SMOKING AS A FACTOR OF REDUCED LIFE EXPECTANCY IN RUSSIA

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Smoking is an important factor of preventable mortality in Russia. According to the author's calculations, based on international estimates of the relative risks of mortality for smokers and Russian data on smoking prevalence, self-assessment of health and mortality by causes of death, in 2017 the life expectancy of smokers was 5.2-5.3 years lower than that of non-smokers, while healthy life expectancy was 2.6-3.2 years lower.

Since 2005, smoking-related standardized mortality rates have been steadily declining, generally repeating the changes in mortality from all causes in Russia during this period. However, the aggregated data conceal significant gender differences – the main decrease in smoking-related mortality was observed among men. The smoking epidemic among men started earlier and is now at a more mature stage (decline) than among women (stagnation or even growth for some groups).

From 2004 to 2017, the life expectancy of women smokers increased significantly more (by more than a year and a half) than for non-smokers, although for men such a trend is not observed. The decomposition of differences in life expectancy between smokers and non-smokers shows that the advantage in life expectancy of non-smoking women mainly decreased in the age range from 50 to 69 years, mainly as a result of changes in mortality from cardiovascular diseases. For men, a similar reduction of the advantage in life expectancy of non-smokers compared to smokers occurred at younger ages, from 40 to 64 years. At older ages, non-smokers compensate for their lag in the increase of life expectancy; however, since for women this trend is observed later and on a smaller scale, life expectancy of women smokers in the study period grows faster.

***Key words**: smoking, mortality, causes of death, life expectancy, healthy life expectancy.*

INTRODUCTION

Smoking is an important factor in preventable mortality. Beginning, as a rule, already in adolescence[1], by the age of 30-35 it becomes the cause of significant differences in mortality between smokers and non-smokers.

Due to the higher prevalence of smoking among men (in 2017, according to the HSE RLMS, 43% of men and 14% of women in Russia smoked[2]), smoking is especially noticeable for male mortality, including at working ages.

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[1] According to the author's calculations for 2017, to the question "Could you please recall when you started smoking? How old were you then?", among current smokers more than 80% of men and more than 65% of women replied that they had started smoking before the age of 20.

[2] The data of specialized surveys on questions of tobacco consumption give, as a rule, higher estimates than sociological surveys of households. In particular, in the presence of other relatives, some of the respondents - more often women and youth (Hwang et al. 2018) - may hide the fact that they smoke (Perlman et al. 2007; Laatikainen, Vartiainen, Puska 1999). According to the GATS (World Health Organization 2016) specialized global survey, 50% of men and 15% of women in Russia smoked in 2016.

Long-term observations of significant groups of smokers and non-smokers as part of prospective mortality surveys conducted in many countries on international (see, for example, (Oza et al. 2011; National Center ... 2014) and Russian data (Plavinsky, Plavinskaya 2012; Konstantinov and et al. 2007), allowed us to identify a number of diseases that can be caused by smoking and to assess how much higher the risks of death from these diseases are at certain ages for smokers compared with non-smokers (see the example of the estimates in table 1). By combining such estimates of relative risks with data on mortality by causes of death and on the proportion of smokers among different age and gender groups, the contribution of smoking to total mortality can be determined. Such calculations have been made before. For example, (Maslennikova, Oganov 2011) used similar methods to estimate tobacco-related mortality in 2009 at 278,000 people, or 14% of all deaths.

Of interest is the effect of smoking on both life expectancy and healthy life expectancy. This study attempts to answer a number of questions. In particular, we were interested in the extent to which changes in life expectancy in 2004-2017 were due to changes in mortality from diseases caused by smoking. Another object of study was the dynamics of life expectancy and healthy life expectancy of smokers and non-smokers, as well as its gender characteristics. The final section of the article provides comparative data on the effect of smoking on life expectancy in Russia and other countries (using as examples the USA and India).

LITERATURE REVIEW

Since 2003, life expectancy in Russia has been growing, making this the longest period of improvement in mortality rates since the mid-1960s (Shkolnikov et al. 2014). But a comparison with the values of half a century ago does not show an improvement in the mortality structure; the age distribution of mortality from large classes of causes has not changed, which allows us to conclude that there are no signs of a second epidemiological transition in Russia (Vishnevsky 2015).

The work (Shkolnikov et al. 2013) notes that the improvement in mortality dynamics in the 2000s was mainly due to the decrease in mortality from cardiovascular diseases and external causes among adults. The authors note a larger effect on the reduction in mortality from circulatory diseases and especially from cerebrovascular diseases, which makes the current situation in Russia partly similar to the changes both in the countries of Central Europe in the 1990-2000s and in Western European countries in the 1970s, what is called the “cardiovascular revolution.” But the question of how sustainable this trend is trend remains open.

The same authors in the study (Shkolnikov et al. 2014) note that excess mortality in Russia can be reduced, including by further reducing tobacco consumption (along with a decrease in alcohol consumption and an increase in the effectiveness of the national healthcare system).

The work (Grigoriev et al. 2014) explores the components and factors of the steady decline in mortality in Russia observed since 2003. Using data on mortality by cause of death, the main elements of recent improvements were determined - a combination of factors due to changes in behavior (reduced alcohol consumption, improved diet) and the implementation of healthcare policies (using drugs to lower blood pressure, expanding access and using high-tech medical and

surgical interventions), as well as an improved economic situation of the population. The authors conclude that, despite a certain similarity between the Russian trend and the initial stages of mortality reduction in a number of European countries (France, Poland and Estonia), one cannot exclude the possibility of a return to stagnation of mortality due to the insufficient willingness of the authorities and society to pay adequate attention to public health care.

In addition, Russia's significant lag in life expectancy behind not only developed countries, but also behind countries with similar levels of economic development persists. Thus, life expectancy in Russia is significantly lower than the level predicted by the Preston curve, which establishes a relationship between life expectancy and GDP per capita. According to the results presented in the work (Andreev, Shkolnikov 2018), in 2010 the difference between model and actual life expectancy for Russia was 8.7 years and was the highest among the 57 countries included in the calculations.

A significant effect of smoking on mortality has been repeatedly proven, including for Russian data. For example, according to the results of a prospective study of mortality among residents of St. Petersburg over the course of 30 years, mortality from all causes among men was for smokers more than double the mortality of never-smokers (Plavinsky, Plavinskaya 2012). A retrospective study of male mortality in Tomsk in 1990-2001 showed that between the ages 15-74, smoking increases the risk of death by 1.5 times, and at working age - more than 2 times (Efimova et al. 2017). Female smoking is no less dangerous. In a prospective study of mortality among residents of Moscow aged 20 and older, the relative risks of mortality from all causes for moderate smokers and ex-smokers were assessed as 1.86 and 1.25, respectively (Konstantinov et al. 2007).

A study carried out on the panel data of a national representative survey of the Russian Monitoring of the Economic Situation and Health of the National Research University - Higher School of Economics (hereinafter RLMS) showed that smoking is comparable in terms of its influence on mortality to excessive consumption of alcohol: relative mortality risks for smokers and respondents with a dangerous type of alcohol consumption were 1.64 and 1.56, respectively (Denisova 2010).

The tobacco epidemic in Russia began in the Soviet era, when it was widespread mainly among men. In the 1990s, it continued to gain momentum: smoking prevalence among men reached its maximum and then stopped for a long time, while the proportion of women smokers almost doubled over this period (Perlman et al. 2007).

By the end of the 2000s, when the negative consequences of mass smoking became apparent not only to experts, but to society as a whole, the tobacco control policy was significantly strengthened: a ban on smoking in public places was introduced, advertising was prohibited, excise taxes on cigarettes and other tobacco products began to increase noticeably[3]. Over the past decade,

[3] Most of the non-excise measures restricting the consumption of tobacco products were introduced by Federal Law No. 15-FZ "On the Protection of Citizens' Health from Exposure to Tobacco Smoke and the Consequences of Tobacco Use" dated February 23, 2013.

noticeable changes have occurred in smoking in Russia: for the first time in the post-Soviet period, the prevalence of smoking has steadily declined.

In a recent work (Quirmbach, Gerry 2016), it was concluded that the dynamics of smoking in Russia as a whole repeat the main stages of the development of the tobacco epidemic previously observed in other countries. In particular, the authors note a change in the behavior of different generations of smokers, as well as a steady decrease in gender differences in the prevalence of smoking.

METHODOLOGY

Data

The calculations used estimates of the relative risks of mortality from a number of diseases caused by smoking on the data of the second round of the American Cancer Prevention Study CPS II (Oza et al. 2011). The relative risk values used are shown in Table 1. The CPS II survey[4] was conducted by the American Cancer Society over a 24-year period and included observations of 1.2 million people in all 50 states, the District of Columbia and Puerto Rico. The purpose of this large-scale prospective survey was to examine the relationship between individual factors and lifestyle characteristics, including nutrition and bad habits, and the risk of developing cancer and other diseases.

The survey questionnaire included questions about the physical and demographic characteristics of respondents, their personal and family history of cancer and other diseases, the use of drugs and vitamins, the reproductive behavior of women, work in harmful industries, eating habits, smoking and drinking, physical education and sports and other aspects of personal behavior. Over 24 years of observation (from 1982 to 2006), 491,188 deaths were recorded as part of the survey, with the cause of death being recorded for 99.3% of them. Estimates of the relative mortality risks obtained using the survey data have a significantly higher level of detail both by gender and age groups and by the list of diseases compared to similar Russian prospective mortality surveys (Plavinsky, Plavinskaya 2012; Konstantinov et al. 2007; Efimova et al. 2017).

To estimate the prevalence of smoking and health status, data from the RLMS of the Higher School of Economics[5] from 1994 to 2017 were used.

The main source of information for estimating mortality from diseases caused by smoking is the Russian NES[6] database on fertility and mortality (mortality rates by cause of death and average annual population for five-year age and gender groups, 1994-2017).

[4] See (Calle et al. 2002), and the American Cancer Society site survey URL: https://www.cancer.org/research/we-conduct-cancer-research/epidemiology/cancer-prevention-study -2.html

[5] Russian monitoring of the economic situation and public health of the HSE (RLMS HSE), conducted by the Higher School of Economics National Research University and Demoscope LLC with the participation of the Population Center of the University of North Carolina at Chapel Hill and the Institute of Sociology of the Federal Research Sociological Center of the Russian Academy of Sciences. (RLMS HSE Survey Sites: URL: http://www.cpc.unc.edu/projects/rlms and URL: http://www.hse.ru/rlms).

[6] URL: http://demogr.nes.ru/index.php/ru/demogr_indicat/data

Estimated smoking prevalence and poor / good health by gender and age

To assess the prevalence of smoking, RLMS data for 1994-2007 were used. Smokers were considered those respondents who gave a positive answer to the question "Do you currently smoke?", and ex-smokers – those who gave a negative answer to the question about smoking at present and a positive answer to the question "Have you ever smoked?"

In the research literature, the problem of accounting for the delayed effect of smoking on health and mortality is addressed in different ways. One possible solution is the Peto-Lopez approach (Peto et al. 1992), which involves the use of the smoking impact ratio (SIR) on public health. The value of the impact ratio of smoking, SIR, is determined by comparing mortality from lung cancer in the study population and in the reference group, usually borrowed from the previously mentioned American Cancer Prevention Survey CPS II. The fact is that lung cancer in the vast majority of cases is caused precisely by active or passive smoking. The impact level of smoking, SIR, is defined as:

$$SIR = [(C_{LC} - N_{LC})/(S^*_{LC} - N^*_{LC})] \times (N^*_{LC}/N_{LC}), \quad (1)$$

where C_{LC} and N_{LC} are the mortality rates for lung cancer for the studied population as a whole and for those who never smoked, respectively, and S^*_{LC} and N^*_{LC} are the mortality rates for lung cancer for smokers and non-smokers in the control group. The N^*_{LC}/N_{LC} correction factor is necessary in cases where, in addition to smoking, there are other factors that significantly affect mortality from lung cancer, for example, the use of coal for heating and cooking, a high level of incarceration, etc.

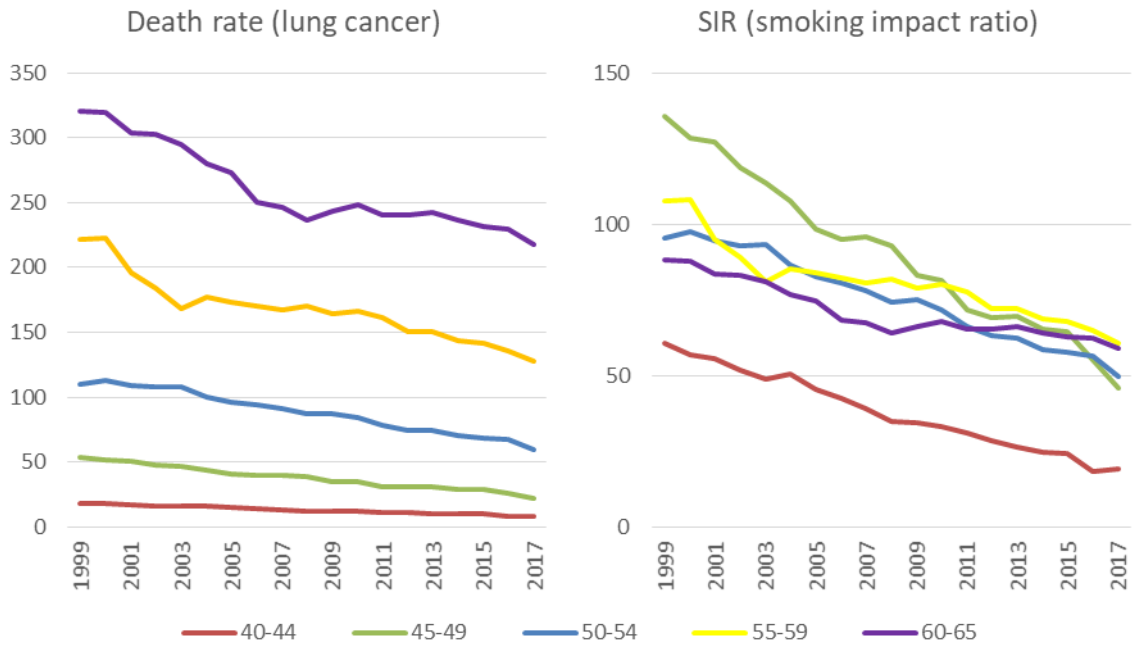

Figure 1. Dynamics of male mortality from lung cancer and the smoking impact ratio (SIR) determined on their basis, 1999-2017

Source: Author's calculations based on data from the Russian database on fertility and mortality.

In the course of our study, an attempt was made to apply the SIR method to Russian data starting from the 2000s. However, due to the very high mortality rate from lung cancer in the first half of the 2000s, the accumulated negative effect of smoking for some groups, in particular for men 45-49 years old, turns out to be higher than 100% (Figure 1).

Table 1. Relative mortality risks from a number of diseases for current smokers and former smokers compared to never smokers

	Men		Women	
	Current Smokers	Former smokers	Current Smokers	Former smokers
Neoplasms				
trachea, bronchi, lungs (C33, C34)	21.3	8.3	12.5	4.8
lips, oral cavity and pharynx (C00-C14), esophagus (C15) and larynx (C32)	8.1	4.4	6.0	3.0
stomach (C16)	2.16	1.55	1.49	1.36
liver (C22)	2.33	1.81	1.5	1.69
pancreas (C25)	2.2	1.2	2.2	1.6
cervix (C53)	0	0	1.5	1.4
bladder (C67)	3.0	2.0	2.4	2.0
leukemia (C91-C95)	1.89	1.3	1.23	1.3
rectum (C18-C21)	1.32	1.15	1.41	1.22
kidney and other urinary organs	2.5	1.8	1.5	1.2
Cardiovascular diseases				
Coronary heart disease (I20-I25), 30-44 years	5.51	1.18	2.26	2.22
Coronary heart disease (I20-I25), 45-59 years	3.04	1.64	3.78	1.74
Coronary heart disease (I20-I25), 60-69 years of age	1.88	1.29	2.53	1.34
Coronary heart disease (I20-I25), 70-79 years old	1.44	1.13	1.68	1.40
Coronary heart disease (I20-I25), 80 years old and over	1.05	1.02	1.38	1.40
Cerebrovascular disease (I60-I69), 30-44 years	1	1	1	1
Cerebrovascular disease (I60-I69), 45-59 years	3.12	1	4.61	1.44
Cerebrovascular disease (I60-I69), 60-69 years of age	1.87	1.19	2.81	1.44
Cerebrovascular disease (I60-I69), 70-79 years	1.39	1	1.95	1.36
Cerebrovascular disease (I60-I69), 80 years and older	1.05	1	1	1
Hypertension (I10-I15)	1.96	1	2.12	1.12
Other cardiovascular diseases (I00-I09, I26-I51, I70-I99)	2.15	1.3	2.0	1.34
Respiratory diseases				
Bronchitis, emphysema and other chronic obstructive pulmonary diseases (J20-J22, J40-J44)	10.8	7.8	12.3	8.9
Other respiratory diseases (pneumonia, asthma, flu) (J09-J18, J45-J46)	1.9	1.4	2.2	1.2
Tuberculosis (A15-A19)	1.62	1.58	1.62	1.58
Diabetes (E10-E14)	1.42	1.1	1.14	1

Sources: (Oza et al. 2011: table 1), as well as (Ezzati et al. 2005a: table 1) - neoplasms, (Thun, Apicella, Henley 2000: table 4) - respiratory diseases, (Ezzati et al. 2005b : table 1) - cardiovascular disease.

Due to the impossibility of using the SIR coefficient, the proportion of the population affected by the negative effects of smoking was estimated using data on smoking prevalence (National Center ... 2014; Oza et al. 2011). Many authors (Kong et al. 2016; Liutkute et al. 2017) use data on smoking prevalence with a lag of 8, 10, or 20 years to take into account the delayed effect of smoking on health and mortality. The period of observation of smoking in the RLMS began in 1994, for which reason it was decided to use a lag of 10 years, making it possible to track the dynamics of the indicator from 2004 through 2017.

To estimate the share of the population with poor health, RLMS data for 2004-2017 were used. Respondents were considered to have poor health if they answered the question "How do you assess your health?" with the answer "bad" or "completely bad". A similar method of assessment is used in the methodology for calculating the indicator "Healthy life expectancy (years)"[7].

Mortality from smoking-related diseases

To estimate the mortality from diseases caused by smoking, we calculated the coefficient of additional risk due to smoking, the PAF (population attributable fraction), separately for the types of diseases and age and gender groups:

$$PAF_{ij} = \left(\left(p_j^{(0)} + p_j^{(1)} \times RR_{ij}^{(1)} + p_j^{(2)} \times RR_{ij}^{(2)}\right) - 1\right) / \left(p_j^{(0)} + p_j^{(1)} \times RR_{ij}^{(1)} + p_j^{(2)} \times RR_{ij}^{(2)}\right), \quad (2)$$

where $p_j^{(0)}, p_j^{(1)}, p_j^{(2)}$ is the prevalence of smoking in the age and gender group j among never-smokers, ex-smokers and smokers, respectively, and $RR_{ij}^{(1)}$ and $RR_{ij}^{(2)}$ are the relative death risks for ex-smokers and smokers from disease i in the age and gender group j compared to never-smokers. The prevalence of smoking depending on the status of the smoker for various age and gender groups was calculated on the basis of RLMS data with a lag of 10 years. The relative risks of death were taken from studies using the CPS II survey data ((Oza et al. 2011: table 1) and others) and are presented in table 1.

The number of additional deaths AM (here, mortality attributed to smoking) for a given disease is calculated as $AM = OM \times PAF$, where OM is the total number of deaths from a given cause of death, taken from official mortality data.

Age-specific mortality rates for smokers, ex-smokers and non-smokers

Knowing the relative risks of death (RR), smoking prevalence (p), and mortality rates by cause of death for five-year age groups (m^{total}), we can calculate the mortality rates from disease i for age group j for smokers ($m_{ij}^{(2)}$), ex-smokers ($m_{ij}^{(1)}$) and never-smokers ($m_{ij}^{(0)}$):

$$\begin{aligned} m_{ij}^{(2)} &= m_{ij}^{total} * \frac{RR_{ij}^{(2)}}{p_j^{(0)} + p_j^{(1)} * RR_{ij}^{(1)} + p_j^{(2)} * RR_{ij}^{(2)}}; \\ m_{ij}^{(1)} &= m_{ij}^{total} * \frac{RR_{ij}^{(1)}}{p_j^{(0)} + p_j^{(1)} * RR_{ij}^{(1)} + p_j^{(2)} * RR_{ij}^{(2)}}; \\ m_{ij}^{(0)} &= m_{ij}^{total} * \frac{1}{p_j^{(0)} + p_j^{(1)} * RR_{ij}^{(1)} + p_j^{(2)} * RR_{ij}^{(2)}}. \end{aligned} \quad (3)$$

[7] Rosstat order of February 25, 2019 No. 95 "On approval of the methodology for calculating the indicator 'Healthy life expectancy (years).'" URL: http://www.consultant.ru/document/cons_doc_LAW_319186/076a4f37654d826be73fe6c5347bee3830e053

Then, using the standard technique for constructing mortality tables[8], we can calculate the life expectancy for smokers, ex-smokers and never-smokers. Similarly, dividing the totality of people in each age group into two groups, those with poor health and the rest, the values of the healthy life expectancy for these three groups of the population are calculated.

The contribution of changes in mortality by age groups and causes of death to the dynamics of life expectancy (decomposition method)

When analyzing the contribution to the increase in life expectancy of changes in mortality of certain age groups and mortality from various causes, the decomposition method was used (Andreev, Shkolnikov, Begun 2002); see also recent examples of the application of the method in (Timonin et al. 2017; Papanova, Shkolnikov, Timonin 2019). The calculations used a numerical decomposition program from a technical report (Andreev, Shkolnikov 2012: Example 1: decomposition of differences in life expectancy at birth by age and causes of death for two populations). Two examples were considered: 1) the contribution to the differences between life expectancy in 2004 and 2017 of diseases caused by smoking; 2) the contribution of the main classes of diseases to the differences in the life expectancy of smokers and non-smokers in 2004 and 2017.

RESULTS

The dynamics of mortality due to smoking

Since 2004, Russia has witnessed a long period of decline in mortality and an increase in life expectancy, against which, according to the calculations, the mortality from diseases caused by smoking was reduced. According to the results, in 2017 smoking was the direct cause of 211.5 thousand deaths among men and 23.4 thousand deaths among women (table 2). The absolute values of mortality due to smoking have been steadily decreasing since 2005, generally repeating the changes that occurred during this period in all-cause mortality. However, data across the entire population mask significant gender differences: the main decrease in tobacco mortality occurred among men.

One possible explanation of what is happening is offered by the theory of the tobacco epidemic (Lopez, Collishaw, Piha 1994). The tobacco epidemic among men began earlier and is now at a more mature stage compared to the female one. For women, smoking in many respects continues to be one of the manifestations of emancipation or, on the contrary, an attribute of more successful male behavior, as well as a possible struggle with stress, overweight, etc. Use of lagged data on smoking prevalence (to take into account the delayed effect of smoking on health, when calculations looked at data with a 10-year shift) only enhances this effect. And if for men smoking in 1994-2007 stabilized (albeit at very high values), the proportion of women smokers during this period increased markedly. As a result, even the favorable dynamics of mortality from

[8] See (Preston, Heuveline, Guillot 2001: 49); when calculating a_0 for a given m0, the Andreev-Kingcade formula from the technical protocol Methods Protocol for the Human Mortality Database (Version 6) was used, URL: https://www.mortality.org/Public/Docs/MethodsProtocol.pdf

cardiovascular diseases in the second half of the 2000s and 2010s did not allow a reduction in the relative rates of tobacco mortality for women (Figure 2); see also (Kalabikhina, Kuznetsova 2019).

Table 2. Prevalence of smoking, number of deaths and standardized mortality rates[9] from diseases caused by smoking. Russia, 2004-2017

Year	Smoking prevalence, % (with a 10-year lag)		Deaths from diseases caused by smoking, persons		Standardized death rate, per 100,000	
	men	women	men	women	me	women
2004	57.6	9.2	296 830	24 401	492.0	24.4
2005	59.6	9.1	301 059	24 730	494.3	25.4
2006	59.7	9.8	276 705	21 666	453.4	22.2
2007	59.3	10.2	263 561	22 984	430.8	22.9
2008	58.8	10.5	263 153	25 001	429.8	24.8
2009	58.9	11.1	253 258	23 138	413.7	23.6
2010	58.9	11.7	249 926	21 598	404.2	22.8
2011	59.9	14.3	239 145	26 044	379.9	25.7
2012	60.9	14.2	232 907	20 618	366.3	21.5
2013	60.6	15.0	229 747	23 376	355.6	23.1
2014	60.1	15.6	226 198	21 403	345.7	21.8
2015	59.9	15.2	225 554	19 182	333.7	19.9
2016	60.4	15.7	224 550	22 817	325.8	22.6
2017	59.9	15.9	211 538	23 368	303.5	22.5

Source: Author's calculations.

Note: Data on smoking prevalence is taken with a 10-year lag in order to take into account the effect of the delayed effects on health.

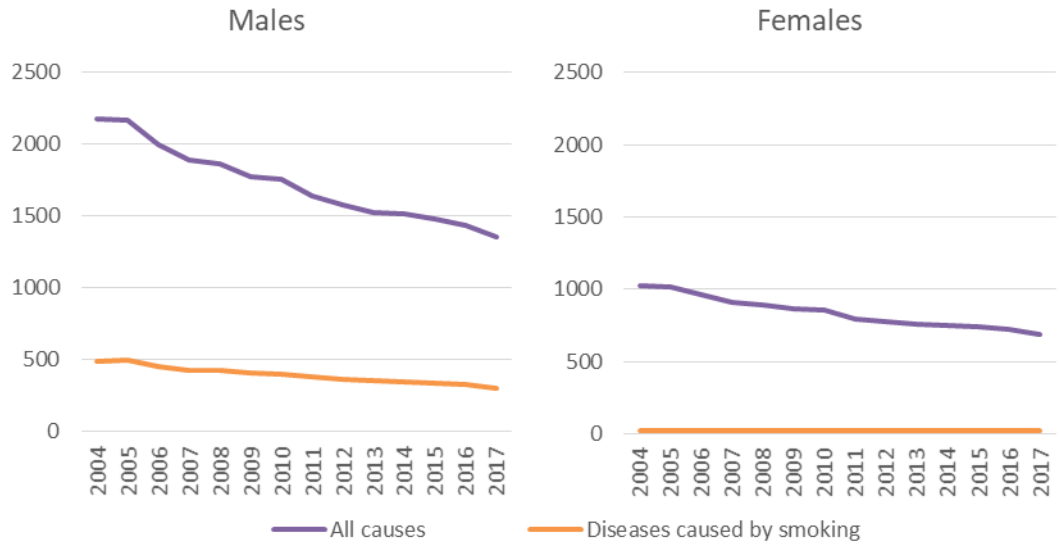

Figure 2. Standardized mortality rates for all causes and for diseases caused by smoking, 2004-2017, per 100,000

Source: Author's calculations.

[9] The WHO European standard is used. See: Rosstat (1996). Methods of standardization of indicators of natural population movement. Methodological provisions on statistics (issue 1, 2, 3, 4, 5). URL: http://www.gks.ru/bgd/free/B99_10/IssWWW.exe/Stg/d000/i000050r.htm

Dynamics of life expectancy indicators of smokers and non-smokers

By calculating the mortality tables separately for smokers, ex-smokers and never-smokers (see Appendix), we can compare the values of life expectancy for these three groups, which together give the entire adult population. The largest differences in life expectancy, as expected, are observed for smokers and never-smokers, amounting to 5.3 years for men in 2017 and 5.2 years for women. The fact of quitting smoking significantly (by 2.6 years for men and 3.2 years for women) prolongs the life of quitters (table 3).

Table 3. Life Expectancy at birth depending on smoking status, 2004-2017, years

Year	Men				Women			
	Never smoked	Used to smoke	Smoke	Difference (never smoked / smoke), years	Never smoked	Used to smoke	Smoke	Difference (never smoked / smoke), years
2004	62.6	60.1	57.2	5.4	72.7	69.3	65.9	6.7
2005	62.6	60.2	57.3	5.4	72.8	69.3	66.1	6.7
2006	64.1	61.7	58.8	5.4	73.6	70.2	67.1	6.5
2007	65.2	62.7	59.8	5.4	74.4	71.0	68.0	6.3
2008	65.6	63.1	60.2	5.4	74.7	71.3	68.3	6.3
2009	66.6	64.0	61.1	5.5	75.2	71.7	69.0	6.2
2010	66.8	64.3	61.4	5.4	75.3	71.9	69.4	5.9
2011	67.8	65.2	62.3	5.5	76.1	73.0	69.9	6.2
2012	68.3	65.8	62.9	5.4	76.4	73.2	70.5	5.8
2013	68.9	66.3	63.5	5.5	76.8	73.7	70.9	6.0
2014	68.9	66.4	63.6	5.4	77.0	74.4	71.3	5.7
2015	69.5	66.9	64.2	5.3	77.2	74.4	72.3	4.9
2016	70.1	67.6	64.9	5.3	77.6	74.3	72.2	5.3
2017	71.1	68.5	65.9	5.3	78.2	75.0	73.0	5.2

Source: Author's calculations.

The dynamics of healthy life expectancy indicators for smokers and non-smokers are presented in table 4. We used the methodology used in Russian official statistics, according to which people are considered healthy who rate their health as average, good or very good. A healthy life expectancy for both smokers and non-smokers is markedly lower than similar indicators of life expectancy, and differences for non-smokers are especially noticeable, since their additional life years compared to smokers are in old age, when self-evaluation of health decreases sharply.

As a result, the gap in life expectancy caused by smoking is reduced: if for life expectancy in 2017 it was more than 5 years, then for healthy life expectancy it is only 2.5-3 years. The healthy life expectancy of smokers depending on smoking status in 2017 was, for men, 59.8 years for smokers and 62.8 years for non-smokers, and for women - 63 years for smokers and 65.4 years for non-smokers. Of particular note is the significant gap between life expectancy and healthy life expectancy of the population: even for non-smoking women, the group with the lowest mortality risks, the healthy life expectancy is barely more than 65 years. This is due, at least in part, to the characteristics of the indicator used for the proportion of healthy people based on respondents' self-evaluation.

Table 4. Information on healthy life expectancy depending on smoking status, 2004-2017, years

Year	Men			Women		
	Never smoked	Smoke	Difference	Never smoked	Smoke	Difference
2004	55.1	52.0	3.1	57.7	54.7	3.0
2005	55.6	52.2	3.4	59.1	56.2	2.9
2006	56.3	53.2	3.2	59.5	56.7	2.8
2007	57.6	54.3	3.3	59.9	57.3	2.6
2008	58.3	54.8	3.4	59.5	57.0	2.5
2009	58.8	55.5	3.3	60.8	58.2	2.6
2010	58.1	54.9	3.1	61.5	58.7	2.7
2011	59.6	56.4	3.2	62.4	59.6	2.8
2012	60.6	57.1	3.5	63.3	60.7	2.6
2013	61.0	57.6	3.4	62.7	60.1	2.6
2014	61.3	57.9	3.4	63.9	61.2	2.7
2015	61.8	58.5	3.3	64.8	62.5	2.4
2016	62.4	59.1	3.4	64.7	62.2	2.5
2017	62.8	59.8	3.0	65.4	63.0	2.4

Source: Author's calculations.

Estimates of mortality from diseases caused by smoking have a number of limitations. Thus, the calculations did not take into account passive smoking, as well as the effect that smoking of pregnant women has on the health of their unborn children. Another important limitation is the use of relative mortality risk values for smokers compared to non-smokers obtained for another population (US population 1982–2006). The accuracy of the estimates directly depends on the quality of the RLMS data used to calculate the proportion of the healthy population and smoking prevalence.

THE CONTRIBUTION OF SMOKING TO CHANGES IN LIFE EXPECTANCY IN 2004-2017

The increase in life expectancy of men in 2017 compared to 2004 was mainly due to a decrease in mortality in older working age from 40 to 60 years, and a significant part of this improvement was associated with a decrease in mortality from diseases caused by smoking (Figure 3).

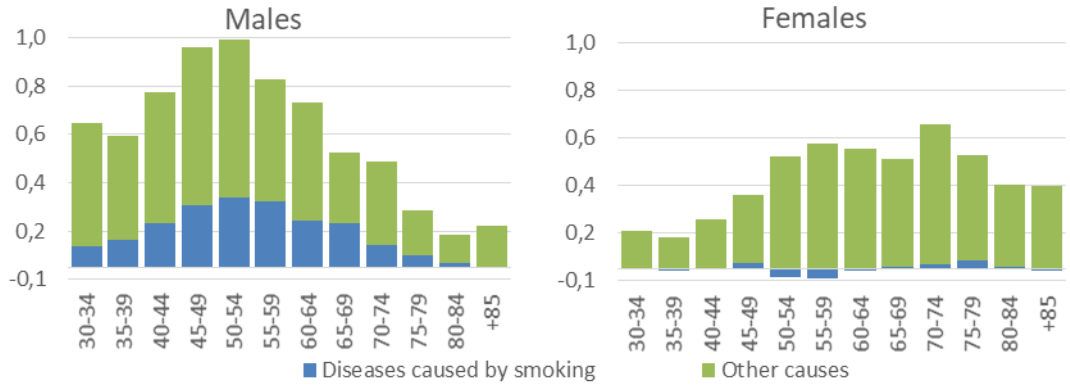

Figure 3. Contribution of mortality from diseases caused by smoking to changes in life expectancy of men and women, 2004-2017, years

Source: Author's calculations.

Decomposition of the increase in the life expectancy of women, on the contrary, shows that the change in mortality from diseases caused by smoking practically did not affect the improvement of the situation, and for some age groups (50-54 and 55-59 years) it even contributed to a certain decrease in life expectancy.

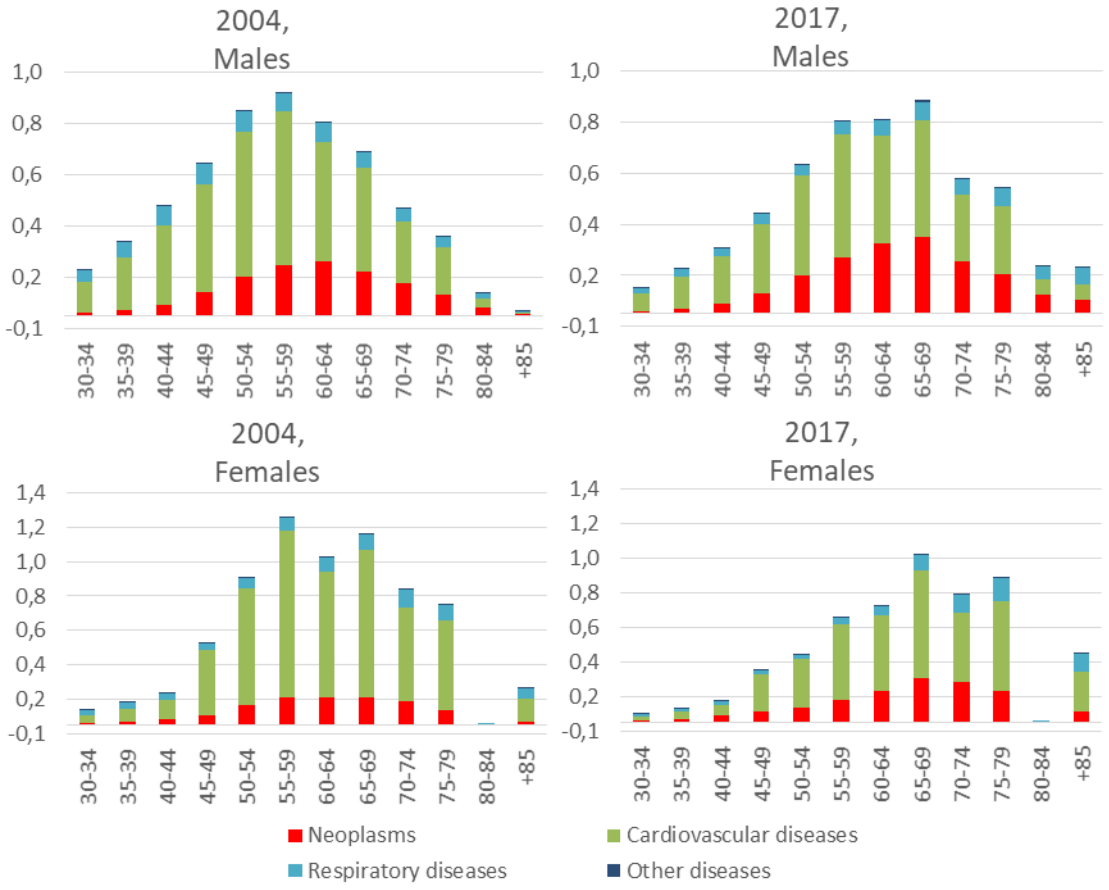

Figure 4. Contribution of mortality from various causes to differences in life expectancy of smokers and non-smokers, 2004 and 2017

Source: Author's calculations.

We emphasize that the life expectancy of women smokers from 2004 to 2017 increased more than for non-smokers: the growth for smokers and non-smokers was 7.1 and 5.5 years, respectively (table 3). Similar dynamics were observed for healthy life expectancy: the advantage of non-smokers over smokers decreased by 0.5 years (table 4). Why did this happen? One possible explanation arises when studying the contribution of changes in mortality by age groups and causes of death to the dynamics of life expectancy (Figure 4) using the decomposition method. As can be seen from the data presented, for smokers (both men and women) in 2017, compared with 2004, the advantage of non-smokers over smokers was reduced at younger ages. In particular, the advantage of non-smoking women is especially noticeable in the age range from 50 to 69 years, which is mainly due to a change in mortality from cardiovascular diseases. For men, a similar reduction in the advantage of non-smokers over smokers occurs in younger ages (from 40 to 64 years). At older ages, non-smokers compensate for their lag in the increase in life expectancy, however, since for women this effect manifests itself later, its influence is insufficient and the overall increase in life expectancy of women smokers in the study period is higher.

INTERNATIONAL COMPARISONS

In order to compare the life expectancy of smokers and non-smokers in Russia with other countries, we used data from (Jha, Peto 2014: 62), which summarizes information on four countries where nationally representative studies of the dependence of mortality on the smoking status of the deceased were conducted. Thus, according to the results of such studies, in the UK for 35-year-old men the probability of surviving to 80 is 60% for those who have never smoked, and 26% for smokers, and the differences in life expectancy for these categories are 10 years. In Japan, the probability of survival is 68 and 41%, respectively, for non-smokers and smokers, and the difference in life expectancy is 9 years.

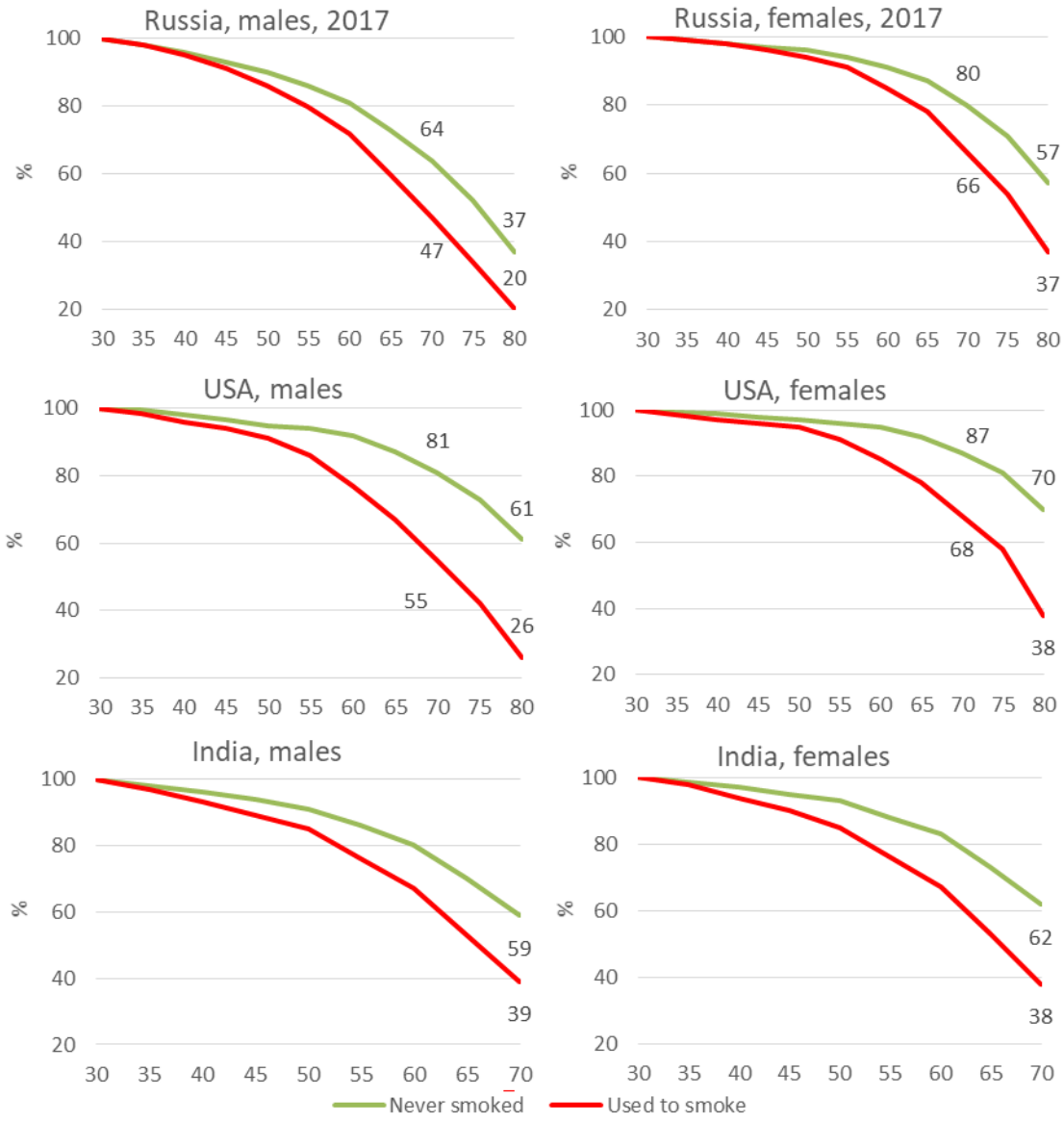

Figure 5. Probability of surviving to a certain age for people over 30 in Russia, the USA and India

Source: Russia - author's calculations; USA - (Jha et al. 2013), India - (Jha et al. 2008).

Figure 5 presents comparisons of the situation in Russia with two other countries mentioned in the article (Jha, Peto 2014): the USA (Jha et al. 2013) and India (Jha et al. 2008).

The United States was chosen as a large economically developed country, India as a country with a value of life expectancy closer to Russia's. It should be noted that for both countries we are talking about estimates of mortality caused by smoking at the beginning of the 2000s. For India, estimates were made of the probabilities of surviving to age 70, which is more relevant when comparing with Russian data. For men, they came to 59 and 39%, respectively, for non-smokers and smokers (similar values for Russia were 64 and 47%, respectively). A feature of India is the almost complete absence of gender differences in the effect of smoking on life expectancy: the proportion of women surviving to 70 years of age is 62 and 38% for non-smokers and smokers, respectively.

Comparison of the proportion of those living up to 80 years old with similar American indicators shows a significant lag in Russia in the expected life expectancy of non-smokers. If in the USA 61% of thirty-year-old men and 70% of women live to the age of 80, in Russia only 37 and 57%, respectively, do so. Similar values for smokers are much closer: in the USA - 26% of men and 38% of women, in Russia - 20% of men and 37% of women. This suggests that, in addition to smoking, in Russia there are other factors that significantly reduce life expectancy, including excessive consumption of alcohol and the low quality of public healthcare (How to overcome ... 2016).

CONCLUSION

Smoking is an important factor in preventable mortality. Long-term studies conducted both in Russia and abroad show that smokers face significantly higher mortality risks from many diseases of the cardiovascular system, respiratory system and neoplasms. This paper provides a quantitative assessment of the effect of smoking on the mortality rate of the Russian population in 2004-2017, using indicators such as standardized mortality rates, life expectancy and healthy life expectancy for smokers and non-smokers. For the estimates, we used international data on the relative risks of mortality from various diseases and Russian data on the prevalence of smoking, ill health and mortality by cause of death.

Mortality from diseases caused by smoking, according to estimates, in 2017 exceeded 220 thousand people, having significantly decreased compared to the beginning of the 2000s, following the decrease in overall mortality from cardiovascular diseases observed during this period. Among women, mortality from smoking has not declined, due to the less mature tobacco epidemic among women: having started later than among men, it has not yet reached peak smoking prevalence rates and the mortality caused by it, and smoking remains attractive to many teenage girls and young women.

According to calculations, smoking significantly reduces life expectancy. In 2017, the differences in life expectancy of smokers compared to never-smokers were 5.3 years for men and 5.2 years for women. The fact of quitting smoking noticeably (by 2.6 years for men and 3.2 years for women) prolongs the life of quitters.

Compared to 2004, the life expectancy of smokers and non-smokers increased significantly, and for smokers, the increase in life expectancy was greater, resulting in a decrease in the advantage of non-smokers in life expectancy in 2004-2017 of more than 1.5 years (in healthy

life expectancy - 0.5 years). The decomposition of differences in life expectancy between smokers and non-smokers shows that the advantage of women non-smokers mainly decreased in the age range from 50 to 69 years, the result primarily of a change in mortality from cardiovascular diseases. In men, a similar reduction in the benefits of non-smokers compared to smokers occurs in younger ages (from 40 to 64 years). At older ages, however, non-smokers compensate for their lag in growth of life expectancy, since for women this effect appears later, its influence is insufficient and the overall increase in the life expectancy of women smokers in the study period is higher.

Compared with developed countries (USA, UK, Japan), the life expectancy of smokers and non-smokers in Russia shows more noticeable gender differences. Another important feature of Russia is a significant lag in the life expectancy of non-smokers. If in the USA 61% of thirty-year-old men and 70% of women live to the age of 80, in Russia only 37 and 57%, respectively, do so. Similar values for smokers are much closer, which additionally confirms the existence in Russia, in addition to smoking, of other factors that significantly reduce life expectancy, including lifestyle-related factors (alcohol abuse, unbalanced diet, untimely medical treatment, etc.).

REFERENCES

Andreev E., Shkolnikov V. (2018). The relationship between mortality and economic development in Russia and its regions. *Demographic Review*, 5(1), 6-24. (In Russ.). Retrieved from URL: https://doi.org/10.17323/demreview.v5i1.7707

Andreev E., Shkolnikov V., Begun A. (2002). Algorithm for decomposition of differences between aggregate demographic measures and its application to life expectancies, healthy life expectancies, parity-progression ratios and total fertility rates. *Demographic Research*, 7(14), 499-522. Retrieved from URL: https://dx.doi.org/10.4054/DemRes.2002.7.14

Andreev E.M., Shkolnikov V.M. (2012*).* An Excel spreadsheet for the decomposition of a difference between two values of an aggregate demographic measure by stepwise replacement running from young to old ages. *Rostock: Max Planck Institute for Demographic Research (MPIDR Technical Report TR–2012–002).* Retrieved from URL: https://www.demogr.mpg.de/papers/technicalreports/tr-2012-002.pdf

Calle E.. Rodriguez C., Jacobs E., Almon M. Chao A., Mccullough M., Feigelson H., Thun M. (2002). The American cancer society cancer prevention study II nutrition cohort: rationale, study design, and baseline characteristics. *Cancer: Interdisciplinary International Journal of the American Cancer Society, 94*(9), 2490-2501. doi: 10.1002/cncr.101970.

Denisova I. (2010) Adult mortality in Russia. *The Economics of Transition, The European Bank for Reconstruction and Development*, 18(2), 333-363. Retrieved from URL: https://doi.org/10.1111/j.1468-0351.2009.00384.x

Efimova E.V., Konobeevskaya I.N., Maksimenko G.V., Karpov R.S. (2017). Smoking and cardiovascular mortality in Tomsk inhabitants as a typical city of Western Siberia. *Cardiovascular Therapy and Prevention*, 16(6), 115-121. (In Russ.). Retrieved from URL: https://doi.org/10.15829/1728-8800-2017-6-115-121

Ezzati M., Henley J., Thun M.J., Lopez A.D. (2005b). Role of Smoking in Global and Regional Cardiovascular Mortality. *Circulation.* 112(4), 489-497. doi: 10.1161/CIRCULATIONAHA.104.521708

Ezzati M., Henley S.J., Lopez A.D., Thun M.J. (2005a). Role of smoking in global and regional cancer epidemiology: Current patterns and data needs. *International journal of cancer*, *116*(6), 963-971. doi:10.1002/ijc.21100

Grigoriev P., Meslé F., Shkolnikov V., Andreev E., Fihel A., Pechholdova M., Vallin J. (2014). The Recent Mortality Decline in Russia: Beginning of the Cardiovascular Revolution? *Population and Development Review*, 40(1), 107-129. Retrieved from URL: https://doi.org/10.1111/j.1728-4457.2014.00652.x

How to overcome Russia's lag in life expectancy? (2016). *Demographic Review*, 2(3), 154-201. (In Russ.). Retrieved from URL: https://doi.org/10.17323/demreview.v2i3.1778

Hwang J., Kim J., Lee D., Jung H. (2018). Underestimation of Self-Reported Smoking Prevalence in Korean Adolescents: Evidence from Gold Standard by Combined Method. *International journal of environmental research and public health*, 15(4), 689. Retrieved from URL:

Jha P., Jacob B., Gajalakshmi V., Gupta P. C., Dhingra N., Kumar R., Sinha D. N., Dikshit R. P., Parida D. K., Kamadod R., Boreham J., Peto R. (2008). A Nationally Representative Case–Control Study of Smoking and Death in India. *New England Journal of Medicine*, 358(11), 1137-1147. Retrieved from URL: https://doi.org/10.1056/NEJMsa0707719

Jha P., Peto R. (2014). Global Effects of Smoking, of Quitting, and of Taxing Tobacco. *The New England Journal of Medicine,* 370 (1), 60–68. doi:10.1056/NEJMra1308383.

Jha P., Ramasundarahettige C., Landsman V., Rostron B., Thun P., Peto R. (2013). 21st-Century hazards of smoking and benefits of cessation in the United States. *New England Journal of Medicine*, 368(4), 341-350. doi: 10.1056/NEJMsa1211128

Kalabikhina I.E., Kuznetsova P.O. (2019). Gender aspects of tobacco epidemic in Russia. *Journal of the New Economic Association* (to be published in number 4). (In Russ.).

Kong K., Jung-Choi K., Lim D., Lee H., Lee W., Baik S., Park S., Park H. (2016). Comparison of Prevalence- and Smoking Impact Ratio-Based Methods of Estimating Smoking-Attributable Fractions of Deaths. *Journal of epidemiology*, 26(3), 145-54. doi: 10.2188/jea.JE20150058

Konstantinov V.V., Shalnova S.A., Kireev C.V., Timofeeva T.N., Shestov D.B., Kapustina A.V., Balanova Yu.A., Lel'chuk I.N., Deev A.D. (2007). Associations of mortality relative risk, smoking status, alcohol intake, and educational level in women. *Russian Journal of Preventive Medicine and Public Health*, 14(3), 19-27. (In Russ.).

Laatikainen T., Vartiainen E., Puska P. (1999). Comparing smoking and smoking cessation process in the Republic of Karelia, Russia and North Karelia, Finland. *Journal of epidemiology and community health*, 53(9), 528–534. doi:10.1136/jech.53.9.528

Liutkute V., Veryga A., Štelemekas M., Goštautaite N. (2017). Burden of smoking in Lithuania: attributable mortality and years of potential life lost. *European Journal of Public Health*, 27(4), 736-741. doi: 10.1093/eurpub/ckx035

Lopez A., Collishaw N., Piha T. (1994). A descriptive model of the cigarette epidemic in developed countries. *Tobacco Control*, 3(3), 242–247. Retrieved from URL: http://dx.doi.org/10.1136/tc.3.3.242

Maslennikova G.Ia., Oganov R.G. (2011). Medical and socioeconomic damage caused by smoking in the Russian Federation: diseases of circulatory system. *Russian Journal of Preventive Medicine and Public Health*, 14(3), 19-27. (In Russ.).

National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health (2014). The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General. Atlanta (GA): Centers for Disease Control and Prevention (US), Chapter 12, Smoking-Attributable Morbidity, Mortality, and Economic Costs.

Oza S., Thun M., Henley J., Lopez A., Ezzati M. (2011). How many deaths are attributable to smoking in the United States? Comparison of methods for estimating smoking-attributable mortality when smoking prevalence changes. *Preventive Medicine*, 52 (6), 428-433. doi: 10.1016/j.ypmed.2011.04.007

Papanova E.K., Shkolnikov V.M., Timonin S.A. (2019). Distinctive features and components of mortality decrease in Moscow in 1989-2017. *Demographic Rev*iew, 6(1), 50-103. (In Russ.). Retrieved from URL: https://doi.org/10.17323/demreview.v6i1.9113

Perlman F., Bobak M., Gilmore A. B., Mckee M. (2007). Trends in the prevalence of smoking in Russia during the transition to a market economy. *Tobacco Control*, 16(5), 299–305. Retrieved from URL: https://dx.doi.org/10.1136%2Ftc.2006.019455

Peto R., Lopez A., Boreham J., Thun M., Heath C., Doll R. (1992) Mortality from Tobacco in Developed Countries: Indirect Estimation from National Vital Statistics. *Lancet*, 339, 1268-1278.

Plavinski S.L., Plavinskaya S.I. (2012). Smoking and mortality in a large prospective study. *Russian family doctor*, 16(2), 29-36. (In Russ.).

Preston S., Heuveline P., Guillot M. (2001). *Demography: Measuring and modeling population processes*. Oxford: Wiley-Blackwell.

Quirmbach D., Gerry C. (2016). Gender, education and Russia's tobacco epidemic: A life-course approach. *Social Science & Medicine*, 160, 54-66. Retrieved from URL: https://doi.org/10.1016/j.socscimed.2016.05.008

Shkolnikov V.M., Andreev E.M., McKee M., Leon D.A. (2013). Components and possible determinants of decrease in Russian mortality in 2004-2010. *Demographic Research*, 28(32), 917-950. Retrieved from URL: https://dx.doi.org/10.4054/DemRes.2013.28.32

Shkolnikov V.M., Andreev E.M., McKee M., Leon D.A. (2014). Rising life expectancy in Russia of the 2000s. *Demographic Review*, 1(2), 5-37. (In Russ.). Retrieved from URL: https://doi.org/10.17323/demreview.v1i2.1815

Thun M.J, Apicella L.F., Henley S.J. (2000). Smoking vs Other Risk Factors as the Cause of Smoking-Attributable Deaths: Confounding in the Courtroom. *Jama*, 284(6),706–712. doi:10.1001/jama.284.6.706

Timonin S., Danilova I., Andreev E., Shkolnikov V.M. (2017). Recent Mortality Trend Reversal in Russia: Are Regions Following the Same Tempo? *European Journal of Population*, 33(5), 733-763.

Vishnevsky A. (2015). Mortality in Russia: the second epidemiologic revolution that never was. *Demographic Review*, 1(4), 5-40. (In Russ.). Retrieved from URL: https://doi.org/10.17323/demreview.v1i4.1801

World Health Organization (WHO) (2016). Global Adult Tobacco Survey: Russian Federation. *Executive Summary*. (In Russ.). URL: http://www.euro.who.int/ru/countries/russian-federation/publications/global-adult-tobacco-survey-russian-federation.-executive-summary-2016-2017 (data downloaded on 14.06.2019).

APPENDIX

A1. Health Self-Assessment Data, RLMS, 2004-2017

Table A1.1. Distribution of answers to the question "Tell me, please, how do you rate your health?", Men aged 15 years and older

Year	Very good	Good	Average, not good but not bad	Bad	Very bad	Number of observations
2004	2.5	37.2	49.9	8.9	1.5	3179
2005	2.7	38.8	48.2	8.6	1.7	3013
2006	2.7	36.6	50.3	8.8	1.6	3841
2007	3.2	37.9	48.7	8.5	1.7	3707
2008	3.4	38.8	47.0	9.6	1.2	3504
2009	3.7	35.9	49.9	9.3	1.2	3387
2010	2.7	40.1	48.4	7.8	1.0	5922
2011	3.0	39.6	47.0	9.0	1.3	5974
2012	3.0	41.4	46.7	7.5	1.3	5899
2013	2.8	41.4	46.6	8.1	1.1	5555
2014	3.2	42.3	45.5	8.0	1.0	4522
2015	3.4	43.2	44.5	7.6	1.3	4414
2016	3.3	44.5	43.5	7.8	0.9	4355
2017	3.5	45.0	43.0	7.4	1.2	4368

Table A1.2. Distribution of answers to the question "Tell me, please, how do you rate your health?", Women aged 15 years and older

Year	Very good	Good	Average, not good but not bad	Bad	Very bad	Number of observations
2004	1.1	24.5	55.6	15.8	3.0	4359
2005	1.7	26.2	54.2	15.1	2.7	4120
2006	1.5	23.2	57.0	15.8	2.5	5324
2007	2.1	25.4	54.7	15.0	2.8	5146
2008	2.0	25.4	54.3	15.4	2.9	4971
2009	2.1	25.6	55.1	15.0	2.1	4844
2010	1.6	28.2	54.7	13.6	2.0	8180
2011	1.8	29.3	52.4	14.4	2.1	8184
2012	1.3	29.8	54.1	12.8	1.9	8290
2013	1.2	30.3	53.1	13.5	2.0	7743
2014	1.6	31.9	52.4	12.5	1.6	6212
2015	1.2	32.0	52.6	12.5	1.6	6130
2016	1.7	32.9	51.9	12.2	1.4	6093
2017	1.6	35.1	50.0	11.7	1.7	6019

A2. Mortality Tables by Smoking Status

Table A2.1. Mortality table of the population of Russia (never smoked)

Age x (total number of completed years)	Death rate at age x years, m (x)	Life expectancy at age x years, e (x)	Healthy life expectancy at age x years, eh (x)	Death rate at age x years, m (x)	Life expectancy at age x years, e (x)	Healthy life expectancy at age x years, eh (x)
	Men			Women		
0	0.005911	71.1	62.8	0.004826	78.2	65.4
1-4	0.000371	70.5	62.2	0.000293	77.6	64.7
5-9	0.000226	66.7	58.4	0.000173	73.7	60.9
10-14	0.000311	61.7	53.5	0.000192	68.7	55.9
15-19	0.000867	56.8	48.7	0.000382	63.8	51.0
20-24	0.001547	52.1	43.9	0.000499	58.9	46.3
25-29	0.002394	47.4	39.4	0.000801	54.1	41.5
30-34	0.003579	43.0	34.9	0.001288	49.3	36.8
35-39	0.005331	38.7	30.7	0.001996	44.6	32.3
40-44	0.006262	34.7	26.7	0.002477	40.0	27.8
45-49	0.006899	30.7	22.8	0.003082	35.5	23.4
50-54	0.008935	26.7	18.8	0.003949	31.0	19.3
55-59	0.011818	22.8	15.1	0.006008	26.5	15.2
60-64	0.019486	19.0	11.5	0.009542	22.3	11.6
65-69	0.027453	15.7	8.6	0.015424	18.2	8.3
70-74	0.039438	12.7	6.3	0.024185	14.5	5.8
75-79	0.066309	9.9	4.1	0.045274	11.0	3.8
80-84	0.099167	7.9	2.6	0.077993	8.2	2.7
85+	0.15626	6.4	1.6	0.166846	6.0	2.1

Source: Author's calculations.

Table A2.2. Mortality table of the population of Russia (previously smoked)

Age x (total number of completed years)	Death rate at age x years, m (x)	Life expectancy at age x years, e (x)	Healthy life expectancy at age x years, eh (x)	Death rate at age x years, m (x)	Life expectancy at age x years, e (x)	Healthy life expectancy at age x years, eh (x)
	Men			Women		
0	0.005911	71.1	62.8	0.004826	78.2	65.4
1-4	0.000371	70.5	62.2	0.000293	77.6	64.7
5-9	0.000226	66.7	58.4	0.000173	73.7	60.9
10-14	0.000311	61.7	53.5	0.000192	68.7	55.9
15-19	0.000867	56.8	48.7	0.000382	63.8	51.0
20-24	0.001547	52.1	43.9	0.000499	58.9	46.3
25-29	0.002394	47.4	39.4	0.000801	54.1	41.5
30-34	0.003579	43.0	34.9	0.001288	49.3	36.8
35-39	0.005331	38.7	30.7	0.001996	44.6	32.3
40-44	0.006262	34.7	26.7	0.002477	40.0	27.8
45-49	0.006899	30.7	22.8	0.003082	35.5	23.4
50-54	0.008935	26.7	18.8	0.003949	31.0	19.3
55-59	0.011818	22.8	15.1	0.006008	26.5	15.2
60-64	0.019486	19.0	11.5	0.009542	22.3	11.6
65-69	0.027453	15.7	8.6	0.015424	18.2	8.3
70-74	0.039438	12.7	6.3	0.024185	14.5	5.8
75-79	0.066309	9.9	4.1	0.045274	11.0	3.8
80-84	0.099167	7.9	2.6	0.077993	8.2	2.7
85+	0.15626	6.4	1.6	0.166846	6.0	2.1

Source: Author's calculations.

Table A2.3. Mortality table of the population of Russia (smoke)

Age x (total number of completed years)	Death rate at age x years, m (x)	Life expectancy at age x years, e (x)	Healthy life expectancy at age x years, eh (x)	Death rate at age x years, m (x)	Life expectancy at age x years, e (x)	Healthy life expectancy at age x years, eh (x)
	Men			Women		
0	0.005911	68.5	61.4	0.004826	75.0	64.0
1-4	0.000371	67.9	60.8	0.000293	74.4	63.3
5-9	0.000226	64.0	57.0	0.000173	70.5	59.5
10-14	0.000311	59.1	52.1	0.000192	65.5	54.5
15-19	0.000867	54.2	47.3	0.000382	60.6	49.7
20-24	0.001547	49.4	42.5	0.000499	55.7	44.9
25-29	0.002394	44.8	37.9	0.000801	50.8	40.1
30-34	0.003749	40.3	33.5	0.001412	46.0	35.4
35-39	0.005653	36.0	29.2	0.002227	41.3	30.9
40-44	0.006801	32.0	25.2	0.002921	36.8	26.4
45-49	0.008137	28.0	21.3	0.003844	32.3	22.1
50-54	0.01136	24.1	17.4	0.00512	27.9	18.0
55-59	0.016065	20.3	13.9	0.008254	23.5	14.0
60-64	0.026408	16.8	10.4	0.01342	19.4	10.5
65-69	0.038495	13.8	7.8	0.023385	15.6	7.4
70-74	0.050101	11.2	5.8	0.036856	12.2	5.0
75-79	0.082651	8.8	3.7	0.067404	9.2	3.2
80-84	0.115421	7.0	2.4	0.102949	6.9	2.2
85+	0.176617	5.7	1.4	0.204242	4.9	1.7

Source: Author's calculations.