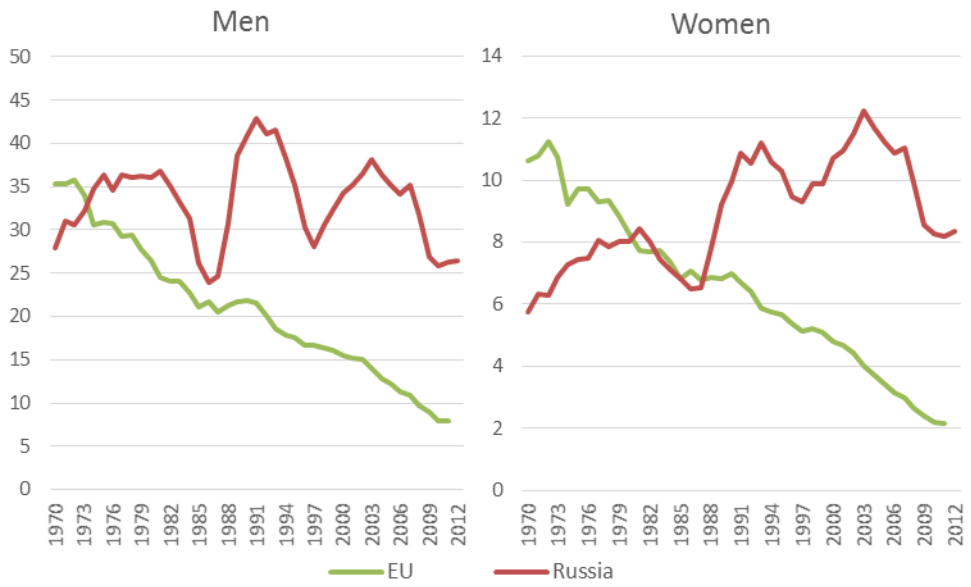
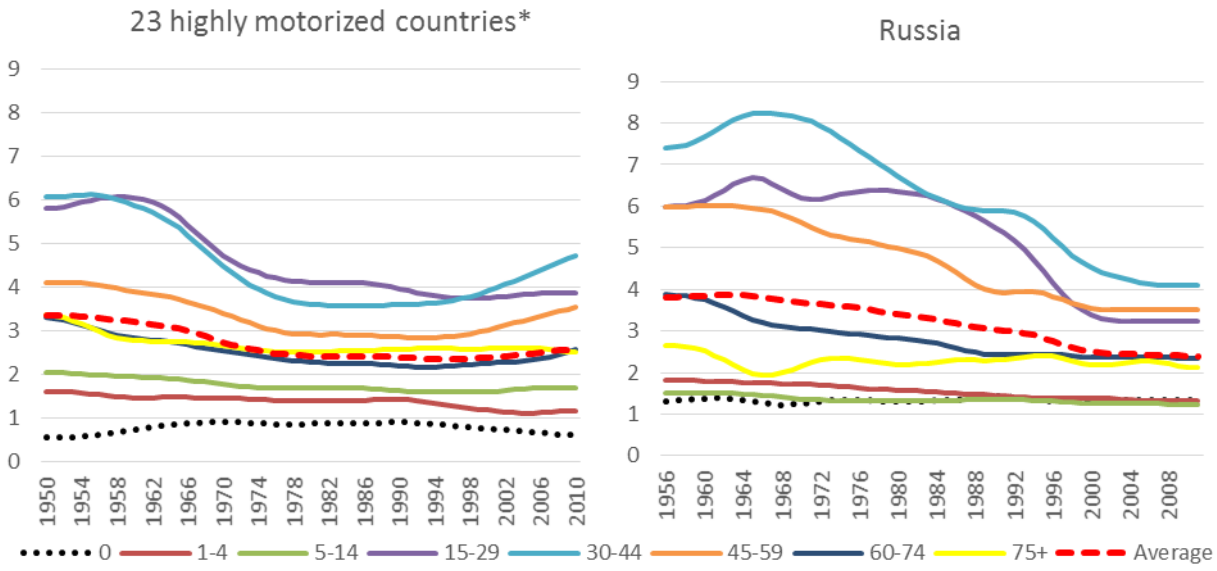


Figure 13. Standardised death rates from traffic accidents by sex, 1970-2013, per 100,000

Source: the author's calculations based on [WHO Mortality Database] and reconstructed data on mortality from road traffic accidents



**Australia, Austria, Belgium, Bulgaria, Canada, Denmark, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, the United Kingdom and the United States.*

Figure 14. Sex ratio in mortality from road traffic accidents in different age groups, 23 highly motorised countries and Russia, 1950-2011, male deaths per one female death

Source: the author's calculations based on [WHO Mortality Database] and reconstructed data on mortality from road traffic accidents

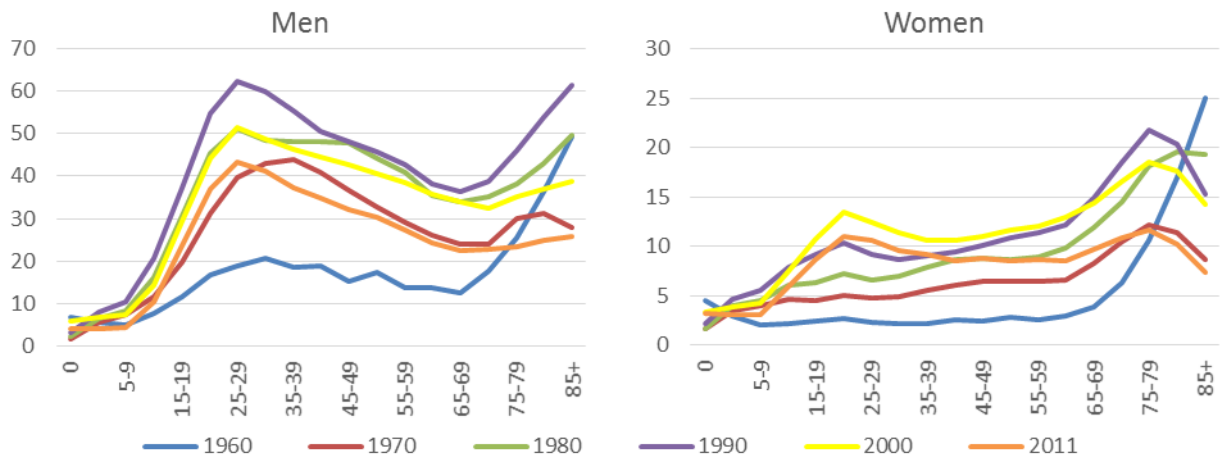


Figure 15. Age profile of mortality from traffic accidents in Russia, by sex, 1960-2012, per 100,000

Source: the author's calculations based on the reconstructed data on mortality from road traffic accidents

Such an age profile of mortality from road traffic accidents is typical not only for Russia but also for most countries. Mortality resulting from traffic accidents would seem to follow some kind of biological or sociological law operating equally everywhere. In most of them, among both men and women, the first peak of road traffic mortality is in the age group 20-24, and the second peak happens in the group aged 85 and over. Russia's lag is characteristic of all age groups. It is especially pronounced among children and among those of working age (Figure 16).

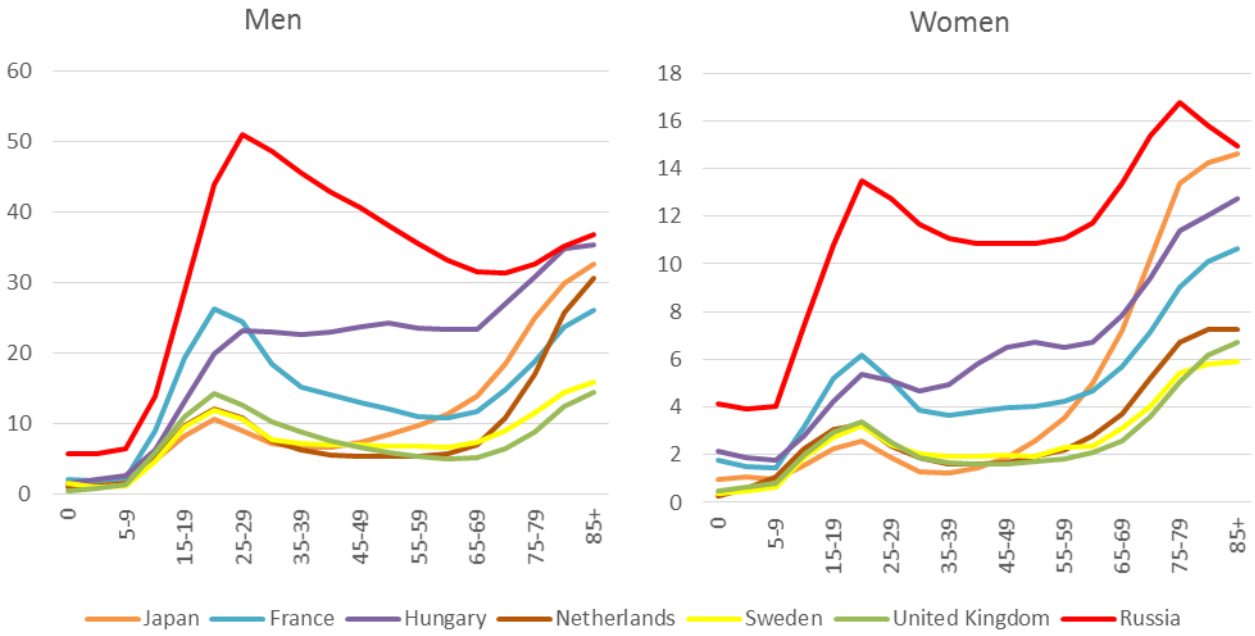


Figure 16. Age profile of mortality from road traffic accidents in Russia and selected countries, average for 2010-2013, deaths per 100,000

Source: the author's calculations based on [WHO Mortality Database] and reconstructed data on mortality from road traffic accidents

In Russia, the dynamics of the age-specific death rate from road traffic accidents can be traced back to 1956. The age distribution of road traffic mortality shows that, throughout the second half of the twentieth century, the main risk group was the working-age population aged 20-40 (Figure 17).

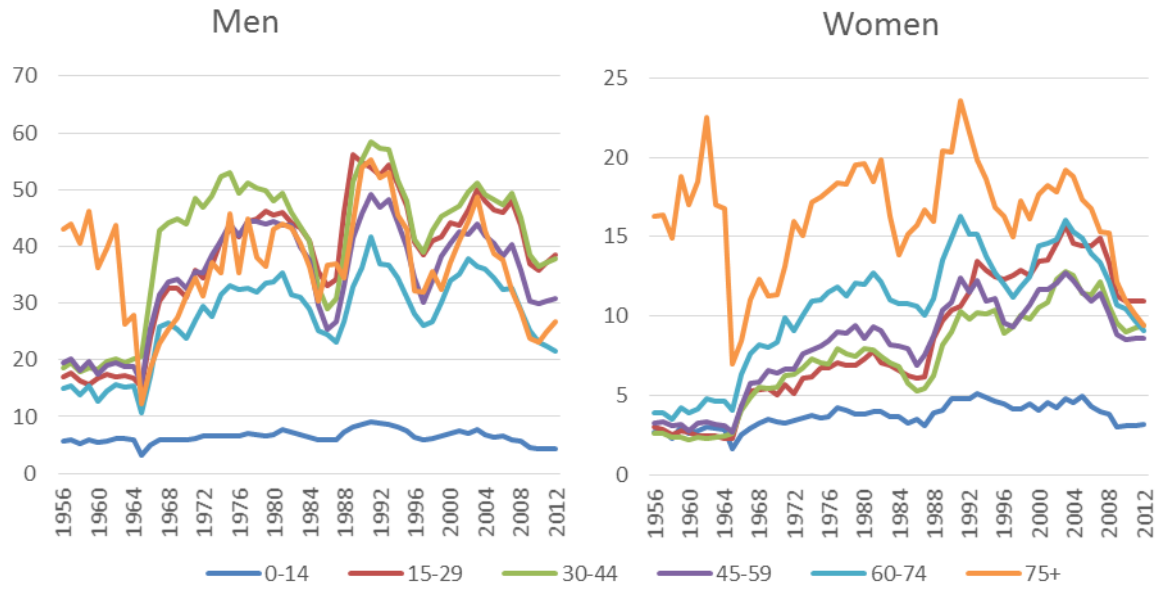


Figure 17. Age-specific death rates from traffic accidents in Russia, 1956-2012, per 100,000

Source: the author's calculations based on [WHO Mortality Database] and reconstructed data on mortality from road traffic accidents

VEHICLE OCCUPANTS AND PEDESTRIANS

In Russia, information on road traffic fatalities by category of road user can be traced to 1991. According to traffic police, until 2009 pedestrians were the main risk group on Russian roads. In the first half of the 1990s, a reduction in mortality from traffic accidents in Russia was characteristic for all groups of road users. From 1998 to 2003, overall mortality from road traffic accidents grew, especially at the expense of vulnerable road users. Since 2004, mortality of pedestrians began to decline again, which cannot be said of the occupants of vehicles. The decline in road traffic mortality observed in the last decade was completely determined by the trends in pedestrian mortality (Figure 18).

Recent trends in pedestrian deaths represent major progress for Russia, but the lag behind advanced countries remains significant. In Russia in 1991, 9 pedestrians per 100,000 perished, while in European countries the level was only 2.8 per 100,000. In 2013, 6 people per 100,000 perished on the roads in Russia, while the number in European countries was 0.9. The gap between Russia and European countries increased during that time from a three-fold to a six-fold difference.

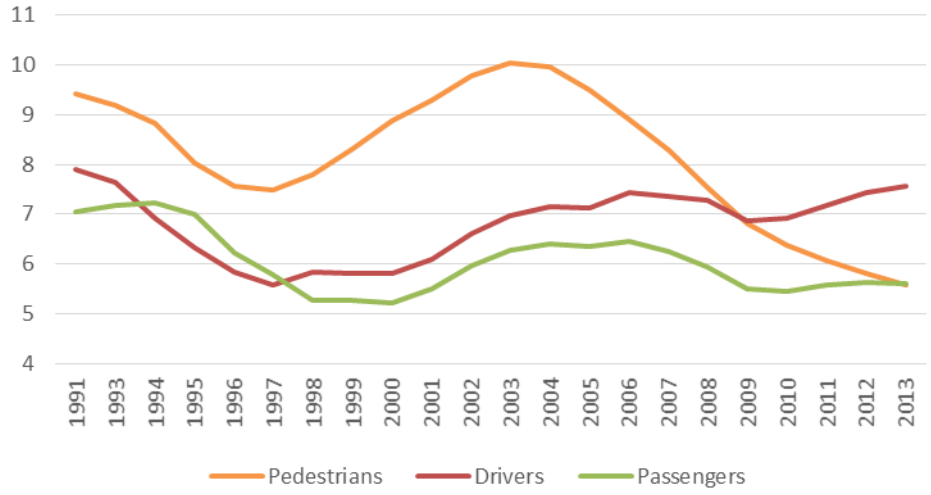


Figure 18. Dynamics of the crude death rates among different road users in Russia, 1991-2013, per 100,000

Source: the author's calculations based on [STSI…]

Mortality among Russian vehicle occupants has not decreased since 1998. Russia's lag behind European countries is widening. In 1991, for every 100,000 people in Russia, 15.5 vehicle occupants perished, while in European countries the number was 8; this constitutes a nearly two-fold gap. In 2013 in Russia, for every 100,000 people 13 vehicle occupants perished, while in European countries the number was 2.7. The gap has grown to a five-fold difference (Figure 19).

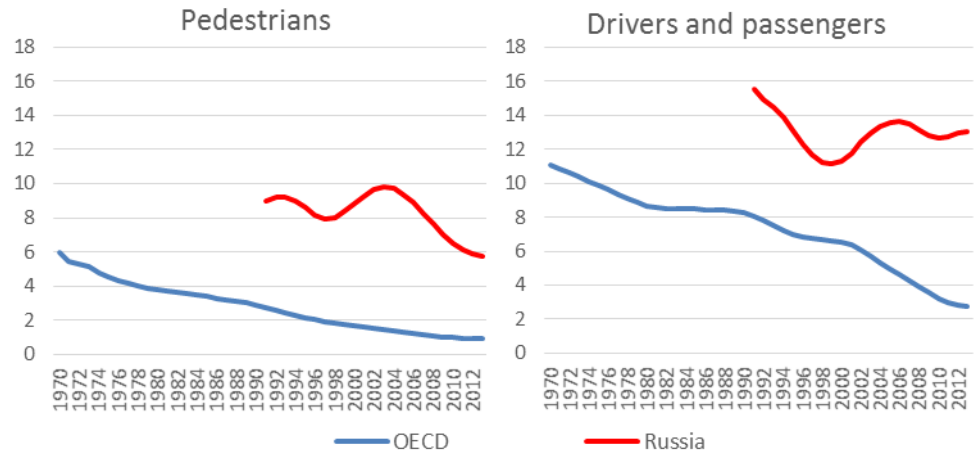
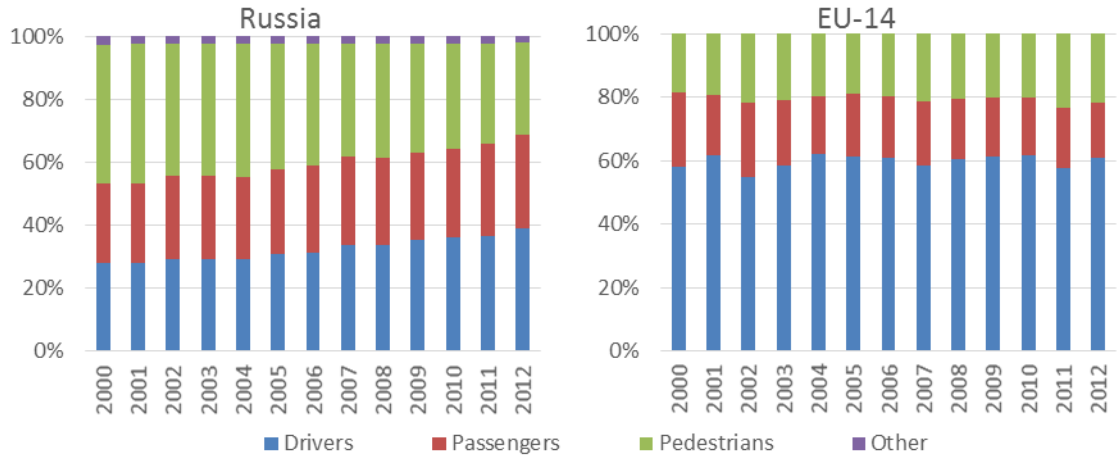


Figure 19. Fatalities of pedestrians, vehicle occupants in OECD (average country indicator) and Russia, 1970-2013, per 100,000

Source: [OECD, STSI…]

In both European and non-European countries with low levels of traffic injuries, vehicle drivers represent the majority of victims currently. The proportion of pedestrians and vehicle occupants among fatalities is small, and the proportion of pedestrians tends to decrease. In Russia, the same tendency is observed, but the proportion of both pedestrians and passengers among road traffic fatalities is much higher than in countries with a lower incidence of traffic injuries.

The success of many European countries with relatively low mortality from road traffic accidents is largely due to the fact that most of them were able to reduce the risk to pedestrians. Though Russia too has embarked on this path, it happened quite late. For a long time, pedestrians were the most vulnerable group of victims. The number of pedestrian victims became less than that of drivers for the first time in 2009, but their share is still very high (Figure 20).



** EU-14: the Czech Republic, Denmark, Germany, Spain, France, Italy, Luxembourg, the Netherlands, Austria, Poland, Portugal, Romania, Finland and the United Kingdom*

Figure 20. Structure of road traffic fatalities by category of road users in Russia and the EU-14 countries*, 2000-2012, percent

Source: [European Road Safety Observatory, STSI…]

In the European countries, the greatest reduction in mortality from traffic accidents among pedestrians in the years 1991-2012 was observed in Portugal, Hungary, Poland and Greece. In 2012, pedestrian mortality per 100,000 was lowest in Sweden (0.3), Norway (0.3), the Netherlands (0.4) and Finland (0.5). The highest rates were recorded in Russia (5.8), Poland (3.0), Hungary (1.6) and the Czech Republic (1.6).

As for mortality of protected road users (vehicle occupants) in European countries, from 1991 to 2012 the greatest decrease was shown in such countries as Spain, France, Austria, Belgium and Portugal. The lowest mortality of protected road users in Europe (per 100,000) in 2012 was observed in 2012 in Switzerland (1.3), the UK (1.3), the Netherlands (1.4), Norway (1.4) and Denmark (1.5). The highest rates were recorded in Russia (13), Greece (4.2), Poland (4.2), the Czech Republic (3.5) and Belgium (3.5).

Thus, despite the fact that the structure of road fatalities varies greatly across countries, Russia still maintains absolute leadership in road traffic deaths for all categories of road users (Figure 21).

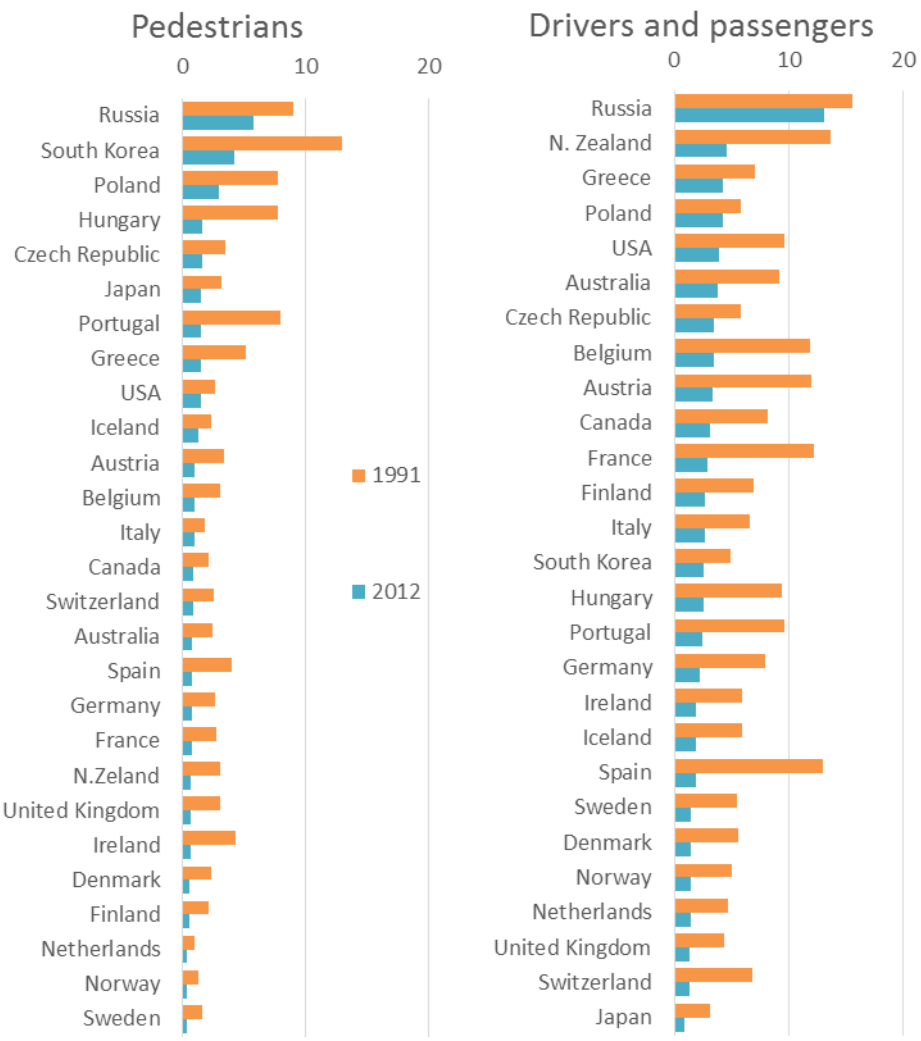


Figure 21. Crude death rate from road traffic accidents for different categories of road users, 1991 and 2012, per 100,000

Source: [International Road Traffic Accident Database; STSI...]

As far as age and sex differentiation is concerned, the following can be observed. Among men, young drivers are most at risk. Mortality among male pedestrians increases with age and peaks in old age. Male passengers have a similar mortality profile to that of drivers, but for every age group except for children, the value of the age rate is lower.

In women, the age structure of mortality for different categories of road users is different. Female pedestrians provide the largest contribution to female road traffic mortality. The profile of the mortality curves for women vehicle occupants is similar to the curve for men, though less pronounced (Figure 22).

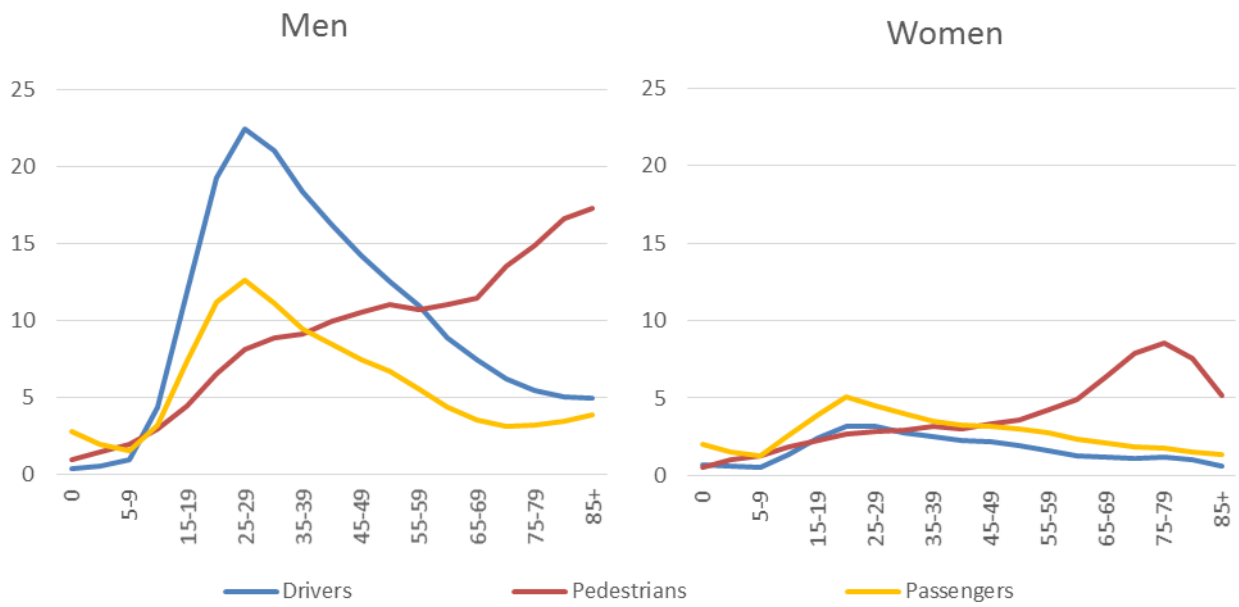


Figure 22. Age-specific death rates from road traffic accidents by category of road users, Russia, 2011, per 100,000

Source: [International Road Traffic Accident Database], Rosstat unpublished data

CONCLUSION

Road traffic accidents are a quite recent cause of death, just a little over 100 years old. But in this century-long history of traffic accidents, three stages of development – "rise, peak and fall" – have been observed. The transition from one stage to another is explained by a combination of factors. Industrialisation and technological progress made possible the birth of the car. Further social development made it a part of public life, with all the ensuing consequences and ideas about the problem. Mass motorisation was accompanied by growing awareness of not only its positive effects, but also its negative ones; views on the problem shifted, and a search for new solutions began. Since Western countries were the pioneers in motorisation, they also had to be the first to find, by trial and error, countermeasures. The results achieved by some countries in reducing deaths from road traffic accidents are stunning. A rate of 3-5 fatalities per 100,000 shows that road traffic accidents are an almost completely avoidable cause of death.

Russia's level of transport development lags far behind Western countries, and this lag concerns not only the general level of motorisation of the population, but also the level of infrastructural, legal and administrative organisation. There is an underestimation of the importance of research activities in the field of road safety, which has been fundamental in the West.

The lag in the main indicators of transport development, such as the number of fatalities per 100,000, the death toll per 10,000 vehicles, the number of fatalities per mileage and the overall level of motorisation, suggests that Russia's level of transport development is 40-50 years behind that of Western countries.

The road traffic injury rate in Russia is a highly politicised issue; most people have their own, though not necessarily well-informed, opinion about what can be done to make roads safer. Fragmentary information and its coverage in the media too often interpret individual cases as major transport safety problems requiring urgent action from politicians. But strategic decisions aimed at effective prevention of road traffic injuries should be based on comprehensive and objective information, rather than individual reports from the field.

The authors of the first and second Federal Target Programmes "*Improving global road safety*" implemented in Russia are convinced that they are guided by the best foreign practices. The plan carried out in recent years is essentially focused on fixing the technical deficiencies of public transportation, like separating barriers, the prohibition of mobile phone use while driving, the use of seat belts in the back seat or of child car seats. But the essence of "Western practices" lies not in the technical details, but in the right institutional structures. Transport risks are a function of the quality of institutions in a given country, and depend, above all, on the "total equality of rights, responsibilities and duties of all road users" [Blinkin, Reshetova 2013].

How positive the trends in mortality from traffic accidents in Russia will be in the near future depends on the desire to study and understand the problem. Only in the presence of such a desire will it be possible to develop appropriate, balanced recommendations and solutions in matters of road safety. In the absence of research and regular publications on the problems of road traffic accidents, there remains only the option to adopt random, impulsive decisions.

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THE REJUVENATION OF MOTHERHOOD IN DAGESTAN: TREND OR ARTEFACT? (PRELIMINARY RESULTS OF A RURAL POPULATION SURVEY)*

KONSTANTIN KAZENIN, VLADIMIR KOZLOV

This article is devoted to the dynamics of the mean age at childbearing in Dagestan, an indicator which has differed significantly from the overall Russian trend within the last decade. The paper is based both on data from official sources and preliminary results from field research conducted by the authors in the rural areas of Dagestan. The data from both sources strongly support the idea of a decrease in the childbearing age in the republic, both for the mean age at childbearing (MAB) without parities and for the mean age at childbearing at first and second births.

The existing literature highlights, inter alia, two main factors inhibiting the increase of the MAB usually expected with a decrease of the total fertility rate. The first factor is the important role of religion (mainly Islam) in the society, and the second is the "traditional" structure of the family. Our preliminary results lead us to the conclusion that the first factor is more important.

Key words: *demographic transition, mean age at childbearing, Dagestan*.

INTRODUCTION

The subject of research in this article is the dynamics of the mean age of mother in Dagestan. These dynamics are of considerable interest because they differ significantly from those in the rest of Russia. In the Russian Federation as a whole, the last decade has seen a steady increase in the mean age of mother, both without regard to birth parity and according to individual parities, including the first and second. In Dagestan, however, there has been a rejuvenation of motherhood, which manifests itself both in a reduction in the overall mean age of mother and in a decrease in the mean age of the "start" of procreation.

This situation is very unusual, in particular because in Dagestan at the present time there are signs of the completion of the "first demographic transition". Following the reduction in mortality in the 1950s-1960s, there was a decrease in fertility in the region, which by the end of the 1990s had reached the replacement level. In most countries where the first demographic transition has already taken place, it has been accompanied by an increase in the mean age of mother. The opposite dynamics observed in Dagestan require an explanation.

The article, whose main goal is to raise the problem, discusses both official statistics and preliminary data from our field research conducted in a sample of rural settlements in Dagestan. The trend towards the absence of ageing and, in some locations, even to the rejuvenation of fertility, is confirmed by all sources of data used in the article. Field research already at this stage provides some basis for discussing the causes of this phenomenon.

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The first section of the article presents data on the dynamics of the overall level of fertility in post-Soviet Dagestan, showing the end there of the first demographic transition, which in most of the regions of Russia had occurred by the start of the 1960s. The second section summarises the official statistics on the mean age of mother in rural Dagestan. The separate attention paid to fertility in the countryside is due to the fact that our field research at this stage concerns rural areas. Also, possible problems with the reliability of the official data are briefly discussed. The third section contains the currently available results of our field research, and the fourth section formulates hypotheses explaining the non-standard "timing" of fertility in the region.

1. DYNAMICS OF FERTILITY IN POST-SOVIET DAGESTAN: EVIDENCE OF THE COMPLETION OF THE FIRST DEMOGRAPHIC TRANSITION

Despite the fact that the second demographic transition began about 20 years ago in Russia, phenomena characteristic of the end of the first demographic transition are more typical for Dagestan now. The official statistics on fertility in Dagestan for 1990-2014[1] show that during this period fertility in the region decreased to a level that is believed to ensure reproduction but not population growth: the total fertility rate (TFR) in Dagestan in 1990 was 3.1, and in 2014 it was 2.08 (Rosstat data)[2]. It is important to note that the decline in the TFR paralleled the intensive, region-wide migration of the Russian population, whose decline in fertility, including in Dagestan, had occurred much earlier. Perhaps this did in part affect the overall decline in the region's fertility, but the share of Russians (as well as other ethnic groups whose demographic transition had already occurred by this time) in the population of the republic was quite small by 1990[3]. In addition, the decline in fertility in this period occurred also among the indigenous peoples of the republic (for more details on the "ethnic" aspect of declining fertility, see below).

The reduction of the TFR occurred both in urban and rural Dagestan, but the absolute level of the TFR in the countryside, as expected, exceeded that in the city. After 2007, there was an increase in the TFR, reflecting the well-known trend for Russia as a whole, associated with the state policy on the maintenance of fertility. The overall level of the TFR in Dagestan did not, however, surpass the level corresponding to simple reproduction of the population. As in the rest of Russia, this recent increase in fertility has not reached those levels at which, when there is a lag in fertility, it is appropriate to talk about a "stalling" demographic transition [Bongaarts 2006; 2008; Ezeh, Mberu, Emina 2009; Cetorelli, Leone 2012].

[1] At the time of submission of the article, the data for 2015 were preliminary.
[2] According to preliminary data of Rosstat, in 2015 the TFR in Dagestan dropped to 2.02.
[3] According to the 1989 Population Census, about 9.2% of the population. From 1979 to 2010, there was a decrease from 11.6 to 3.6%.

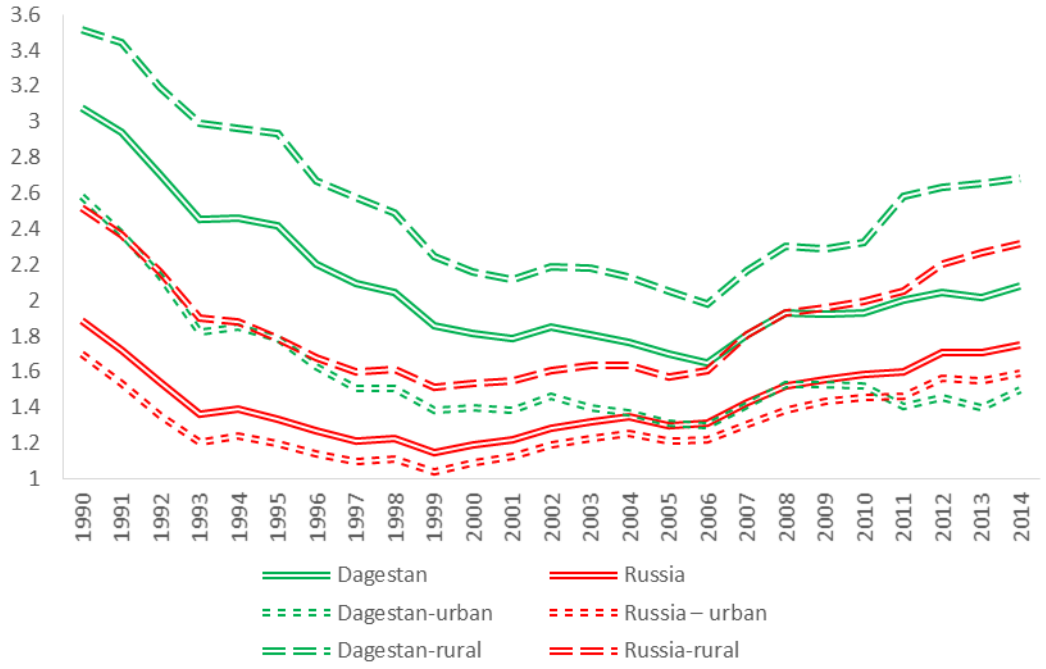

Figure 1. Total fertility rate in Dagestan and Russia in 1990-2014, children per woman

Source: Authors' calculations based on [Appendix of Demoscope Weekly 2016; RusFMD 2016].

Dagestan's chronological "lag" behind the rest of Russia in its fertility reduction is shown in Figure 1. In addition, as can be seen in Figure 2, the TFR in Dagestan for the period 1990-2014 decreased most in comparison with the regions of the North Caucasus, as well as with a number of national republics of Siberia[4]. At the same time, we note that the current fertility rate of the rural population deviates from that of 1990 approximately by the same amount as in other republics of the North Caucasus.

Based on the data of the Russian Census of 2010 (hereinafter, RC-2010), the decline in fertility in Dagestan began before 1990 and, in the decades that preceded it, occurred in all indigenous ethnic groups. Figure 3 shows the overall fertility rate in different age groups that had completed or were completing their childbearing careers by 2010, for the major indigenous ethnic groups in Dagestan. It is evident that, for all indigenous ethnic groups, the total number of children per woman for women who in 2010 were 40-45 years old is at least a third lower than for women who in 2010 were 70 or older. The graph also shows that the fertility of older age groups in different ethnic groups was not the same. For example, among Lak women who in 2010 were 70 or older, the total number of children per woman was about 40% lower than among Tabasarans. It is interesting that interethnic contrasts observed in older age groups were partially reproduced among the youngest. Thus, among women who in 2010 were 40-44 years old, the lowest level of this indicator after the Russians was observed among Laks, as well as among the Nogais, who in the older generations occupied a position in the middle of the hierarchy. On the other hand, fertility

[4] Not including Chechnya and Ingushetia. Also in the figure for comparison are regions with a relatively high proportion of titular nations in the population.

declined fastest among the Tabasarans (who demonstrated the highest rates in our sample for the generations born in 1940 and earlier).

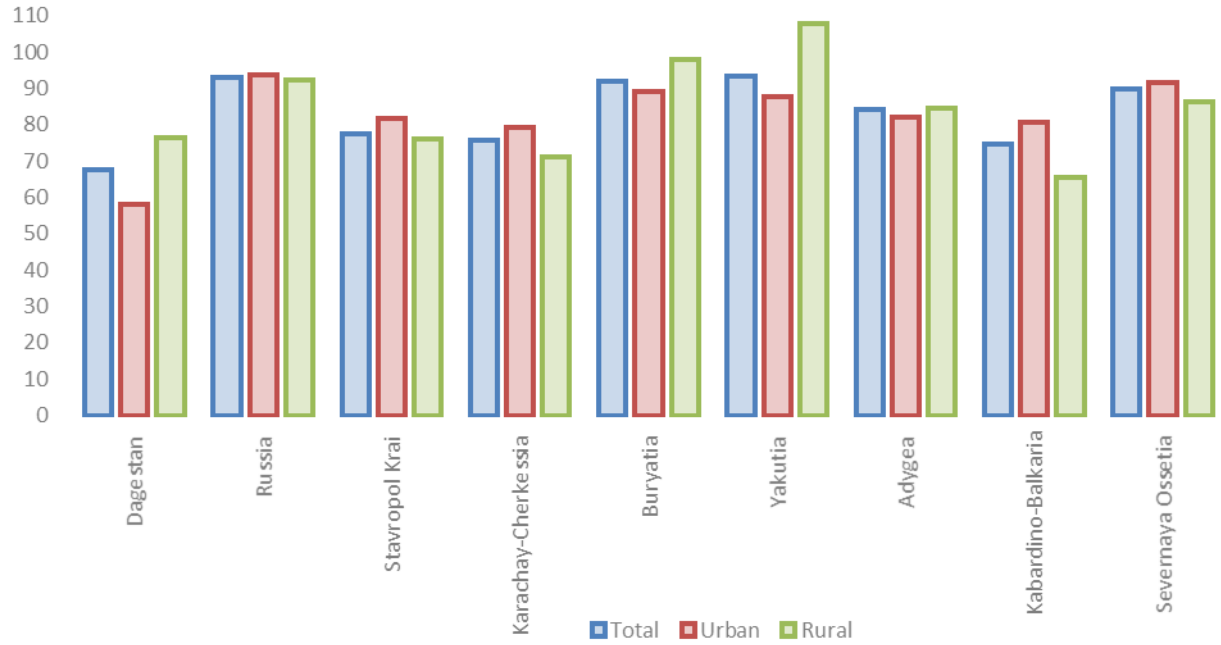

Figure 2. The ratio of the total fertility rate of 2014 to the level of 1990, %

Sources: [Demograficheskiy ezhegodnik... 2015], authors' calculations based on [Appendix of Demoscope Weekly 2016].

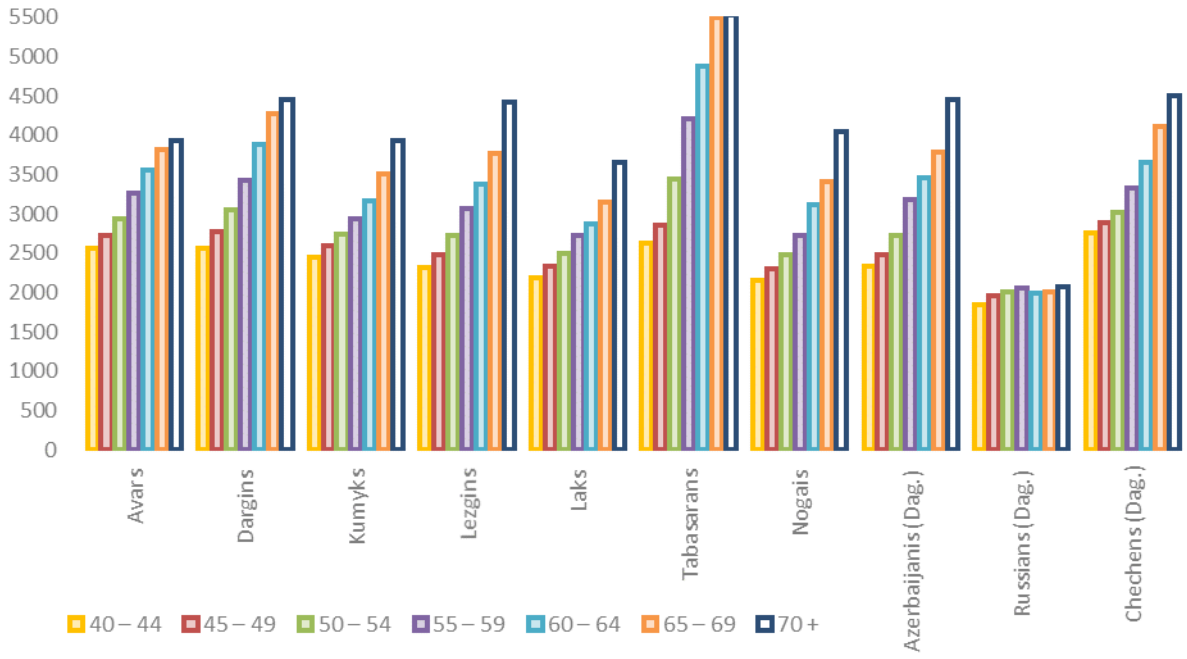

Figure 3. Cumulative fertility of Dagestan women reaching a certain age by 2010, according to ethnic group, per 1000 women of the corresponding age, indicating the number of children born

Source: Authors' calculations based on [RC-2010].

Let us summarise our examination of the most common statistical data on fertility. Official statistics show that in the post-Soviet period in Dagestan there was a reduction in fertility corresponding to the first demographic transition. This process, according to official sources, affected both the city and the country and took place for all the major indigenous peoples of the republic, although not entirely synchronously. In most of the regions of Central Russia, the first demographic transition took place much earlier, with the second demographic transition beginning in the mid-1990s in Russia. Some increase in fertility in Dagestan since 2007 corresponded to the all-Russian trend, hence it is not a unique phenomenon.

2. DYNAMICS OF MATERNAL AGE IN POST-SOVIET DAGESTAN: STATISTICAL DATA

Let us now turn to the official data on maternal age. The differences between Dagestan and Russia as a whole are quite significant. This applies to both current values and trends.

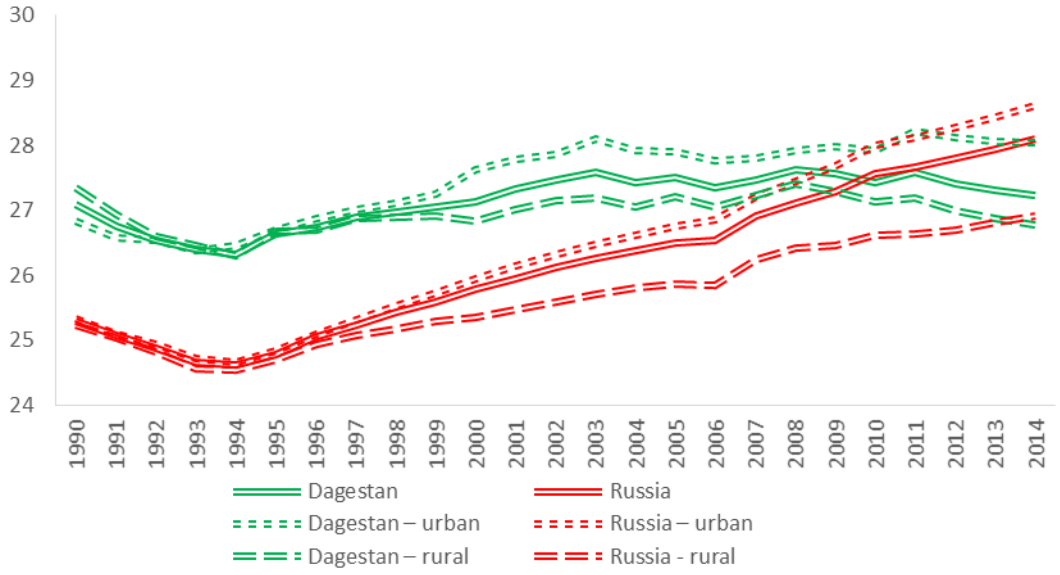

Figure 4. The mean age of mother at birth in Dagestan and Russia, not accounting for birth parity

Source: Authors' calculations according to [RusFMD 2016].

In this section, we will consider two parameters: the mean age of mother and fertility rates in different age groups.

2.1. The mean age of mother in rural areas

As the data of the Russian Fertility and Mortality Database (RusFMD) show, the Dagestani and all-Russian dynamics of maternal age are correlated in different ways for different birth orders. At the birth of the first child in Dagestan, the mean age of mother does not currently show a tendency to increase, unlike in Russia as a whole (Figure 5). In Dagestan, it began to decline from 2006 and remained approximately at the same level from 2008 to 2013, while in rural Russia for the entire period reflected by the graph, there was a steady increase in the indicator with a short period of stabilization in the period when pronatalist family policies were enacted (2006-2008).

The mean age of mother at birth of a second child in Dagestan increased until 2005, then fell a little, returned in 2008 to the 2005 level, and after this short "rebound" resumed its decline. In rural Russia, the decline after a steady 15-year growth began in 2009. In 2011-2013, in Dagestan, the decline was almost 3 times greater than in Russia as a whole.

The dynamics of the mother's age at the birth of the third child in rural Dagestan and in rural Russia are approximately the same. Nevertheless, in the 2000s the indicators began to diverge, and by 2013 in Dagestan the mean age of mother at birth of the third child was 0.8 years lower than in Russia as a whole. Taking into account the stably higher share of births of low parities in the total number of births, it was to be expected that Dagestan would not demonstrate in the 2010s the all-Russian growth of mean maternal age without taking into account birth order. As can be seen in Figure 4, in Russia as a whole this indicator is increasing, while in Dagestan it is decreasing.

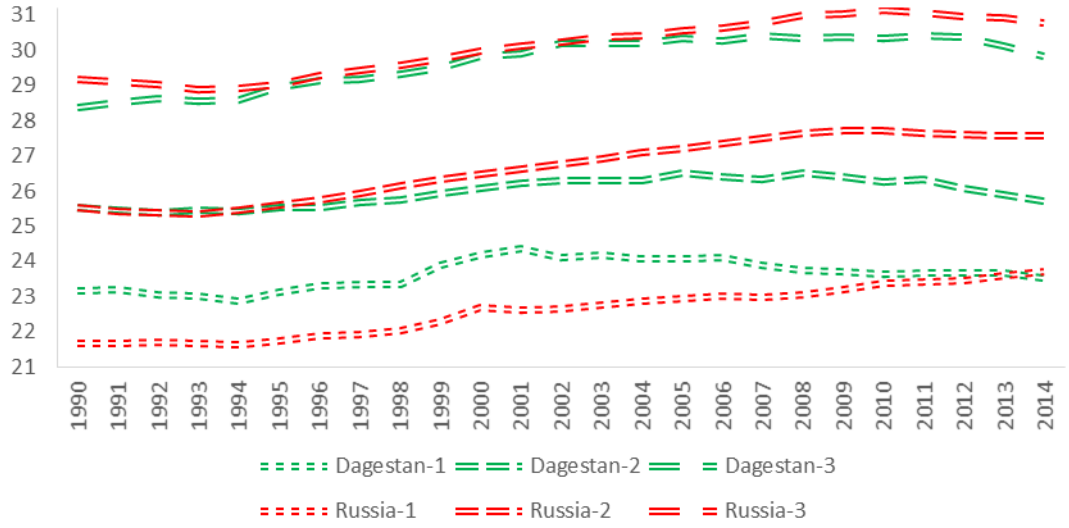

Figure 5. The mean age of mother at birth of children of different parities in the rural areas of Russia and Dagestan

Source: Authors' calculations according to [RusFMD 2016].

The notion that the divergence in the dynamics of maternal age in rural Dagestan and in rural Russia as a whole occurred precisely in the 2000s is confirmed by the RC-2010 data, on the basis of which the mean age of mother at birth of the first child can be calculated both for annual periods and for the cohorts of mothers of different birth years. As shown in Figure 6, which reflects the dynamics of the mean age of mother at birth of the first child by the year of birth of mothers for the age groups of those born in 1930-1975, the age of mother at birth of the first child in rural Dagestan and in rural Russia basically changed for these age groups in parallel, with the age being constantly higher in Dagestan. In particular, the lowering of the mean age of the start of maternity in the age groups of women born in the 1960s, which is commonly associated with the measures of the Soviet government to increase fertility in the 1980s [Zakharov, Ivanova 1996], was even more significant in Dagestan than in Russia as a whole. A noticeable discrepancy in the trends can be seen only among women born in the late 1960s and early 1970s.

If we consider the mean age of mother according to the year of birth of the child according to the data of the RC-2010, it is clear that Dagestan in the 1960s began to correspond to the all-Russian trend, from which it had deviated somewhat in the 1950s: in the republic the indicator grew, while in Russia there were fluctuations. Data for the 2000s as a whole confirm the results of current statistics: despite the sharp increase in the mean age of mother in rural Russia nearly to the highest post-war values, the indicator stagnated in Dagestan.

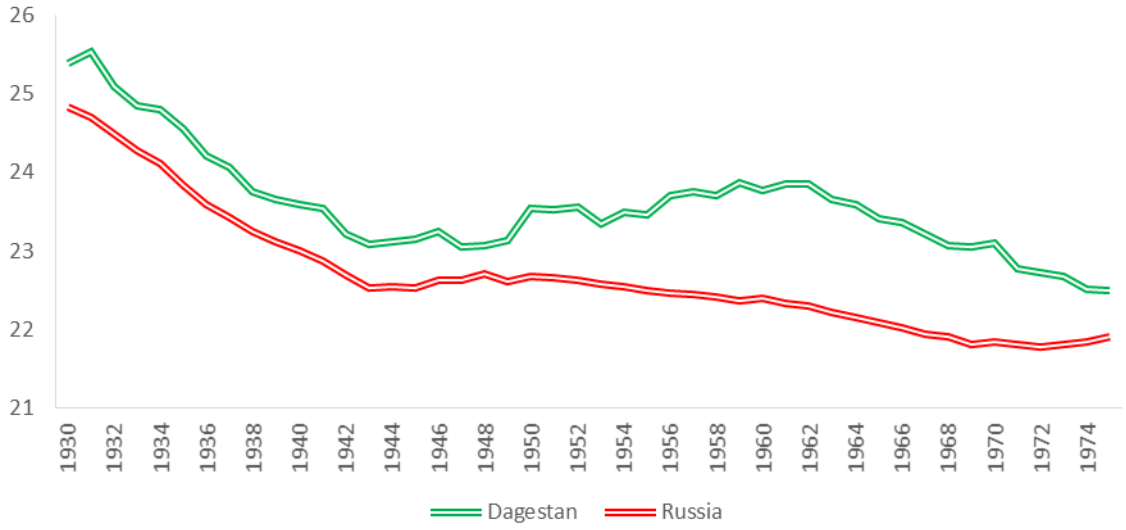

Figure 6. The mean age of mother at birth of the first child in Dagestan and Russia. Cohort indicators for years of birth of mothers

Source: Authors' calculations according to [RC-2010].

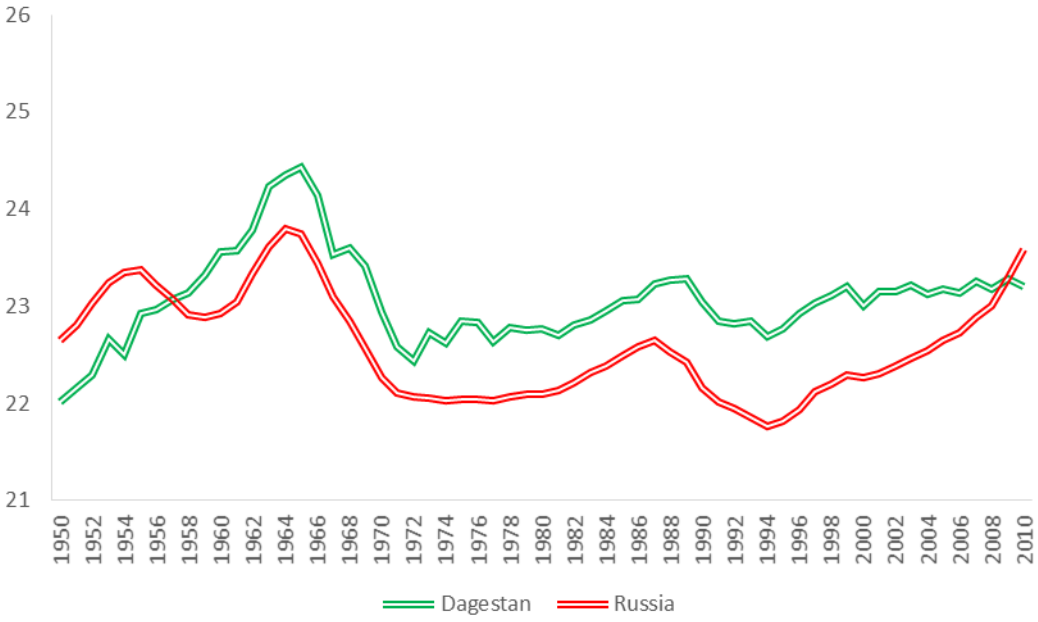

Figure 7. The mean age of mother at birth of the first child in Dagestan and Russia. Indicators for calendar periods by birth years of children

Source: Authors' calculations according to [RC-2010].

Thus, data on the mean age of mother show that a significant discrepancy in the dynamics of maternal age between rural Dagestan and rural Russia as a whole arose only in the 2000s. All observed differences in dynamics led to greater stability of young motherhood in Dagestan in comparison with Russia as a whole.

Note that the differences in the starting age of maternity can only partially be explained by differences in marital behaviour. Figure 8 shows that, in general, the proportion of women who have never married (registered and unregistered) is approximately the same for ages 16-17 and 18-19 in Russia and Dagestan (if we compare Russia with Dagestan and rural Russia with rural Dagestan). By the age of 25-39 years, a small difference in the proportion of never-married women appears – approximately 4-5 percentage points.

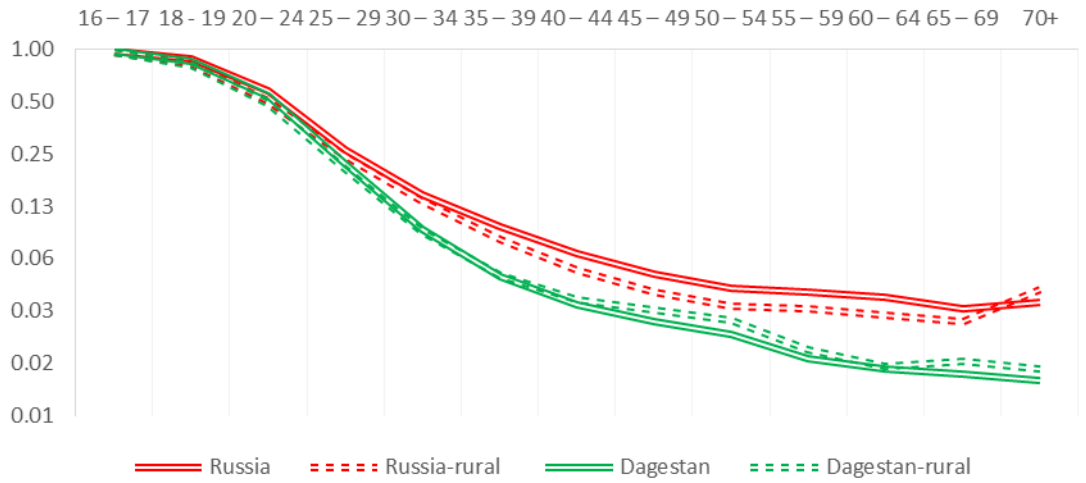

Figure 8. The proportion of never-married women to reach a certain age in Russia and Dagestan in 2010 among those indicating their marital status

Note: in logarithmic scale

Source: [RC-2010].

2.2. Age-specific fertility rates

Dagestan's trend toward a younger motherhood than in Russia as a whole is also evident from the dynamics of age-specific fertility rates. Figure 9 shows the age-specific rates for rural Dagestan without taking into account the order of birth.

The dynamics of the age-specific fertility rates in rural Dagestan and in rural Russia as a whole at the beginning of the 2010s differed in young age groups: in the 15-19-year-old group in Dagestan there was growth amidst a fall in Russia as a whole, and in the 20-24-year-old group in Dagestan there was faster growth. This corresponds to the trend towards younger motherhood in Dagestan. It is also clear that at the previous stage, in 2005-2008, the rates for young age groups grew in Russia as a whole, but then this growth slowed down compared to Dagestan's, or stopped altogether.

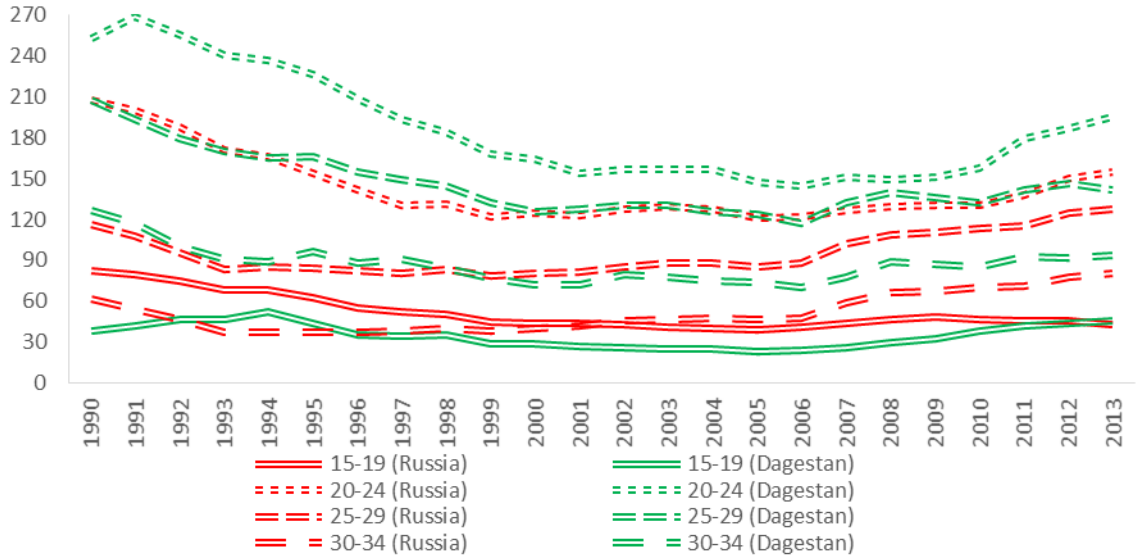

Figure 9. Age-specific fertility rates in rural Dagestan in 1990-2013, per 1000 women, not accounting for birth parity

Source: Authors' calculations according to [RusFMD 2016].

The difference in trends concerning the age of motherhood is also shown by the age-specific fertility rates for first children. Figures 10 and 11 show this difference for rural Russia and rural Dagestan in 1990, 2000 and 2010. In rural Russia, the distribution of the start of motherhood by age in 2010 was much more "flat" than in 2000 and 1990, due to an increase in the births of first children at later ages, whereas in Dagestan no such changes occurred: age-specific rates in 2010 and 2014 were higher than in 2000 at young ages, at which there was even a slight increase compared to 1990.

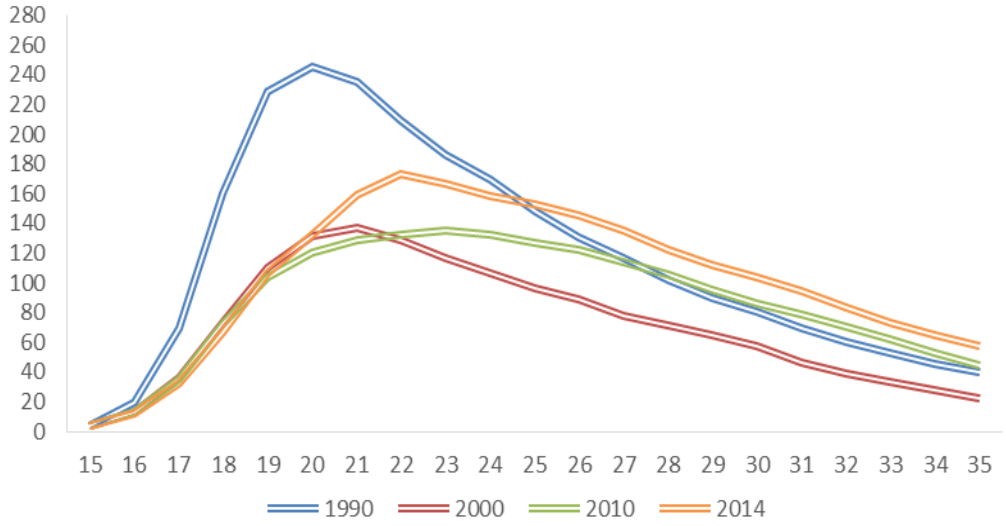

Figure 10. Age-specific fertility rates for the first parity in rural Russia, per 1000 women

Source: Authors' calculations according to [RusFMD 2016].

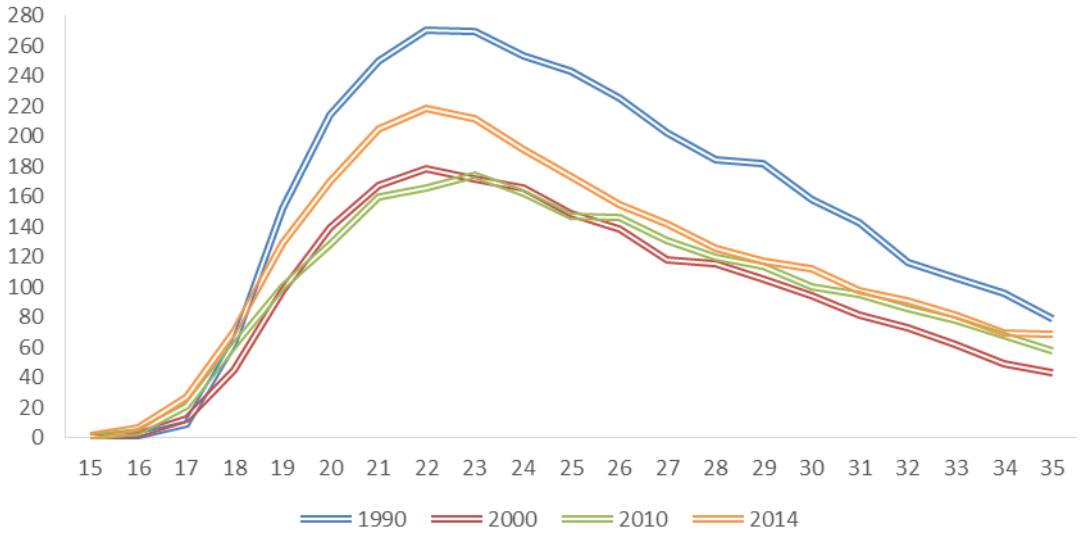

Figure 11. Age-specific fertility rates for the first parity in rural Dagestan, per 1000 women

Source: Authors' calculations according to [RusFMD 2016].

Let us summarise. Rural Dagestan as of 2014 differed little from rural Russia as a whole in terms of the general level and trends of fertility, but showed marked differences in the age of motherhood. It is the absence of the "ageing" of motherhood in Dagestan that creates a clear contrast with all-Russian trends, even in the countryside, where, compared to the city, there was no such significant ageing and shifting of the age of childbearing to older ages. Before that, there was no contrast; it appeared only at the turn of the 2000s-2010s.

2.3. Reliability of the results

There is frequent criticism among experts of the reliability of the census, thus of current data on the total population of Dagestan [Andreev 2012; Bogoyavlenskiy 2008, 2012; Shakhbanov 2011, 2012]. Accordingly, the level of fertility in the cities of Dagestan seems to be very doubtful to researchers, roughly corresponding to the level of Central Russia. When adjusting the data after the census, it is necessary to declare a migration increase, which is not confirmed by the researchers of Dagestan (sociologists and ethnographers) who do not work directly with statistics.

Let us consider what population distortions will look like when analysing fertility. There is reason to believe that there are no large discrepancies between the real and declared number of births in Dagestan, i.e., there are no statistically significant distortions of births. To confirm this hypothesis, let us turn to the data of the Social Insurance Fund (SIF). According to them, it can be assumed that some children do not get into the SIF report, which leads to slightly lower values of the total fertility rate in the whole of the country, if they are calculated according to the data of the SIF, not of Rosstat[5]. However, this discrepancy may not be related to "distortions" in a pure form, since part of the births can occur at home and do not fall immediately into the data of the fund.

[5] Thus, the TFR calculated for a similar number of women by age according to the number of births from the SIF in 2013 is about 1.9 in Dagestan, and according to Rosstat it is 2.015.

The period average parity (PAP)[6], calculated on the basis of SIF data, but using the denominator (the number of women in different age groups) of Rosstat, indicates a fertility of approximately 1.9 children per woman, which is lower than the TFR. The reason may be an overstatement of the size of the permanent population (because of the higher denominator value, the final age-specific fertility rate becomes lower). On the other hand, this discrepancy (uncharacteristic for modern Russia, where the PAP exceeds the TFR) may be caused by the absence of the practice of postponing the birth of children and by the forced decrease in the mean age of mother.

However, the SIF data still allow one to see some strangeness in the republic's fertility. If we consider the share of births by parity – even according to the data of the SIF, which are slightly incomplete – it turns out that Dagestan is among the leading regions in the percentage of children of third and higher parities (31.4% of all children born), outstripping the Republic of Altai, Yakutia and – just behind – Tuva (regions with a TFR sufficient for extended reproduction and, according to Rosstat data, exceeding the level of Dagestan; see, for example, Figure 2). Consequently, the real TFR in the republic may indeed be higher. However, this is not necessarily the case: according to the same SIF data, a distribution similar to Dagestan's is shown by the Republic of Kalmykia (29.8% of births were of children of third or higher orders in 2013, with a figure in Dagestan of 30%), where the TFR was below 1.89 in the observed period, and there are practically no reports of incorrect registration.

A serious problem with official statistics of the population in Dagestan, as shown by experts [Andreev 2012], is overcounting the population of the republic. This is often caused by a double count: for example, rural residents are counted both in the city to which they migrate, in some cases temporarily, and in the countryside. Overcounting, according to E.M. Andreev, occurred during the All-Russian population censuses in 2002 (RC-2002, where the population according to the census differed from pre-census calculations by 380,000 people) and 2010 (which diverged by more than 150,000). These figures are indirectly confirmed by the data of voting lists. Due to overcounting, the real denominator in calculating fertility rates will be significantly lower than indicated by the statistical authorities, which leads to an underestimation of fertility in official statistics. Most likely, the low rates of TFR in the cities of Dagestan, based on official statistics, are explained precisely by this.

At the same time, the problem of incorrect counting of the population is not the same for different ages. According to Andreev, as a result of the RC-2010, in the entire population of Dagestan there was a decline in the size of the cohort born in 1981-1985. If this is an undercount, then the real age indices of women of this age will be lower, since we are dealing with a lower denominator. However, if, as experts assume, the RC-2002 data show that the size of these generations was overestimated, then there is a return to the original size, and this cohort will not affect the initial fertility and the age of the mother. At the same time, there was a probable overestimation of the younger population born in around 1990 in the RC-2010. Thus, in addition to the fact that in such circumstances the age-specific fertility rates must in reality be higher, they should be higher precisely at young ages, which can lead not only to a truly higher TFR, but also to a lower age of the mother than observed.

[6] Weighted average of TFR by birth parity.

Thus, we can conclude that those adjustments that could be made for fertility data in Dagestan, taking into account the probable errors in official statistics, are unlikely to lead to an increase in the maternity age indicators.

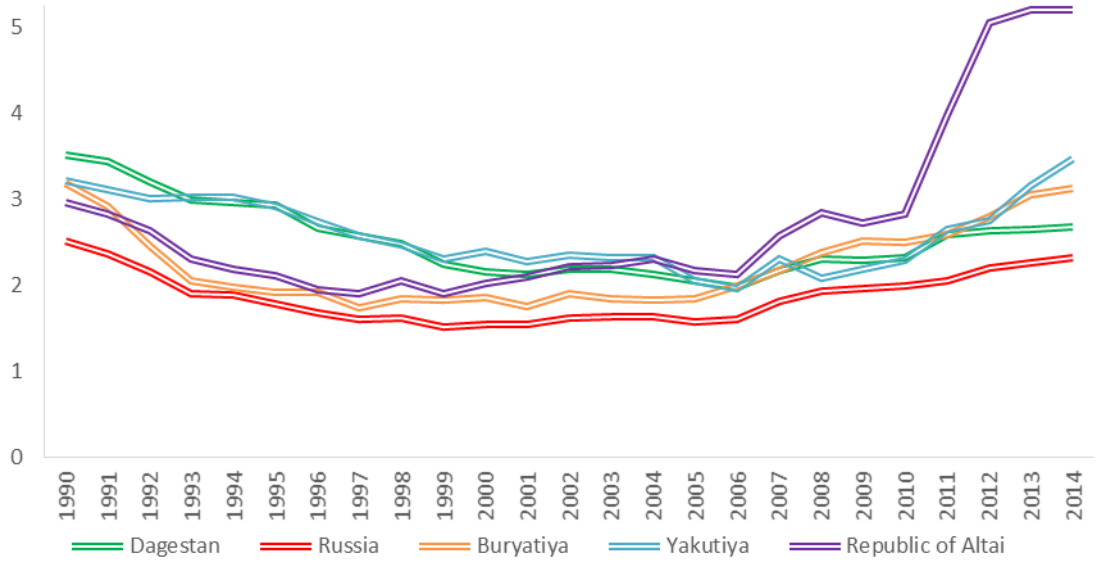

Figure 12. The total fertility rate in rural areas of several regions of Russia, 1990-2014, children per 1 woman

Source: authors' calculations according to unpublished data of Rosstat and [RusFMD 2016].

We also note that, since our field study concerns the rural population, it is more important for us to understand the extent to which an incorrect calculation of the denominator is possible for rural residents. It is believed that in a number of regions of the Russian Federation, in rural areas there is an undercounting of the adult population together with full registration of all children born (for example, because parents who moved to the city for permanent or temporary work are counted in the city[7], while their children are registered in the village, where the adults go to give birth). This leads to a clear overestimation of the TFR of the rural population. With such statistical distortions, an abrupt change in this indicator for rural areas is expected, which is observed in a number of regions with a small population (Figure 12). When compared with the "jumps" observed in Yakutia and the Republic of Altai (regions where the problem of undercounting the adult population in the countryside is well known), it is evident that in Dagestan the dynamics of the TFR in the countryside are more "smooth", which suggests that for this region this problem is irrelevant (although we should not forget about the large population of Dagestan in comparison with Yakutia and the Republic of Altai). On the basis of this comparison, it is more likely in Dagestan that a double count is taken of both the adult population and of children in the village and in the city, which for the village means registration of residents actually living in cities. However, this distortion of the data should not cause the artificial growth of fertility in the countryside.

[7] Especially if they were counted in the city.

Nevertheless, given the criticisms that exist about the quality of population registration in Dagestan, it is important to conduct field research to confirm and explain the phenomenon of unusual births in the republic.

3. AGE OF MOTHER IN SOME VILLAGES OF DAGESTAN: FIELD DATA CONFIRM THE STATISTICS

The official data sources presented above are partially confirmed by our data on fertility in some villages of Dagestan. These data were obtained during a field study we conducted in 2015-2016. In total, during our study, the birth rate was studied in 20 villages distributed among the main geographical zones of Dagestan (mountains, foothills, plains) and in whose populations all the most numerous ethnic groups of the republic are represented. The main source of information during the study was data from rural medical institutions in the cities of Dagestan, where medical records of children born in 2013-2014 provided information about the age of the child's mother and the birth parity. Only those medical records that contained records of visits to the doctor during the previous year (a proxy for rural residence) were taken into account. To assess the extent to which the number of children accounted for in this way is different from the total number of children born in the village in the years indicated, the number of accounted children was compared with the records of the health facility and of the rural administration for the relevant years. The overall reliability of these health facilities regarding the number of children was also controlled by comparing these data for older children with the data of the rural school on the number of pupils of the same age.

At the time of writing, we had processed data for 11 of the 20 villages studied, so our observations are purely preliminary. Table 1 shows the villages for which data are considered below. In all these villages, the number of births used in our study was at least 70% of the births that occurred in the village according to the consolidated data of local medical institutions, and at least 50% of births which took place according to the village administration. Thus, we can speak of sufficient representativeness of the data available to us.

Table 1. Data on the villages included in the study

Geographic zone	Village (nationality and population size)
Mountains	Kubachi (Dargins; 3060); Kumukh (Laks; 1930)
Foothills	Leninaul (Avars and Chechens; 8340); Tukhchar (Avars, Laks and Chechens; 3567); Karabudakhkent (Kumyks and Dargins; 15,356), Dorgely (Kumyks; 5783)
Plains	Tsadakh (Avars; 503); Tamazatube (Nogais; 1718); L'vovskoe-1 (Kumyk; 1262)

Figure 13 shows the data on the mean age of mother in the studied villages in 2013 and 2014 (without taking birth parity into account). It can be seen in the figure that there is significant variation in the indicator across the villages, but the mean age of mother for all the villages studied at the moment in 2013 (25.92) and in 2014 (25.03) is slightly below the mean values for the years indicated for rural Dagestan (26.88 and 26.77, respectively; see Figure 4). Thus, the results for this sample of villages are consistent with the data of RusFMD and Rosstat on the rejuvenation of

motherhood in Dagestan, indicating the current value of the mother's mean age as somewhat younger than calculated according to official data for the republic.

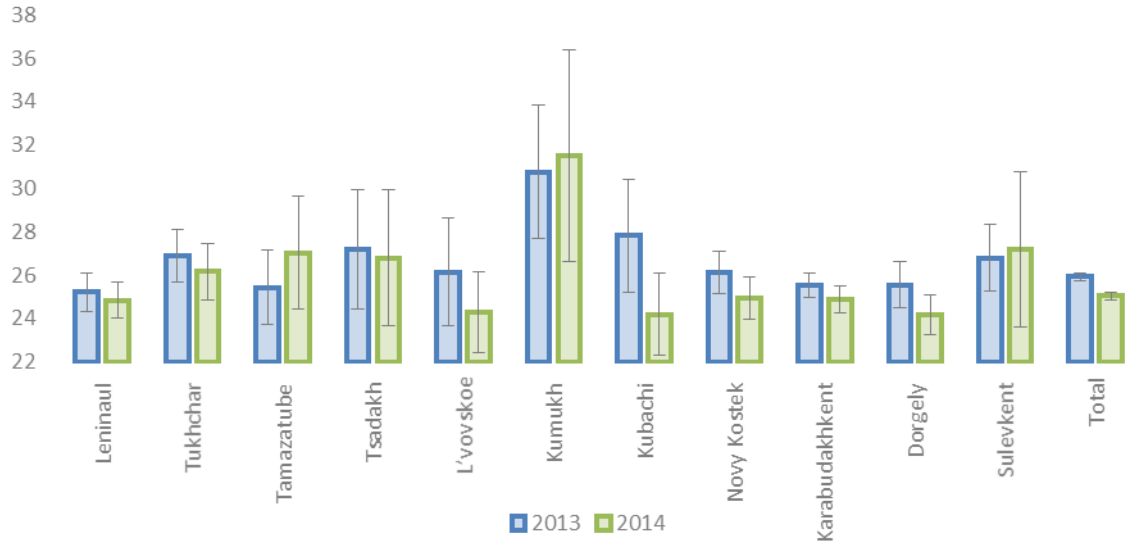

Figure 13. The mean age of mother in some villages of Dagestan in 2013-2014, not accounting for birth parity

Notes: Confidence intervals are constructed according to the normal distribution for the number of observations (childbirths) over 30 and the t-distribution for the number of observations under 30. Confidence intervals are shown for p-value < 0.05.

It is interesting to note that villages with a low mean age of mother are found both in the foothills (Dorgeli, Leninaul) and on the plains (Lvovskoe-1). The opposite is also true: an above-average age for the country can be found in the mountains (Kubachi in 2013, Kumukh), on the plains (Tsadakh, Sulevkent) and in the foothills (Tukhchar).

In four of the villages surveyed we were able to obtain data on the mean age of mother in 2011-2012. In none of these villages did the age of the mother not change monotonically, but the mean age of mother during these years for these villages turned out to be even lower than in rural Dagestan as a whole.

Table 2. The mean age of mother in some villages of Dagestan in 2011-2014, not accounting for birth parity

Village (ethnic group)	2011	2012	2013	2014
Leninaul (Avars and Chechens)	24.80 (104)	25.61 (145)	25.21 (123)	24.83 (149)
Kubachi (Dargins)	25.45 (31)	26.15 (34)	27.82 (17)	24.19 (31)
Tsadakh (Avars)	28.85 (13)	25.47 (15)	27.18 (17)	26.78 (17)
Lvov-1 (Kumyks)	24.81 (27)	24.46 (37)	26.29 (34)	24.28 (33)

Note: The total number of registered births is in parentheses.

Note that the mean age of mother at first birth depends on the distribution of children by birth parity. Therefore, in order to obtain a more adequate picture, it is necessary to refer to the mean age of mother at birth of the first child in the studied villages in 2013-2014. Unfortunately,

the significance of this indicator in a number of villages can be considered low because of the small number of births. Only in four villages does the number of births exceed 30 in at least one of the two surveyed years (and only in Leninaul and Karabudakhken is it higher for both years).

In 2013, the mean age of mother at first birth in rural Dagestan according to the RusFMD was 23.68 years. Of the surveyed villages, this level was exceeded in 2013 only in three, and in two of them (Kubachi, Lvovskoe-1) the total number of first births was very low (below 10), meaning the data of these villages can hardly be statistically significant. In another village, where the indicator in 2013 was higher than the mean for Dagestan (Novy Kostek), in 2014 the age of the start of motherhood decreased to 22.14 years. In general, in 2013 the mean age of mother at first birth in our sample was 22.27 years, and in the next year it went down to 21.36 years (a downward trend noted in RusFMD, but there the figure is still above 23 years).

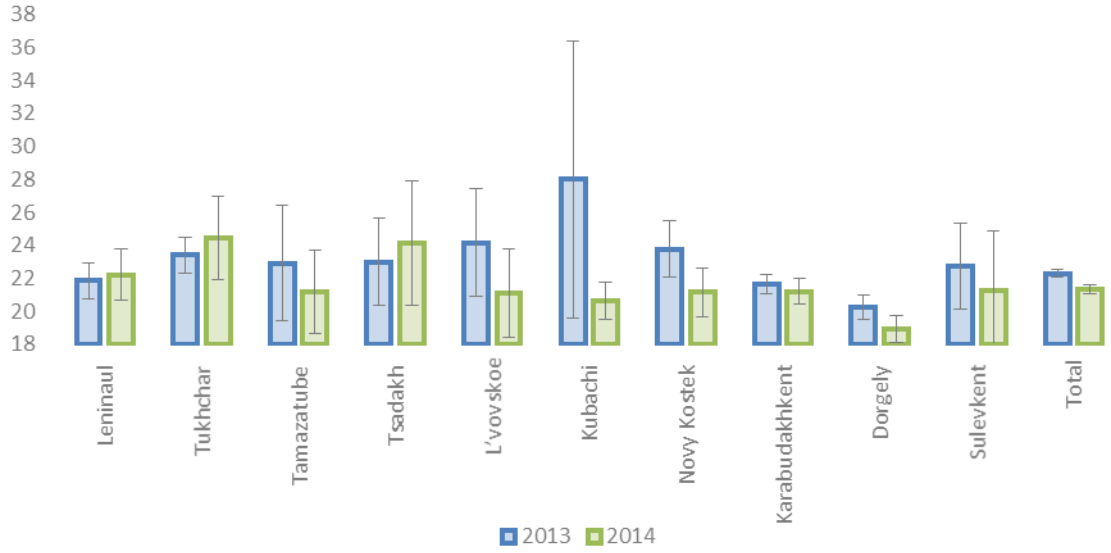

Figure 14. The mean age of mother at the birth of a first child in some villages of Dagestan in 2013-2014

Note: Confidence intervals are constructed according to the normal distribution for the number of observations (childbirths) over 30 and the t-distribution for the number of observations under 30.

It should be noted that there are a number of reasons, in addition to the aforementioned statistical overcounting of women at young reproductive ages, for the lower age of the mother in our sample compared to that for Dagestan as a whole. Firstly, our sample is not weighted according to the representation of various ethnic groups in the general population of Dagestan, as well as to their distribution across plains, mountains and foothills. Secondly, in calculating the mean age of mother, we use the number of children born in a given year, rather than the age-specific fertility rates (since data on the age structure currently are not available for all the villages). Thirdly, we do not have data about age, but about the year of the mother's birth, and in order to avoid a possible overestimation when calculating age according to the formula "year of observation minus the year of birth", we weigh the number of births not at the middle but at the beginning of the age interval, which also leads to certain inaccuracies.

4. POSSIBLE REASONS FOR THE ABSENCE OF "AGEING" OF MATERNITY

In this section, we discuss possible reasons for the absence of "ageing" of motherhood in rural Dagestan. One hypothesis might be that the rejuvenation of fertility is associated with Islamisation – a process that undoubtedly affects family life in post-Soviet Dagestan. The role of Islam as a factor influencing fertility has been repeatedly discussed in the literature [Mazrui 1994; Morgan et al. 2002]. High fertility in some societies is considered by researchers as a consequence of the great role of Islam in their lives. Conversely, the decline in fertility observed in recent decades in most Muslim countries is associated with a decrease in the regulatory role of Islam in society [Heaton 1996; Hirschmann, Rindfuss 1980; Eltighani 2009; Barbieri et al. 1996; Shah 2004].

However, a comparison of the data of a large number of Muslim countries shows that the correlation between Islamisation and high fertility may not be as strong as is often assumed. E. Kaufmann [2008] notes that, based on the results of the World Values Survey, among countries where surveys within the framework of this project have registered the great role of religious values in the society, there are also countries with low (about 2 births per woman) fertility (for example, Azerbaijan and Indonesia). On the other hand, according to the same study, there are countries with a predominantly Islamic population in which a relatively modest role of religious values coexists with high fertility (for example, Tanzania, Uganda). The work of Berman and Stepanyan [2003] examines the correlation between fertility in Muslim families of a number of countries and the level of Islamisation of the family, as determined by whether the children in the family attend a secular or Islamic school. It turns out that the degree to which fertility in families determined by this indicator as Islamic is greater than in other families differs significantly from country to country. However, in none of the countries investigated does this difference exceed 30%. Such a result, according to the authors, shows that Islamisation influences fertility, but that this influence is much more modest than the influence of a number of other religions, in particular Judaism, where fertility among Orthodox Israelis is many times higher than among the other groups of the country's Jewish population.

At the moment, we can only make preliminary judgments about the extent to which Islamisation is "responsible" for the rejuvenation of fertility in Dagestan. Between some villages of our sample, the contrast in the role of religion in the life of the village is very noticeable. Namely, in the villages of Novy Kostek, Leninaul, Dorgeli and Karabudakhkent, judging by interviews with local residents conducted in 2014-2015, religion plays a primary role in the organisation of rural life, as evidenced by such phenomena as the active participation of rural imams and other religious authorities in addressing various issues of rural life, full attendance at Friday prayers, etc. Several other villages surveyed – Kubachi, Kumukh, Sulevkent and Tamazatube – are, in contrast, currently notable for the modest role of Islam in organising their lives. For the remaining villages, it is not possible to draw an unambiguous conclusion about the magnitude of Islam's role there.

According to Figure 13, out of four villages where the role of Islam is great, the mean age of motherhood in 2013-2014 was consistently lower than the mean for all the villages studied in Dorgeli and Karabudakhkent. At the same time, in three of these villages (Leninaul, Karabudakhkent and Dorgeli) in 2013-2014 the mean age of mother at birth of the first child was under 23 years (with the mean for rural Dagestan being 23.68 years in 2013). In another (New

Kostek), the mean age of the onset of maternity was higher than the mean for Dagestan in 2013, but in 2014 it also fell below 23 years.

However, low maternity ages are also observed for some villages with a small role of Islam in rural self-organisation, for example, Tazantube and Sulevkent. Therefore, it is impossible to say that villages with a low level of Islamisation regularly have a higher age of motherhood.

Thus, within the limited space of the villages under consideration, the thesis about the role of Islam in the "non-ageing" of motherhood on the whole finds some confirmation, but requires further study.

Let us turn to another explanation, apart from "Islamisation", of the absence of "ageing" of fertility, an explanation involving the preservation of traditional mechanisms of family organisation, manifested primarily in the following of age and gender hierarchies. Without considering here the general definition of the concept of "traditionality", we note that, in relation to the age of motherhood, this concept involves the repetition of timing of major demographic events in young generations, including the birth of children. The link between the "traditionality" of family organisation and the early start of maternity has been demonstrated for a number of countries with a predominantly Muslim population, including, for example, Uzbekistan [Barbieri et al. 1996].

In the case of Dagestan, the explanation of the slowing-down of the ageing of motherhood as the result of preserving the traditional characteristics of family life is problematic, primarily because the age of motherhood in Dagestan was not stable in the post-Soviet period, nor in the last Soviet decades (Figures 6 and 7). Given the variability of the age-specific features of fertility in the last few decades, their current status can be recognised as reflecting a certain "tradition" only on the basis of fairly arbitrary assumptions.

Table 3. The mean age of mother of different nationalities in the village of Tukhchar in 2013-2014, without accounting for birth parity

Ethnic group	2013	2014
Laks	27.3 (24)	28 (11)
Chechens	25.62 (16)	27.21 (14)
Avars	27.16 (38)	26.97 (34)

Note: In parentheses is the number of observations.

However, it must also be noted that, in certain aspects, the current age of motherhood does reflect trends that have been present for a long time. This does not, though, apply to the general picture of Dagestan, but rather to those cases that differ from it. For example, the age of motherhood (including the birth of the first child) is higher than the mean indicators in the surveyed villages where the Laks live (see Figures 13 and 14, and Table 1). This trend is not, apparently, fortuitous. In Section 1, we saw (Figure 3) that among the Laks a decrease in fertility occurred in earlier cohorts than in other indigenous peoples of Dagestan. The late age of motherhood among the Laks in the villages studied is in keeping with the general low fertility of this people, who

underwent mass urbanisation earlier than other ethnic groups of Dagestan[8]. The possibility of entrenched family norms of a given ethnos influencing the age of motherhood is supported by data on the village of Tukhchar, where the Laks live together with two other peoples. As can be seen from Table 3, among Laks the mean age of mother in 2013-2014 was higher than that of their neighbours in the village.

Such observations suggest that the reproduction of fertility behaviour from generation to generation within individual ethnic groups can take place. However, the Laks are apparently the only major people who, according to the dynamics of birth parameters, have differed markedly from the other peoples of Dagestan in recent decades. An argument for the claim that current trends in the change in the age of motherhood are related to the preservation of some traditional norms would entail contrasts among many ethnic groups.

5. CONCLUSIONS

In this article, we have put forth evidence that in the Republic of Dagestan the dynamics of the age of motherhood currently differ from those for Russia as a whole. This is reflected in the decrease in the mean age of mother in Dagestan, both without regard to birth parity and at births of the first and second parities. This trend is indicated by various official data, as well as preliminary data from our research on the sample of Dagestan villages. In the light of the foregoing, there is no reason to believe that the observed trends are an "artefact" caused by the unreliability of the data.

The search for an explanation of this phenomenon naturally leads us to the question of what social causes it may be related to. As we have seen in studies of fertility in foreign countries, among other things, two factors are noted that can "slow down" the ageing of motherhood that is expected to come with a decrease in the overall level of fertility. These are, firstly, the role of Islam in the society being studied and, secondly, a high degree of preservation of the traditional family life. We have seen that for Dagestan there are, a priori, more grounds for assuming the influence of the first than of the second factor.

The hypothesis that it is Islam that "maintains" the relatively young age of motherhood in Dagestan today merits rigorous checking, because the degree of observance of Islamic norms is not uniform in this region, with different villages differing significantly. In the examples we provided, it is clear that it is precisely villages where these norms are more strictly observed that are distinguished by "younger" motherhood, but the connection between the age of mother at birth of first child and the observance of Islamic norms is not so obvious. At the same time, we can assume that the level of observance of Islamic norms is to a greater extent an individual parameter, and not a characteristic that refers to whole villages. Accordingly, the hypothesis about the role of Islam as the cause of "young" motherhood should be checked within the framework of an

[8] According to the RC-2010, the percentage of the urban population among the Laks was 71.9%, with an overall level for Dagestan of 45.2%. Laks are one of the most "urban" peoples of Dagestan. It can be assumed that this also affects the "rural" fertility of this people, because between the city and the village in Dagestan there are quite intensive ties between relatives, and urban motherhood is normally assumed to be "older" than rural. Based on this, it can be expected that the ethnic group with the highest proportion of urban population as a result of the "diffuse" influence of urban relatives on rural motherhood in the village will also "grow old".

individual sample survey of mothers of different age groups, which we are currently doing in Dagestan.

LIST OF ABBREVIATIONS

RC-2002 – 2002 Russian population census

RC-2010 – 2010 Russian population census

RusFMD – Russian Fertility and Mortality database

TFR – total fertility rate

PAP – period average parity

SIF – Social Insurance Fund

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