

# **LIFE EXPECTANCY AND GENDER GAP IN RUSSIA: CROSS-REGIONAL VARIATION**

By

Valentina Baykalova

Submitted to

Central European University

Department of Economics

*In partial fulfillment of the requirements for the degree of Master of Arts*

*in Economic Policy in Global Markets*

Supervisor: Professor Péter Mihályi

*Budapest, Hungary*

2016

## ABSTRACT

The gender gap in life expectancy in Russia was the highest in the world in 2015 year at 11.6 years, which was unprecedentedly high compared with developed countries. Regional variation in the gender gap in life expectancy in Russia was very high as well – from 5.35 years to 14.98 years in 2013. In this research the gender gap in life expectancy is explained with a variety of external and internal factors behind excess male mortality, and all of them are closely related to each other.

To analyze regional variation and associations of the gender gap, several factors (life expectancy, mortality, female-to-male ratio, urbanization) were studied in its dynamics and variation and were pre-selected for regressions (urbanization was excluded). The time series regression of the gender gap in life expectancy over the period of 1961-2014 and cross-regional regressions in the years 2010-2012 were significant. The cross-regional multivariate regressions of the gender gap in life expectancy, mortality, female-to-male ratio years were robust in the years 2010-2012. The gender gap in life expectancy was negatively associated with life expectancy and positively associated with mortality, and female to male ratio was observed as an insignificant factor.

High values of gender gap in life expectancy and its high regional variation illustrate that an acute demographic gender problem needs to be addressed by Russian government. Policy measures are suggested to aim this problem were offered.

# Table of contents

Table of contents.....	ii
List of Figures and Tables.....	iv
Introduction.....	1
Literature review.....	5
Chapter 1 - Life expectancy and gender gap in Russia: regional aspect .....	7
1.1. Life expectancy and regional variation.....	7
1.1.1. Life expectancy in Russia and its dynamics.....	7
1.1.2. International comparison of life expectancy .....	9
1.1.3. Regional variation in life expectancy in Russia .....	11
1.2. The gender gap in life expectancy and regional variation .....	14
1.2.1. The gender gap in life expectancy and dynamics .....	14
1.2.2. International comparison of the gender gap in life expectancy .....	16
1.2.3. Regional variation of gender gap in life expectancy .....	18
1.3. Regional differences in Russia.....	20
1.3.1. Regional variation of the gender gap in life expectancy .....	22
1.3.2. Urbanization factor in regional differentiation.....	23
1.3.3. Ethno-economies .....	24
1.4. Gender inequality in Russia.....	26
1.4.1. Theories of gender inequality.....	26
1.4.2. Indicators of gender inequality in Russia.....	28
Chapter 2 - Reasons of the gender gap in life expectancy in Russia .....	30
2.1. Mortality .....	30
Mortality and dynamics.....	31
Mortality/morbidity gender paradox .....	32
Gender gap in male mortality (excess male mortality) .....	33
International comparison of mortality and excess male mortality .....	36
Regional variation in mortality .....	37
2.2. Main reasoning behind gender gap in life expectancy and excess male mortality .....	39
2.3. External factors of mortality .....	40
2.4. Internal factors of mortality .....	42
2.5. Relationships between factors.....	47

Chapter 3 – Data analysis .....	53
3.1. Data collection and limitations .....	53
3.2. Data analysis methods.....	57
3.3. Cross-regional differences in the gender gap in life expectancy .....	62
3.4. Regressions of gender gap in Life expectancy in Russia.....	66
3.4.1. Choice of factors for regression .....	66
3.4.2. Regressions on gender gap on life expectancy.....	73
3.4.3. The gender gap and life expectancy, mortality and females-to-males ratio	77
3.4.4. Regression results.....	79
Chapter 4 – Policy addressing the gender gap in life expectancy in regional aspect .....	81
4.1. Necessity of complex policy .....	81
4.2. Policy measures targeting life expectancy and its gender gap.....	85
Conclusion .....	90
References .....	92
Appendix 1 - Cross-section analysis or urbanization factor .....	100
Appendix 2 - Cross-section analysis or urbanization factor .....	102

# List of Figures and Tables

## Figures

Figure 1. Dynamics of life expectancy in Russia 1961-2015 and forecast till 2030. ....	9
Figure 2. World map of life expectancy, 2015 .....	10
Figure 3. International ranking by life expectancy at birth, 2015.....	10
Figure 4. Russian map of life expectancy by regions, 2013 .....	12
Figure 5. Dynamics of life expectancy in Russia and in Siberian Federal District, 2004-2008. ...	13
Figure 6. Dynamics of the gender gap in life expectancy in Russia, 1961-2030. ....	15
Figure 7. World map of the gender gap in life expectancy 2015.....	17
Figure 8. Life expectancy in Russia and 4 European countries 1965-2010.....	18
Figure 9. Russian map of the gender gap in life expectancy by regions, 2013. ....	19
Figure 10. Reasons of mortality in Russia, 2014. ....	31
Figure 11. Map of mortality in Russia across regions, 2012 year. ....	38
Figure 12. Trends in mortality for Dagestan regions and for Russia on average, 1990-2008.....	38
Figure 13. Decomposition of gap in life expectancy by mortality reasons, 2003. ....	60
Figure 14. Distribution of the gender gap in life expectancy by regions, 2010-2013. ....	63
Figure 15. Life expectancy and gender gap dynamics in 1961-2014 .....	68
Figure 16. Dynamics of average mortality in 1990-2014 .....	70
Figure 17. Dynamics of female to male ratio, 2005-2013 .....	70
Figure 18. Dynamics of life expectancy and the gender gap for urban/rural population, 1961-2013 .....	72
Figure 19. Dynamics of difference of rural/urban gender gap in 1961 – 2013 .....	73
Figure 20. Predicted values of regression of the gender gap in life expectancy, 1961-2014 .....	75
Figure 21. Cross-regional regressions of the gender gap in life expectancy, 2010-2012 .....	76
Figure 22. Cross-regional regressions of the gender gap in life expectancy and mortality, 2010- 2012.....	79

## Tables

Table 1. Life expectancy and gender gap in ethno-economies regions, 2013 .....	25
Table 2. Comparison of ethno-economies regions and average in Russia .....	25
Table 3. Mortality in working age in main classes of death reasons, per 100,000ppl, 1996.....	34
Table 4. Excess male mortality by reasons, 2005, 2008, 2012.....	35
Table 5. Excess male mortality in 2012, by mortality factors. ....	35
Table 6. Matrix of efficiency of healthcare by min/max estimates. ....	59
Table 7. The gender gap in life expectancy from birth to retirement, 1950-2000.....	60
Table 8. Regional variation of the gender gap in life expectancy, 2010-2013. ....	62
Table 9. Regional variation of the gender gap in life expectancy, 2010-2013 .....	63
Table 10. Dynamics of the gender gap in life expectancy across regions in 2010-2013.....	63
Table 11. Ethno-economies regions in grouping of all regions .....	65
Table 12. Correlation of factors of regression .....	67
Table 13. Correlation of the gender gap and life expectancy time series, 1961-2014 years .....	68
Table 14. Regional variation of life expectancy across regions. 2010-2012 .....	69
Table 15. Regional variation of mortality, 2010-2012 .....	70
Table 16. Regional variation of female to male ratio, 2010-2012 .....	71
Table 17. Correlation analysis of the gender gap and life expectancy for urban and rural areas .	72
Table 18. Time series regressions' results: the gender gap on life expectancy with time lags ....	74
Table 19. Cross-regional regressions of the gender gap on life expectancy in 2010, 2011,2012. 76	
Table 20. Cross-section regressions of the gender gap on life expectancy and mortality and Female to male ratio across regions. 2010-2012 .....	77
Table 21. Cross-section regressions of the gender gap on life expectancy and mortality across regions. 2010-2012 .....	78
Table 22. Policy measures targeting life expectancy .....	87
Table 23. Policy measure targeting mortality .....	88

# Introduction

*“Women care insufficiently about men: they do not protect them from alcohol and tobacco [consumption], and [that is why] men have excess mortality. A man is a child all his life”<sup>1</sup>*

*Gennady Onishchenko,  
Chief State Sanitary Doctor of Russia in 1996-2013,  
Assistant to the Chairman of the Government of the Russian Federation since 2013*

*Relevancy of the study.* Russia was ranked 110<sup>th</sup> in the world in life expectancy at 71.4 years in 2015, and it was ranked first in the gender gap in life expectancy at 11.6 years, according to WHO Health Statistics. This difference in life expectancy between males and females was considered to be one of the most dramatic indicators of the current health crisis in Russia. The unstable dynamics of life expectancy and the gender gap in the last twenty years made the problem more and more actual, and the goal of decreasing the gender gap and increasing life expectancy has become more important.

In addition, regional inequality has an important political aspect. The gender gaps in life expectancy vary across 84 Russian administrative regions, which are highly heterogeneous in their living conditions, such as climate and healthcare infrastructure. Regional variations of life expectancy and gender gaps in Russia are high: the range of life expectancy range was 17 years in 2014, and the range of gender gap was 9.6 years. The gender gap in life expectancy stretched from 5.35 years in Ingushetia to 14.98 years in Nenetskiy region in 2013, and its high range and variation (14.2%) were considered outstanding.

According to demographic policy, state target for life expectancy at 70 years was reached for 2015, and the next target at 75 years was made for 2030, however, the

---

<sup>1</sup>Torocheshnikova, M. (2016) “Сексист года 2015 [Sexist of the year 2015]”. Radio Svoboda. Radioprograms and podcasts: Justice. Published on 16.03.2016. <http://www.svoboda.org/content/transcript/27617139.html>

government did not set any targets in reducing the gender gap. Needless to say, regional divergence in these indicators of human development potential should be addressed for federal and regional level, as an unprecedentedly high value of the gender gap poses a threat to the realization of the demographic and socio-economic potential of Russia, and therefore should be reduced.

*Theoretical background.* Most literature on the gender gap in life expectancy referred to extensive statistics on higher male mortality and higher female mortality in civilized countries (Braun, Panova and Rusinova, 2007; Shkolnikov 2011). The gender gap paradox stated as follows: “women live longer, but they get sick more often than men”. It was explained with a variety of physiological, social and cultural factors. Macintyre, Hunt and Sweeting’s study (1996) of reasons for the gender gap stimulated many researchers to seek deeper explanations. Results showed that gender differences were much more complex and diverse than it was previously considered. Variance of gender-related variables over stages of life cycle was identified, and variation in state of health during lifetime was demonstrated (Ramonov, 2011). Significant variations in nature of gender differences in health and gender equality were found in comparisons between countries and during different historical periods (Loshakova, 2013; Shkolnikov, Mesle, 1995).

Regional differences in Russia were studied primarily on the level of federal districts or with examination of outlier regions (Ivanova, 2010; Leksin, 2003). Political targets and demographic policy results were presented in a number of official documents such as Concept of Demographic policy till the year 2025, Report of Development of human resource potential (2010).

*The aim of the current research* is to explore the most significant factors of the gender gap in life expectancy and its regional differences in order to discover the conditions, which



would allow it to diminish. Study of the outlier regions is expected to bring new insights for data analysis with an evaluation of existing theories. I then aimed to offer policy measures for federal and regional levels.

*Data.* Data for the research were derived from official statistics, periodical publications and books on demographics, medicine, sociology, politics, gender studies and regional economics which cover regional differences and health policy issues. Statistics from 2010-2012 on female and male life expectancy at birth, mortality, female to male ratio in Russia was used. Data on life expectancy and on its gender gap from 1961 to 2013 years were used for time series analysis.

*Methodology.* I analyzed life expectancy and gender gap in time series and in cross-section univariate and multivariate regressions across regions of Russia to identify their relationship. Multivariate linear cross-section regressions for 2010-2012 were built to explain variation of gender gap based on factors of life expectancy, mortality rate and female-to-male ratio.

*My main hypotheses* for data analysis were the following:

- strong negative association between life expectancy and gender gap;
- strong positive association between of gender gap and mortality;
- strong positive association between gender gap and female-to-male ratio;
- strong positive correlation of urbanization.

*Outline of chapters.* The first chapter introduces the topic of gender gap and life expectancy in Russia and compares it with other countries were provided. Regional differences in Russia are demonstrated. I cover regional factors that might underline high cross-regional variation. The main theories explaining factors of the gender gap in life expectancy are explained.

For the second chapter I analyzed factors connected with the gender gap in life expectancy and excess male mortality (external and internal factors) and illustrated their interconnections.

The third chapter presents the data collection and its limitations, gives an overview of data analysis of similar research topics is given and appropriate methods are explained. Cross-regional variation in the gender gap in life expectancy is studied in multivariate cross-section regressions, and each of factors is examined if it suited the regression by its variance characteristics.

In the fourth chapter I outline policy implications and recommendations on increasing life expectancy, narrowing the gender gap and constructing appropriate regional and federal policy.

# Literature review

The topic of the gender gap in life expectancy and its regional variation has been addressed in a variety of disciplines: demographics and sociology, psychology and medicine, gender studies and regional economics, healthcare and politics. There was not much research carried in Russia on the gender gap by far, and studies lacked quantitative analyses, such as regression and grouping or clusterization. Foreign researchers compared life expectancy and its gender gap in Russia on international scale, though causality analysis and aspects of regional variation were lacking. Earlier studies of social-demographic and economic characteristics in Russia of 1990s still kept their relevance, as many social processes and problems stayed actual.

Russian demographers studied life expectancy and the gender gap from the aspect of mortality reasons and mortality (Shkolnikov et al 2001, 2014; Leon et al, 1997; Ischenko, 2007). A number of experts investigated life expectancy as estimate of realization of human development potential and quality of life (Ramonov, 2011; Zarova, Kotiakova, 2006; Nazarova, 2000, 2014), and economic payoff of high life expectancy and lower gender gap (Kuzmich, Roschin, 2008). Overview of demographic policies, their goals and results were given in official reports (Demographic policy concept till 2025 year, 2007; State family policy concept till 2025 year, 2014) and reports of international organizations (World Health Organization, 2016b; World Economic Forum, 2015) and other groups (Bobylev et al, 2010). Those researches helped to understand the connection of gender gap in life expectancy to the main demographic characteristics and to relate to gender gap in other spheres.

Another group studying gender gap was sociologists (Sachuk, 2011; Goffe, 2006; Shaiakhmetova, Utiasheva, 2011), who investigated social and economic positions of men and women in Russia and the conditions which predetermine unprecedented phenomena of excess male mortality in Russia. Researchers in sociology of medicine such

as Ivanova (2000, 2013), Belov and Rogovina (2014) studied variation of health indicators by gender and disability metrics. Gender studies' scholars such Loshakova (2013), Braun et al (2007), Kalabikhina (1991, 1995, 2010) explored the gender gap in life expectancy as an outcome of the historic inequality of women and men in society and proved it with different indicators, such as those in labour market (Oshepkov, 2006). This category of studies shed light on the social reasons behind gender gap in life expectancy. A number of researches (Eremina, Kudelina, 2014; Shabunova, 2010; Payne, 2009) were devoted to healthcare system, which target was to increase life expectancy, to provide qualified and accessible medical services and to contribute to gender justice. They gave clues on the main probable factors which might increase life expectancy and decrease gender gap, with the help of healthcare policy. Unlike in the most of researches devoted to the topic of the gender gap in life expectancy from special aspect of reasoning of gender gap, like demography or healthcare, I combine demographic and healthcare insights with social and gender studies of the gender gap in life expectancy.

Specialists in regional economics (Ovchinnikov, Kolesnikov, 2006; Akhmetov, Berdnikova, 2009; Leksin, 2006) identified the patterns of political-geographic and socio-economic conditions and indicators across federal districts or specific regions of Russia. Such researches lacked complex evaluation of regional variation in Russia in general, and described only outlier regions or specific groups. In my research I gave overview of all set of regions, grouping them not by administrative borders of federal districts or by geographic characteristics (neighbouring regions, access to the sea, climate conditions), but by values and growth rates of gender gap.

# Chapter 1 - Life expectancy and gender gap in Russia: regional aspect

In the first chapter values and dynamics of life expectancy and its gender gap in Russia are described and compared to an international scale to understand the nature of changes in life expectancy in gender gap and distinguishing characteristics specific to Russia. Regional differences in values and trends of life expectancy and its gender gap are demonstrated, and the overview of regional economics of Russia is given, including the outlier group of regions of ethnical economics. Gender theories of vulnerability and unequal impact and gender inequality indicators are presented to demonstrate the existence of gender gap in Russian society in general.

## 1.1. Life expectancy and regional variation

### 1.1.1. Life expectancy in Russia and its dynamics

One of the factors of general indicator of development of human potential is an ability to live long, i.e. life expectancy. It is considered to be an important characteristic for quality of life and living standards, and it integrally involves many factors such as socio-economic conditions and healthcare system efficiency, ecology and individual lifestyle, and also demonstrates the degree of development of demographic potential of a region (Kozlov, 2013). Therefore, the importance of this indicator for development of social-economic potential of country and its regions is unquestionable.

People in Russia expressed desire to live longer than they actually do, and the problem of an increase of life expectancy is socially and politically important. Life expectancy in Russia was 70.93 years in 2014 and 71.5 years in 2015 year (Demographic yearbook of Russia, 2015).

On average, Russian people expressed desire to live at least 16.6 years longer, according to researches of the years 1980-2000s (Ivanova, 2013). While in mid-1980s desired life expectancy did not exceed 78 years, in the latest researches in regions of Russia it was almost 10 years more – about 87 years. However, Russians told that they expected to live less than desired and the estimated life expectancy was close to the actual one: men expected to live 19 years less than desired, and women – 15.6 years less (Ivanova, 2013, P.122). The identified gap between real and desired life expectancy of population was addressed in demographic policy of Russian government, and the targeted level of life expectancy of 70 years by 2015 year (Concept of Demographic Policy till the year 2025) was reached (Demographic yearbook, 2015). The next goal was to reach 75 years by 2025, and most likely it will not be reached till 2030, according to official Demographic forecast till the year 2030 (2016).

It is necessary to analyze dynamics of life expectancy to understand their vulnerability to main social and economic changes. Life expectancy at birth in Russia demonstrated very unstable dynamics over the period of 1961-2015 years. It increased from 68.75 years in 1961-1962 to a historical maximum of 71.5 years and was forecasted to grow further up to 75.1 years (Figure 1). In the periods of 1979-1985, 1994-1998 and 2003-2015 life expectancy grew steadily, and the trend was broken after 1985-1986, which was partly affected by the anti-alcohol campaign 1985-1986. After the breakdown of Soviet Union in 1991, a decrease in life expectancy intensified in most of former USSR-countries (Leon et al, 1997). Life expectancy reached a historical minimum at 63.98 years in 1994, then it began to grow till the severe financial crisis of 1998 (Shkolnikov et al, 2001), and then fell to local minimum at 64.68 years in 2003. The last period of improvement of the years 2003-2015 was the longest since mid-1960s, and it is still not clear if it was qualitatively a new tendency or a phase in cycle of dynamics of mortality. Thus, in 2014 mortality rates started to increase again (Shkolnikov et al., 2014).

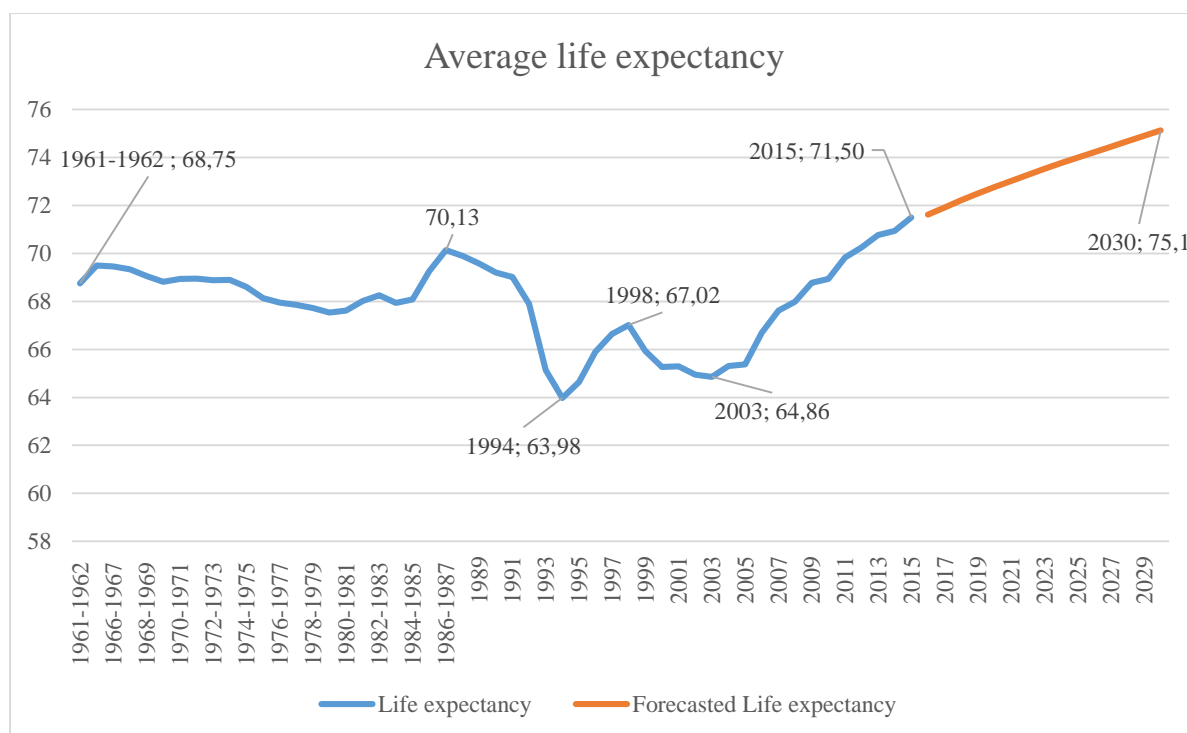


Figure 1. Dynamics of life expectancy in Russia 1961-2015 and forecast till 2030.  
Source: Demographic yearbooks of Russia 2002; 2015 (data used since 2002 year).

### 1.1.2. International comparison of life expectancy

A comparison of life expectancy in Russia on the world scale is needed to understand distinguishing characteristics of its dynamics. In 2015 Russia was ranked 110<sup>th</sup> among 183 countries for average life expectancy at 70.5 years, which was less than global average life expectancy at 71.4 years (WHO Health Statistics, 2016a). Notably, in 2011 life expectancy in Russia approached average global value (70 years), although income and GDP per capita in Russia exceeded average global values.

As a rule, low life expectancy has been a characteristic of less developed countries (Kozlov, 2013). However, despite the positive dynamics of the last years, Russia lagged behind in this indicator behind not only more developed countries or those with comparable social-economic development, but also compared with much less developed countries. As

presented on Figure 2, Russia belonged to the second group of countries with life expectancy from 70 to 79.9 years, and therefore Russia lagged behind regions of North America, Australia and Western Europe (Figure 3). According to the Concept of Demographic policy till the year 2025 (2010), in the second half of 20<sup>th</sup> century, life expectancy in Russia steadily increased and approached to level of European countries, but it lagged behind economically developed countries.

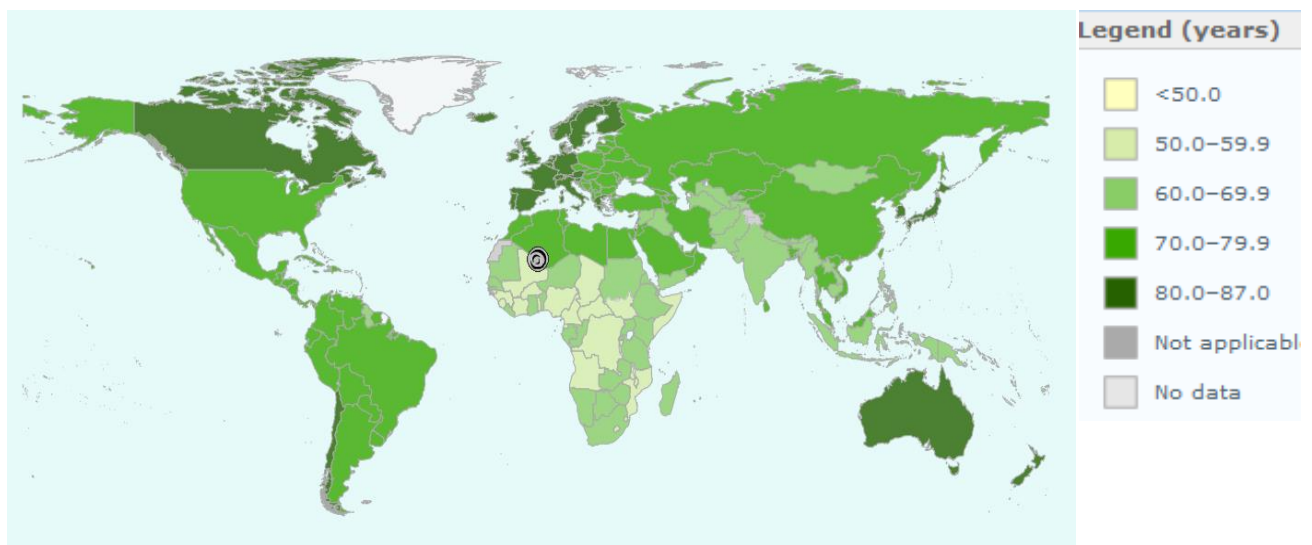


Figure 2. World map of life expectancy, 2015  
Source: World Health Organization: Interactive graphs. 2015

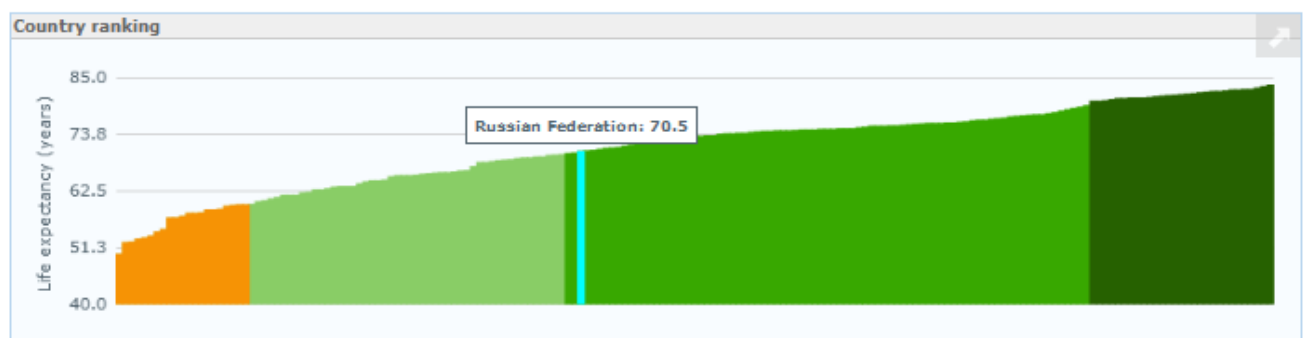


Figure 3. International ranking by life expectancy at birth, 2015  
Source: World Health Organization: Interactive graphs. 2015.

Russia followed global and regional trends, but the improvement in life expectancy in the last decades was not fast enough. In the last sixty years life expectancy increased in all countries in the world, except for African countries, due to high mortality from HIV virus, and for countries of former Soviet Union, due to high mortality of external reasons



and cardiovascular diseases (McMichael et al., 2004). Their mortality dynamics followed the same trend over the period of 1991-1998, and since 2004 Russia and most of these countries experienced a fast improvement of life expectancy.

### 1.1.3. Regional variation in life expectancy in Russia

Russia was divided into 84 regions, which were joined into 8 federal districts in 2014. Regional variation in life expectancy in Russia was observed to be exceptionally high. Life expectancies varied much across regions in Russia in 2013: from 61.79 years in Tyva region to 78.84 in Ingushetia regions (the range was equal to 17.05 years, coefficient of variation 3.73%). Figure 4 demonstrates that the highest values were observed in North-Caucasus federal district between 72.75 and 78.84 years and in Southern district between 71.34 and 72.3 years, and the lowest values were observed in the Far East between 62.11 and 69.13 years. Siberia had a high regional variation with the range between 61.79 and 70.19 years. The absolute outsider region in Siberia and Russia was Tyva<sup>2</sup>. It means, that in Tyva region life expectancy was as low as in Zambia, Tanzania and Niger, which were ranked 155-157<sup>th</sup> of 183 countries (WHO, 2016). This demonstrates an acute need to carry out regionally adjusted demographic policies to deliver better living conditions to all regions.

As well as “actual” life expectancy, desired life expectancies varied geographically in Russia. In 2015 year, citizens of Krasnoyarskiy region expressed the strongest desire to live long at the level of 81.6 years, while citizens of Ufa (Bashkortostan region) – only 78.7 years (UFA1, 2015)<sup>3</sup>. Surprising though it may seem, in earlier years men and women of

---

<sup>2</sup> Data on Tambovskiy region was missing for 2013, and in years 2010-2012 Tambovskiy region was not an outlier.

<sup>3</sup> Karimova M. (2015) “В Уфе самая низкая желаемая продолжительность жизни [Desired life expectancy in the lowest in Ufa]” UFA1.ru. 2/10/2015. <http://ufa1.ru/text/newsline/84702547660800.html?full=3>

Bashkortostan region expressed less desire to live long - 80 years (Shayakhmetova, Utiasheva, 2011), though this discrepancy was probably due to a difference in research methods.

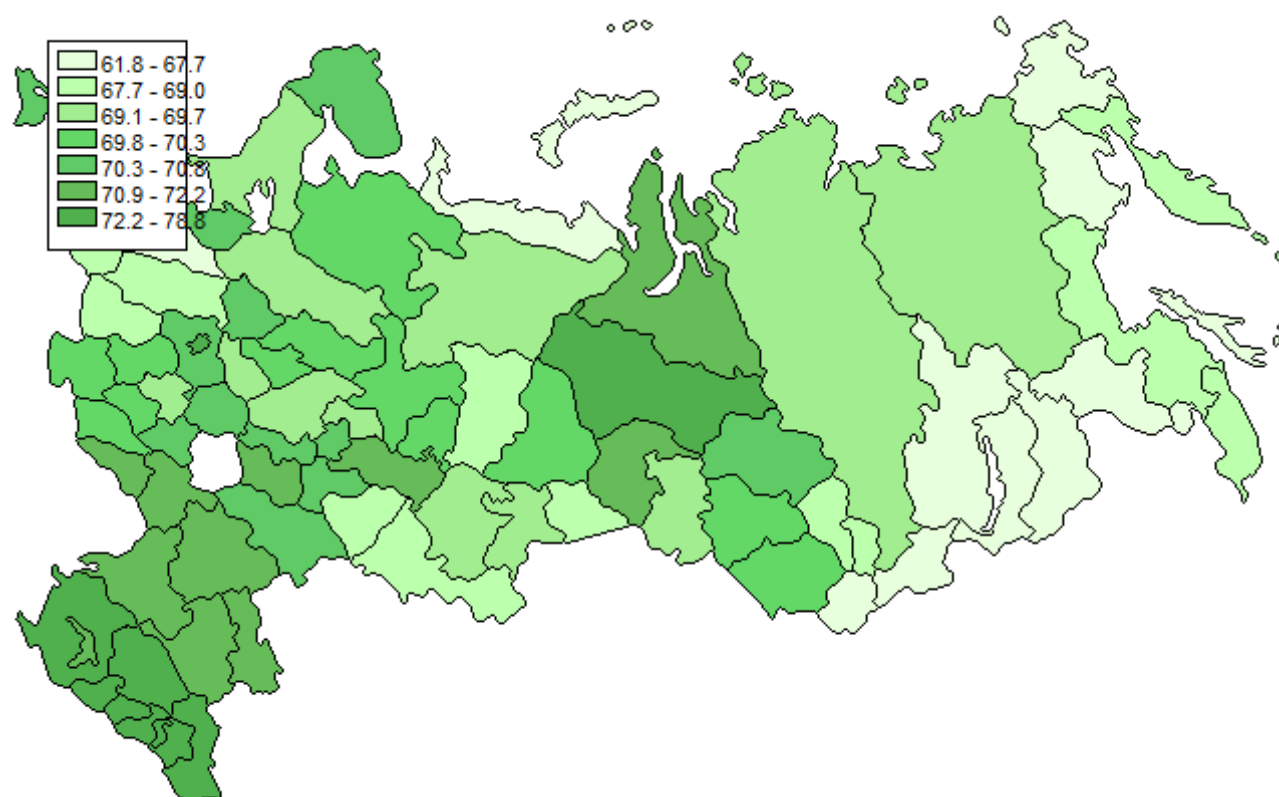


Figure 4. Russian map of life expectancy by regions, 2013  
Source: Demographic Yearbook of Russia, 2014

Regional values of life expectancy were often drastically different from the average in Russia even on the scale of federal districts. According to Bychkov (2015), regions of Northern Caucasus, Siberia and Yakutia and northern regions of Northern-West federal district were characterized with the lowest values of mortality by all causes of mortality and demonstrated the highest average life expectancy at 71.99 years. Regions of the Far East and southeastern regions of Siberia had the lowest life expectancy on average at 60.5 years and high values of mortality by all causes of mortality, except for circulatory diseases and neoplastic diseases. Reaching targets was different also across regions: the goal of average life expectancy at 70 years was reached only twice in history, while in Dagestan region it had always been at the low limit (Abdulmanapov, 2011, P.3). It is necessary to

adjust demographic and other policies according to regional capacities and constraints, and therefore different paths of increasing life expectancy might be chosen.

Life expectancy in federal districts followed an average trend. Thus, the gap in total, of male and female life expectancy between Siberian regions and on average in Russia had always been not less than 2 years (Kozlov, 2013), as demonstrated on Figure 5. Over the period of 2004-2009 the gap stayed the same, which indicated significant dependency path. Other researchers also noted an absence of any significant convergence of regions to an average level. Bychkov (2015) noted that in the latest years the gap between average life expectancy in Russia and northern regions, which had lower values, remained stable or even increased (Yakutia, Kamchatsky and Sakhalin regions)<sup>4</sup>. In Republic Komy in the years 1994-1998 the significant convergence to average level was observed: from 3 years down to almost 0. In 2000s, after a long period of mortality decrease, the gap had levelled at 2 years. What is more, the size of the gap between average in Russia and Khanty-Mansiyskiy and Ymalo-Nenetskiy regions increased. Bychkov (2015) argued that the reason behind the divergence was an insufficient growth of life expectancy in regions with high mortality from external factors.

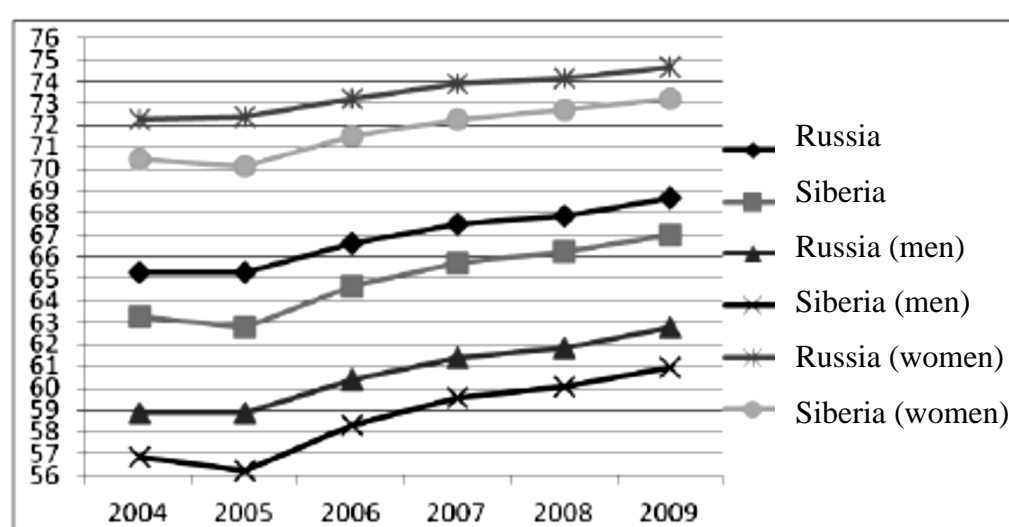


Figure 5. Dynamics of life expectancy in Russia and in Siberian Federal District, 2004-2008.

Source: Kozlov, 2011, P.42. Based on Demographic Yearbook, Russian Federal Statistic Service, 2006, 2008, 2010.

<sup>4</sup> The only exception was Nenetsky region.

## 1.2. The gender gap in life expectancy and regional variation

### 1.2.1. The gender gap in life expectancy and dynamics

The gender gap in life expectancy in Russia was exceptionally high and needs to be addressed to be decreased for better social-economic development of Russia and its regions. The gender gap was equal to 11.18 years in 2014 (Demographic yearbook, 2015) and to 11.6 years in 2015 (World Health Organization, 2016a). It was called as “the brightest and the most dramatic indicators of the current health crisis in Russia” (Braun et al, 2007), along with excess male mortality. However, the goal of narrowing the gender gap was not declared in Russian demographic policy (Concept of Demographic policy till the year 2025), and it remained one of the problems not addressed in gender aspects of demographic, social, healthcare and other policies in Russia (Bobylev et al, 2014).

According to surveys, Russians underestimate the gender gap significantly and did not recognize this problem, though they estimate life expectancy values close to actual ones. Estimated life expectancies of men and of women in Bashkortostan region (Shaiakhmetova and Utiasheva, 2011) differed no more than by 1 year, while in reality the statistic of the gender gap was as much as 10 years in 2006. According to extensive research of Ivanova (2013), men expected to live 69.7 years and women - 72 years, which also represented the gender gap in estimated life expectancy at 2.3 years. The gender gap in desired life expectancy was observed as well, but with opposite sign and at very low absolute value (1 year): on average, men wanted to live 88.6 years and women - 87.6 years (Ivanova, 2013).

Analysis of dynamics of gender gap is essential to understand the phenomena. The gender gap in life expectancy in favor of women grew from 8.3 years (Shkolnikov, Mesle, 1995) in 1958 to 11.18 years in 2014 (Demographic yearbook of Russia, 2015), and it was forecasted to decrease down to 9.1 years by 2030 (Demographic forecast till 2030, 2016). It reached a historical minimum in 1986-1988 at 9.63-9.64 years and a historical maximum in 1995 (13.59 years), as indicated on Figure 6. Then trend reversed direction due to stabilization of economy, but with the crisis of 1998 it continued to increase up to 13.55 years in 2004. These high numbers were qualified by demographers as unprecedented: on average, Russian men died before retirement (Bashkireva, 2010, P.34).

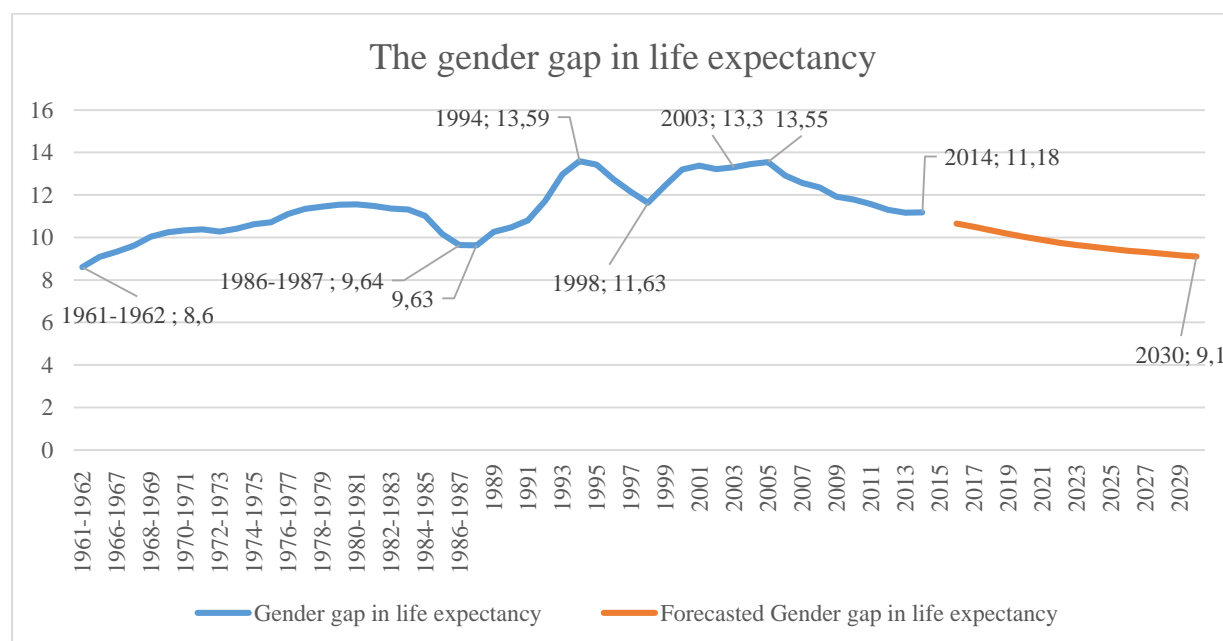


Figure 6. Dynamics of the gender gap in life expectancy in Russia, 1961-2030.  
Source: Demographic yearbooks of Russia 2002; 2015 (data used since 2002 year).

Positive dynamics of gender gap in the last decade was explained with relative increase of male life expectancy: while male life expectancy at birth increased by 4 years (up to 63 years), female indicator increased by 2.7 years (up to 75 years) since 2000 (Kiseleva, 2011). According to official analytics (Concept of Demographic Policy till the year 2030), the increase in life expectancy for males was due to decrease in mortality in working age, and for females

- in mortality in working age and older. In the last twenty years the steady tendency of decrease in male life expectancy in Russia and other indicators was observed, and official forecast of steady decrease in the gender gap was constructed in optimistic scenario (Demographic forecasts till the year 2030, 2016), however, researchers claimed that trend of gender gap might reverse (Ivanova, 2010; Grigoryev et al, 2014).

## 1.2.2. International comparison of the gender gap in life expectancy

Differences of life expectancy of females and males demonstrate clearly the gender gap, due to significant difference in international rankings. In 2015 Russia was ranked 89<sup>th</sup> of 183 countries in female life expectancy at 76.3 years and 127-128<sup>th</sup> in male life expectancy at 64.7 years (World Health Organization, 2016a). Russia lagged behind developed countries in female life expectancy, which was 66 years in 2010, and in male life expectancy Russia lagged behind even developing countries, and from almost all countries of Eastern Europe, Western Asia and Latin America in male life expectancy at 63 years in 2010.<sup>5</sup> Male life expectancy in Russia at the age of 60 was among the lowest in the world in 2013 (Belov and Rogovina, 2014).

The gender gap in life expectancy stayed very high over the last fifty years, and recently it reached global maximum level. The gender gap in life expectancy was the highest in the world at 11.6 years in 2015, lagging behind Lithuania at 11 years and Belarus at 11.5 years. According to Bobylev (2010, P.71), only the following countries in European and Central Asian countries had values similar to Russia: Belarus, Lithuania, Ukraine at 11.7 years each

---

<sup>5</sup> Population Reference Bureau. (2012) World Population Data Sheet. Accessed on 15-05-2016. <http://www.prb.org/>

and Kazakhstan at 11.9 years. Denmark, Norway, United Kingdom, Sweden had minimum values of the gender gap of less than 5 years. As illustrated on the world map (Figure 7), Russia was close to former Soviet union countries and to developing countries of Africa by gender gap values. At the same time, Russia was ranked in second hundred of countries (110<sup>th</sup>) in GDP per capita<sup>6</sup>, which is other social-economic indicator traditionally associated with development of human potential.

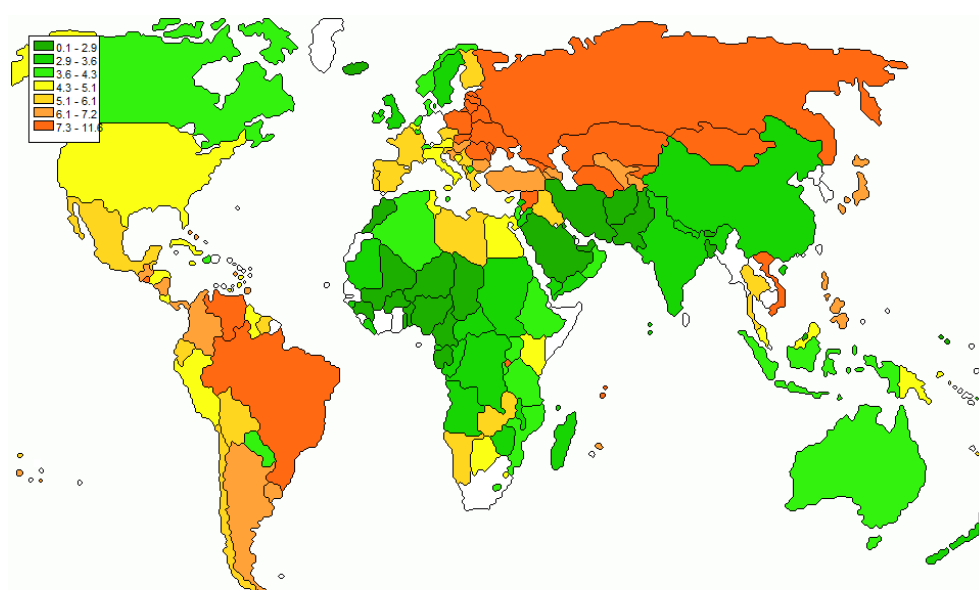


Figure 7. World map of the gender gap in life expectancy 2015.  
Source: World Health Organization, Life expectancy: data by country. 2016a.

A few years ago gender gap was 2 years lower, and still the size of lag behind other countries was dramatic. Thus, in 2013 women were expected to live 76.2 years, and men 65.2 years (the gender gap was 9 years), while in European Union life expectancy was higher for women and men (83.1 and 77.5 years) with lower gender gap (5.6 years). As demonstrated on Figure 8, Russia demonstrated the “worst” dynamics of life expectancy by both genders in comparative set: Czech republic, Estonia, Ukraine, United Kingdom (Shkolnikov et al, 2014).

<sup>6</sup> The World Bank. Data: GDP per capita, PPP (constant 2011 international \$). <http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD?display=default>

In 1994 the drop in life expectancy was the largest, and life expectancy numbers hardly returned to the initial level of 1965 for males, but improved for 2 years for females.

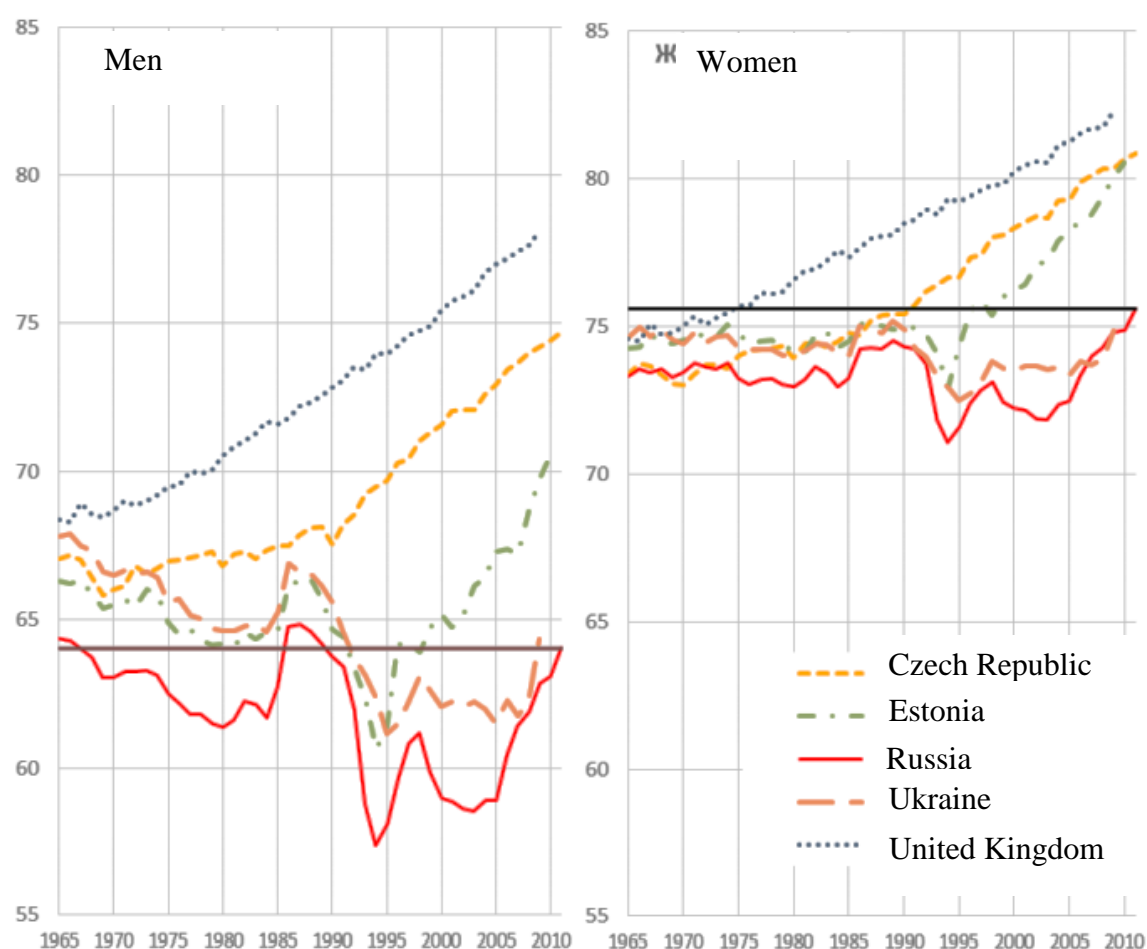


Figure 8. Life expectancy in Russia and 4 European countries 1965-2010.  
Source: Shkolnikov M., et al., 2014, P.9. Based on Russian official statistics and Human Mortality Database.

### 1.2.3. Regional variation of gender gap in life expectancy

The gender gap in life expectancy varied significantly across federal districts and within federal districts of Russia (Figure 9). As in case with life expectancy, favorable situation in 2013 year was in North-Caucasus federal district (5.35-10.6 years) and in the Far East (7.77-12.82), and high variation is observed in Siberia (10.74-12.54) and Urals (9.35-13.04). As life expectancy value, the gender gap in life expectancy is observed to be the lowest in North-Caucasus district, and its record values kept such year on year. In 2009 life expectancy was



higher than in Russia by 7.45 years for men and 2.95 for women, gender gap in life expectancy in Dagestan was 7.4 years only – 4.5 years lower than on average in Russia and 3.11 years lower than in Southern federal district (Abdulmanapov, 2011, P.2).

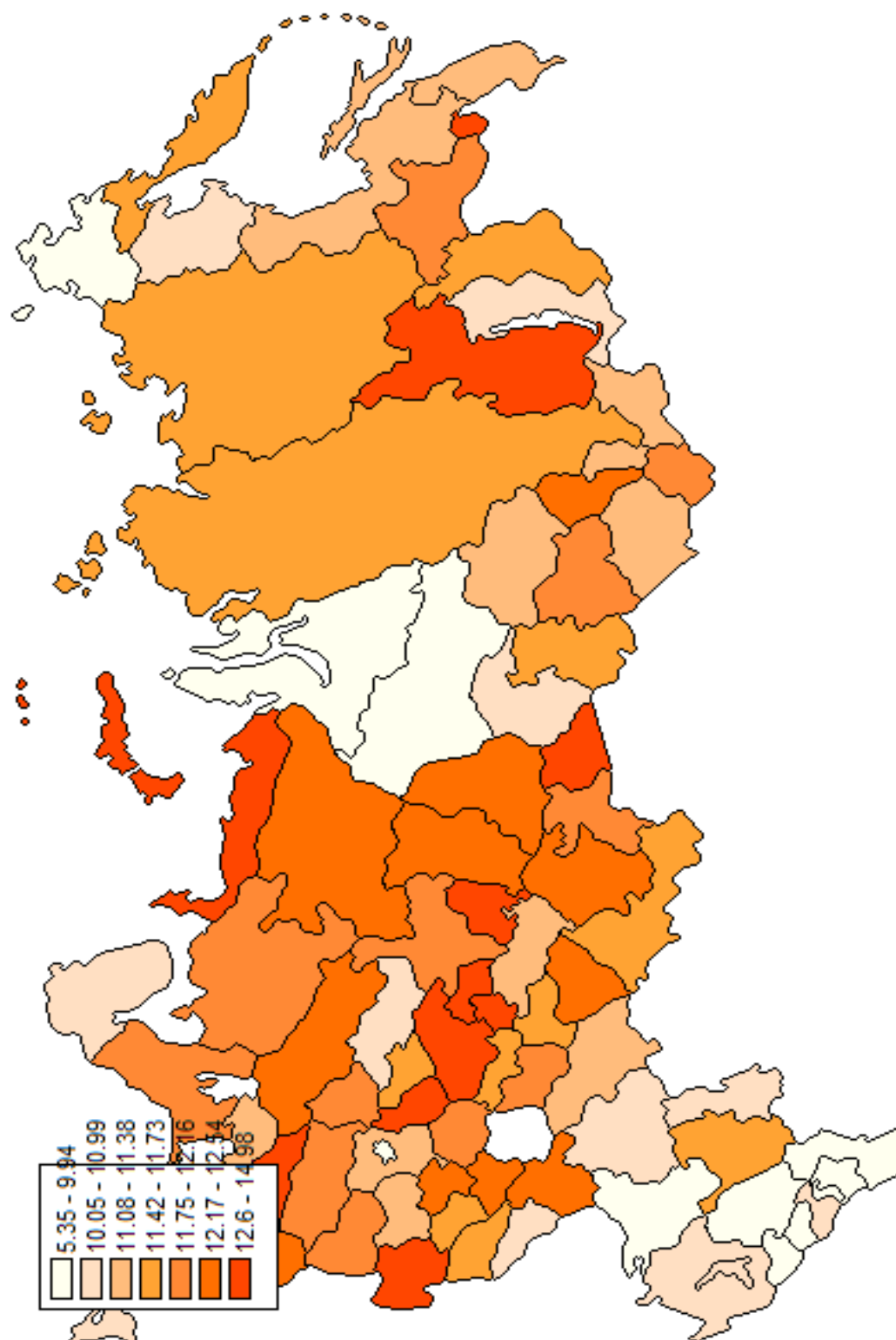


Figure 9. Russian map of the gender gap in life expectancy by regions, 2013.  
Source: Demographic Yearbook of Russia, 2014.

## 1.3. Regional differences in Russia

Aspect of regional variation requires special attention, as territorial disproportions were historic and complex and were present in many spheres. Goffe (2006, P.53) stated that territorial disproportions in social-economic development was natural for countries, their regions and global economic system as well. Due to initial differences in geographical location and natural resources in territories, and therefore the differences in historical, economical, socio-cultural features of countries and their regions, the regional variation became more acute by now. Nowadays due to globalization processes of regional variation became more extreme, and the price of lagging behind is much higher. With intense technological, informational and other competitions taking place, the least developed regions might stay always such, as more resourceful and developed regions not only take benefit of economies of scale and globalization processes, but also form the processes in their own interests at the expense of the less developed regions (Goffe, 2006).

Uniqueness of Russia on the Eurasian continent in its geography by the variety of social, climate, economic conditions, which resulted in high variation of regions in many spheres. In regional policy a complex set of indicators of regional variation was previously analyzed. Goffe (2006) analyzed sets of indicators in Russia to demonstrate deep regional differentiation: GDP per capita, unemployment, shares of poor and of uneducated people, penetration of PC usage, level of R&D investment. Sachuk (2011) investigated regional differentiation by economic development, socio-demographic structure, regional governance and cultural-historical parameters. The conclusion was that from the point of view of various factors, which define middle class, regions are strongly differentiated, and even confront to each other.

Regional variation in Russia could be illustrated with many examples:

- As for climate differences, average temperatures of July vary from 0°C (in Arctic islands) to 25°C (in plains closer to Kazakhstan)<sup>7</sup>. While climate predetermines people's lifestyle and economic activity, it resulted in different cultures and regional specializations by now.
- Regarding geopolitics, neighboring countries of Russia are Finland and Norway on west-north, and Kazakhstan in south-east. Trading partners not only intensify regional economic specialization, but also form consumer basket: citizens of northern regions consume abundant seafood, while people in landlocked rural areas of south have access to cheap summer fruits and vegetables from southern countries.
- Cultural differences also might play important role: with development of Buddhism and Shamanism in South Siberia in contrast to orthodox religion, different lifestyles and health attitudes were formed.
- Abundance of natural resources led to economic prosperity of certain Siberian regions, differentiating them by individual income. Thus, individual disposable income of Tumenskiy region, where income is generated from oil resources, was 29.3% higher than on average in Russia in 2014, and maximum was reached as always in Moscow city (73% higher, than on average)<sup>8</sup>.

Important to mention that no direct relationship of economic development and health state was found, as regional differences are complex. Researchers noted not only dependency path of regional development, but effect of accumulated differences for regional differentiation. Ivanova (2000, P.84) argued that observed absence of significant relationship of economic development and health indicators such as life expectancy in Russia could be explained with the hypothesis that modern health state of population isn't based on current living conditions, socio-economic crisis and its consequences, but on long-term tendencies and living conditions in the past. High inertia of processes results in time lag of effect of living condition

<sup>7</sup>“Закономерности распределения тепла и влаги на территории России [Regularity of distribution of warmth and humidity in territory of Russia]”. Geography of Russia: Climate. Accessed on 25-04-2016. <https://geographyofrussia.com/zakonomernosti-raspredeleniya-tepla-i-vlagi-na-territorii-rossii/>

<sup>8</sup> Household Income, Expenditure and Consumption of households in 2015. Federal State Statistics Service. [www.gks.ru/wps/wcm/connect/rosstat\\_main/rosstat/ru/statistics/publications/catalog/doc\\_1140096812812](http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1140096812812)

on health. Therefore, variations in health state between regions could be based on regional differences, accumulated in time.

Regarding social-demographic structure differences which relate directly to the gender gap in life expectancy, Sachuk (2011, P.277) claimed regional differences in structure of middle class in Russia to be unique for Russian society, on contrast, for example, with Europe. The only exception is Italy with regional differentiation between North and South, which historically differentiated with level of economic development, political regime and stratification of social groups. However, the number of regions and the relative homogeneity of geopolitical and climate conditions makes Italian regions incomparable with Russian federations in the frame of the current research.

### 1.3.1. Regional variation of the gender gap in life expectancy

Aspect of regional variation requires special attention, as territorial disproportions are historic and complex and expressed in many spheres. In general, the most of regional indicators followed normal distribution, often skewed. Thus, Zarova and Kotiakova (2006, P.52) noticed that regional differentiation in Russia by number of employed by industries and by gross regional product followed normal distribution with significant right-skewed asymmetry. Regions were not observed to converge in economic development and growth of economy for federal and regional level, and polarization and degree of variation was forecasted to increase. Bobylev et al (2010, Pp.5-6) mentioned a positive tendency as two-fold decrease of income deficit and its regional variation, however income polarization between the richest and the poorest population groups increased. What is more, living conditions polarizations increased recently, especially it was noticeable in regions with problems of old housing.

Divergence of regions in development resulted in increase of variation in indicators across regions and between urban and rural areas of each region. Domination of regional

capitals is forecasted to grow in the following years, as leading cities differentiate further from peripheries (Leksin, 2006), and we could forecast further differentiation of Russian regions from each other. Another observation was that in all regions, except Moscow city, in 2000-2008 years income increase was followed by increase of income differentiation (Bobylev, 2010, P.159). Almost direct relationship was found between income differentiation and income level, corrected by regional living wage.

However, in general, some regional problems became less acute in 2000s, due to economic growth and increase of budget funding, so that all regions - developed, developing and depressed - improved their indicators. For example, due to modernization of healthcare and increase of state financing infant, child and maternal mortality decreased in all regions (Bobylev, 2010, P.5). Important to mention, that even with variation keeping stable, problems of regional importance could be resolved with government support for federal level and some of them were resolved.

### 1.3.2. Urbanization factor in regional differentiation

The level of urbanization is both an indicator and a factor of regional development and differentiation. Cities are highly unevenly located in Russia: in 2006, 76 cities of 1096 were located in Moscow region, while in neighboring Yaroslavskiy region only 11, in Altai republic only 1 city and in Koryakskiy region none (Leksin, 2006, P. 86). Frolova (2004) noticed that size of middle class varied significantly depending on urbanization: in the biggest cities (Moscow, Saint Petersburg) middle class was not less than 20% of population, in regional centers it was about 10% of its population, and in smaller cities, peripheries, and rural settlements it was not more than 5% of population.

Administrative centers dominated in all regions except only for 5 regions (Leksin, 2006). Leksin stated that regional capitals were similar by degree of domination over territories,

but were very different from each other on the scale of Russia. The degree of their social and economic differentiation from each other to the large extent was defined the degree of such differentiation between regions. Regarding life expectancy and healthcare, Leksin (2006, Pp.85-86) argued that almost all of regional capitals were characterized with better health indicators and higher life expectancy, compared with other cities and the most of rural areas in those regions. For example, in Moscow city and the Moscow region the gap between rural and urban areas was 2 years, and for Novosibirsk and Murmansk regions – 3 years. It could be explained with the fact that the youngest and the healthiest people moved to live in administrative centers (i.e. regional capitals), and with more developed healthcare infrastructure, they changed faster their lifestyle to healthier, compared to rural population. It was supported with statistics on number of diseases diagnosed: even that rural people visited doctors only in cases of acute necessity, the number of diseases diagnosed grew by 20-35% slower than in regional capitals.

### 1.3.3. Ethno-economies

Researchers distinguished regions with “ethnic economies”, or “ethno-economies regions” with a number of attributes, such as traditional types of household and economic activities or pre-industrial type of economy (Akhmetov, Berdnikova, 2009). Regions with the most prominent characteristics of ethno-economies were Dagestan, Kabardino-Balkariya, Karachaevo-Cherkessiya, Kalmykiya, Ingushetia and other (Kolesnikov, 2003). Regions with higher share of ethnic economies in them, which were at least half of them, demonstrated particularly high values of life expectancy and low values of gender gap (Table 1). These regions had life expectancy by 5% (3.3 years) higher than on average in Russia and gender gap by 19% (2,1 years) lower than on average in Russia in 2013 year (Table 2). Ethno-economies not only had high life expectancy and low gender gap values, but also

demonstrated high stability in crisis times. When in demographic crisis of 1990s life expectancy decreased and gender gap increased sharply, these regions kept their good indicators and revamped easier: they were better fitted to social reproduction. According to Ovchinnikov and Kolesnikov (2006, P.120), resources of ethno-economies were enough not only to provide social reproduction of population, but also to invest in development of small and medium entrepreneurship in sphere of services and trade, which was especially acute problem in market economy crisis times.

*Table 1. Life expectancy and gender gap in ethno-economies regions, 2013*

Federal district	Region	Life expectancy at birth, years	Gender gap
North-Caucasus	Ingushetia	78.84	5.35
North-Caucasus	Chechnya	73.20	5.78
North-Caucasus	Dagestan	75.63	6.49
North-Caucasus	Kabardino-Balkaria	73.71	9.05
North-Caucasus	Karachaevo-Cherkessiya	73.94	9.12
North-Caucasus	Stavropolskiy	72.75	9.36
Southern	Rostovskiy	71.39	9.94
Southern	Krasnodarskiy	72.30	10.11
Southern	Adigeya	71.80	10.42
Southern	Volgogradskiy	71.42	10.46
North-Caucasus	Osetiya	73.94	10.60
Southern	Astrakhanskiy	71.34	10.81
Southern	Kalmykia	71.35	11.60

*Source: Demographic Yearbook of Russia, 2014.*

*Table 2. Comparison of ethno-economies regions and average in Russia*

Regional Average	Life expectancy at birth, years	Female life expectancy, years	Male life expectancy, years	The gender gap
Russia	69.9	75.6	64.3	11.3
Ethno-economies Regions (13)	73.2	77.7	68.5	9.2
Difference	105%	103%	106%	81%

*Source: based on Demographic Yearbook of Russia, 2015.*

Reduced vulnerability of ethno-economies was related to their performance of important functions in Russian economy and society. Ovchinnikov and Kolesnikov (2006, P.118) investigated wide diapason of innate opportunities specific to regions with ethnical economies and mentioned their positive and constructive influence on social and modernization processes in 1990s, due to their specific economic and household activities and the majority of rural population. Their agrarian sectors served as a stabilizer and structural base for Russian agrarian economy, it was able to absorb waves of unemployment, to perceive innovations and launch big investment projects, and to reproduce the same conditions of human life activity of population. Ethno-economies had one more social-economic function: it absorbed freed labor resources from other sectors and released social tension (Akhmetov, Berdnikova, 2009). Pechura (2010) mentioned that among main functions of ethnical economics there was “effective realization of human potential of nationalities in the conditions of [Russian] stratified and polarized society and consolidation of population within regional community”.

## 1.4. Gender inequality in Russia

### 1.4.1. Theories of gender inequality

Study of general problem of gender inequality is essential to understand factors behind such social indicator as the gender gap in life expectancy. Gender inequality had always existed in both developed and developing countries over the large set of social and economic indicators: labor market, political sphere, education and other (Loshakova, 2013). However, spheres of gender gap and its size were significantly different globally due to economic and social differences and specific cultural norms. Research on social mechanisms responsible for gender differences in health are usually made in two conceptual approaches (Braun, Panova, 2007): theory of unequal impact and theory of differences in vulnerability.



The theory of unequal impact stated the restricted access of women to material and social resources for preserving health, and higher stress of women due to realizing their gender and family roles. Differences in behavior between men and women were described as follows: men were observed to smoke, abuse alcohol, follow unbalanced diet more often, while women were observed as physically more active, but more suffering from emotional load in realizing their social roles and lacking mechanisms of obtaining social support more (Arber and Cooper, 1999; Arber, 1991).

The theory of differences in vulnerability explained the gender gap in the state of health with idea that women reacted differently to material, social and behavioral conditions, which influence health (MacDonough and Walters, 2001). While smoking and alcohol consumption were more significant health determinants for men, obesity and lack of physical activity were more significant for women. Stress was perceived by women and men differently and was resulted supposedly in different consequences for health (Zuianek and Mannell, 1998).

Researches of Russian society (Panova and Braun, 2007) demonstrated that both approaches helped to investigate gender health differences with methods of regression analysis. Social and psychological determinants were significant for state of health of women and men, which was in accordance to the theory of unequal impact. It was demonstrated according to the theory of differences in vulnerability that men were significantly more vulnerable in terms of health in older ages. However, both approaches did not explain all variation of health indicators by gender: for example, analysis did not significant health differences by gender in health state, according to theory of unequal impact. This meant that problem of gender differences is complex and probably many associations between variables were not unaccounted.

## 1.4.2. Indicators of gender inequality in Russia

Gender inequality was embedded in all spheres of Russian society, and “its problems are acute not only for women, but also for men” (Report on Development of Human Resource Potential, 2010, P.61). Among those were: extremely low male life expectancy, relative decrease in level of male education, high employment in unfavorable working conditions. Gender gaps in Russia was captured in economic and demographic indicators, such as employment and unemployment, education, time budget of household, and also in social and demographic indicators such as mortality, health, birth rates, different family types.

Investigation of the aspects of gender inequality in Russia. The gender gap in social and economic sphere could be illustrated by unemployment indicator: regional variation in female unemployment was much lower than of males (Kalabikhina, 1999). Impact of feminization of employment was confirmed in every region, and average unemployment for females was higher in all ages (1996). More than 70% of regions were characterized with female unemployment more than 3%, and 48% of regions – with more than 5%. In contrast, male unemployment was drawn towards low rates. About 90% of regions had male unemployment lower than 5%, and 70% regions – lower than 3%. Undoubtedly, gender differences were also present in demographic indicators in Russia, such as life expectancy, mortality and morbidity. Thus, Kalabikhina (1999) showed effect of gender factor on mortality by analyzing dynamics of probability of death by age for males and females.

The state of health and gender gap in life expectancy is closely connected with urbanization. In 2012, regional baby mortality varies from 4.6 ‰ (Saint Petersburg city) to 22.3‰ (Chukotskiy region) (Belov and Rogovina 2014, P.19). Lag in 1-year old baby mortality from rural to urban areas was 7.6‰ in 1990 (18.3 and 17‰) and reached 24.7% (10.1 and 8.0‰). Regional dynamics was defined by local improvement

in healthcare, and baby and maternal mortality decreased in regional with 24 new perinatal centers of regional and federal importance.

The main gender problems in Russian society were identified as follows (Report on Development of Human Resource Potential, 2010, P.74):

- Wide acceptance of traditional gender roles in society and state support of role of women as primary one in children upbringing;
- Absence of state policy of gender equality and integral national mechanism of improvement of women's position;
- Preserving historical lag in salary in budget industries with majority of women among employees;
- Widespread direct or indirect discriminatory practices in labor market against women;
- Lack of integral mechanism of protecting women against violence;
- High level of gender differences in self-preserving behavior.

We can conclude that in Russian society high social pressure was set on men, according to traditional roles, and women suffer certain economic discrimination: they are underpaid on certain industries or occupations. By far gender policy has not been carried out by government to eliminate gender differences neither in labor market, not in healthcare and life expectancy. While history of gender differences was “at most a history of unequal privileges and rights of women and men” (Loshakova, 2013), balancing social and economic privileges and roles might decrease the gender gap in the state of health in Russia.

## Chapter 2 - Reasons of the gender gap in life expectancy in Russia

The second chapter presents reasons for the gender gap in life expectancy in Russia. Excess male mortality (or the gender gap in mortality) is presented in its dynamics and by structure of causes of death, and international comparisons are provided. Factors influencing excess male mortality are grouped into external, internal and metaphysical causes and the first two groups were investigated deeper. Relationships between many factors are demonstrated in variety of Russian and foreign researches.

### 2.1. Mortality

Traditionally the gender gap in life expectancy referred to extensive statistics on male mortality exceeding female mortality in civilized countries (Braun, Panova and Rusinova, 2007). Macintyre, Hunt and Sweeting's study (1996) on reasons for the gender led to further researches on variety of factors, which impact the gender gap. Comparisons of gender gap were made between countries and in various historical periods.

The gender gap in life expectancy in Russia was explained by low male life expectancy, due to excess male mortality. Excess male mortality is defined as excess of male mortality over female mortality, and also could be calculated on basis of, for example, probability of death in specific age or in age coefficients of mortality. In Concept of Demographic Policy of Russia till 2025 year (2007) low life expectancy was explained by high mortality in the working age, while 80% of it was explained with male mortality. In international comparisons male mortality was extremely high, while female mortality was comparable to the most of former USSR and socialist countries (Baskakova et al, 2013, P.10).

## Mortality and dynamics

Analysis of mortality and its reasons allows to get more detailed picture of Russian demographic situation for federal and regional levels, to identify factors of mortality which may increase life expectancy and to analyze efficiency or realized measures for decreasing mortality (Bychkov, 2015). The highest number of deaths in Russia in 2014 was due to circulatory diseases (55% deaths), and next by importance - neoplastic diseases (15%) and external factors (8.7%) (Figure 10). Ivanova (2010) named the following traditional elements of mortality in Russia nowadays: high morbidity of infectious diseases, diseases of respiratory organs and digestive apparatus. In older ages reduction of female mortality from cerebrovascular activity was particularly important.

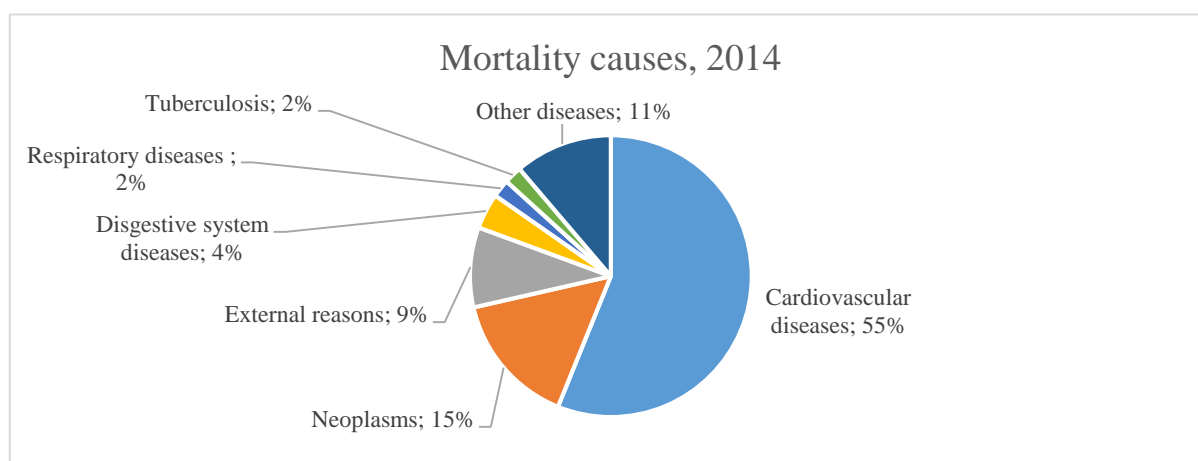


Figure 10. Causes of mortality in Russia, 2014.

Source: Bychkov, 2015.

Analysis of social indicators which composed global indexes in 2009 (Ivanova, 2010) demonstrated that Russian ratings in health indicators deteriorated. Russia was 90<sup>th</sup> in tuberculosis mortality and 97<sup>th</sup> in HIV mortality, 97<sup>th</sup> in life expectancy. Life expectancy gap between Russia and the most of developed countries was still very large in 2014, and mortality from cardio-vascular diseases and many unnatural causes still remains at the record level (Shkolnikov et al, 2014).

Mortality was notably high for young people: cardiovascular and oncological mortality was observed higher for younger people than in other countries. Abdulmanapov (2011, P.4) stated that mortality rates were much higher for men, especially in working age (more than 2 times) and in 30-34 years age (4.2 times and more). Ivanova (2010, P.87) stated that mortality age structure was characterized with significant “rejuvenation”. In 2000-2003 working age mortality (especially for 25-34 years old) reached its maximum since afterwar period. In the following 4 years situation improved, but no fundamental changes took place.

Analysis of dynamics of mortality by causes showed the ways of increasing life expectancy and narrowing gender gap. There were insignificant variations in dynamics of structure of mortality by causes of death. Mortality of external factors started to decrease to the value of the end of 1980s, and respiratory diseases steadily decreased in its share. It is important to note 1.5-times increase in mortality from digestive system diseases over the period of 1980-2014. Shkolnikov, Andreev, Mackey, Leon (2014) has made a systematic analysis of the longest mortality decrease period since 1965 year and increase in life expectancy which started in 2004. They suggested that influence of healthcare on life expectancy was expressed by accelerated decrease in infant mortality and mortality from tuberculosis, diabetes and other avoidable causes of death. The main reasons behind life expectancy increase was reduction in cardio-vascular diseases, violence- and alcohol-related and accidents in working age and in older ages. Mortality analysis demonstrated that main potential factors to reduce mortality in Russia, which would lead to increase of life expectancy and narrowing gender gap, are reduction of mortality of cardiovascular diseases and of external factors.

## Mortality/morbidity gender paradox

Women are observed to live up to 10 years longer than men, however they usually suffer more diseases and get sick more often (Nazarova, 2014; Ivanova, 2013; Nilov, 2012;

Shabunova, 2010). Researchers describe this paradox in the gender gap in life expectancy with phrase “Women get sick more often, and men die more often” (Braun, Panova and Rusinova, 2007). It is a world tendency for civilized countries. For a long time medical statistics was used to demonstrate that men are more vulnerable to life-threatening diseases without distinct symptomatology, while women suffer more often from acute and chronic, but less serious maladies. Ramonov (2011, P.514) demonstrated that on average women in Russia lived longer than males, but they estimate their health worse than males. This tendency is stronger for older ages.

The level of perceived health state perceived of Russian women is lower than of man and also of women in other countries. Thus, lagging of Russia behind Western European countries by 13 years in life expectancy at the age of 20 is explained by high male mortality for men (especially in working age) and by worse health state for women (mostly in older age). However, Braun, Panova and Rusinova (2007) drew attention to the fact that sustainably worse health indicators of women were usually omitted by researchers.

## Gender gap in male mortality (excess male mortality)

Main reason of the gender gap in life expectancy in Russia is higher male mortality compared to female mortality, in all ages. In 1990-1996 mortality of females and males in working age increased in 1.3 and 1.5 times respectively, and absolute values were significantly different. Female mortality in working age was 263.6 per 100,000 women in 1996, and for males it was 1117.7 per 100,000 (Kalabikhina, 1999). In the last decade the difference decreased: in 2005 excess male mortality was 3.3-4.1 times (more than women), in 2008 – 3.2-3.6 times. (Bobylev, 2010, P.71). According to Table 4, excess male mortality was 2 times (over female mortality) in 2012 year, and it decreased twofold since 2006 year.

Excess male mortality is the most prominent in working age, where it is observed in almost all classes of death reasons (Kalabikhina, 1999). Kalabikhina (1999) admitted that there are formal difficulties in identifying gender factor from the whole set of combinations of reasons of excess male mortality, however some implications can be found based on aged excess mortality of males. Peak of male mortality at the age of 25 years reproduced itself in the number of decades, and by 1996 it transformed in plateau with ages between 20 and 30 years old (Table 3). This was the age of the most active socialization of men in both professional and family spheres. What is more, there was surge of male mortality in 40-50 y.o.: particularly, 40-y.o. men suffer crisis of roles in the most extent, as they hadn't succeeded yet in soviet social hierarchy and couldn't fit themselves in modern labor relationships anymore.

Researchers disaggregated life expectancy growth by age groups and main death causes to investigate the main components of the gender gap. Analysis of excess male mortality by causes of death showed that excess male mortality was particularly high from infectious and parasitic diseases, respiratory diseases, and external reasons (accidents, intoxications, traumas) (Table 3).

*Table 3. Mortality in working age in main classes of death causes, per 100,000ppl, 1996.*

Mortality causes	Mortality coefficient		Excess male mortality, times
	Females 16-54 y.o.	Males 16-59 y.o.	
Circulatory diseases	63	322	5.11
Accidents, intoxications, traumas	86	442	5.14
Neoplastic diseases	58	133	2.29
Respiratory diseases	9	55	6.11
Digestive system diseases	13	48	3.69
Infectious and parasitic diseases	6	46	7.67
Other diseases	29	72	2.48
Total	264	1118	4.23

*Source: Kalabikhina, 1999, Pp.412-414. based on Demographic Yearbook, Russian Federal Statistic Service, 1997*



Table 4. Excess male mortality by causes, 2005, 2008, 2012.

	Excess male mortality, times		
	2005	2008	2012
all factors	3,9	3,8	2.0
external factors, including:	5,0	5,0	4.2
from accidental alcohol poisonings	4,5	4,6	4.3
from all types of transport accidents	3,8	3,8	3.2
from suicides	7,4	6,3	5.6
from murders	3,9	4,0	3.7

Source: based on “Report on Human Potential Development in Russia 2010. P.72.; and Shkolnikov et al (2014), Pp.14, 32.

Table 5. Excess male mortality in 2012, by mortality factors.

	Excess male mortality, 2012, times
All factors	2.0
Cardiovascular diseases	1.8
Neoplasms	2.0
Other: alcoholism	4.0
Other: tuberculosis	4.7

Source: Shkolnikov et al (2014), Pp.14, 32.

To investigate the differences in mortality by gender, Shkolnikov and Mesle (1995) decomposed total the gender gap in life expectancy according to leading causes of deaths. More than 60% of gender gap was caused by 2 classes of diseases: injury, poisoning, violence (external factors) (explained about 35% on average) and circulatory diseases (explained from 25% in 1965 to 30-32% in 1990s) (Table 4). Suicide excess male mortality is 5.6 times, and accidental alcohol poisonings 4.3 times. As demonstrated in Table 5, men were observed to die 4.0 times more than women from alcoholism in 2012 year and 4.7 times more from tuberculosis. According to WHO (2016b), in 2015 excess male mortality in cardiovascular diseases was 1.56 times more, on infectious and parasitic diseases was 1.205 more (while imprisoned people are mainly men and they die 5 times more from such diseases there), and on external reasons 1.287. Partly these mortality reasons depended on healthcare and environment, and they could be treated as external for individual. Researchers Shkolnikov and

Mesle (1995) reckoned that the reasons behind the widening gap was due to increasing male excess mortality in cardiovascular diseases and cancer and from external factors. The decrease in gap in 1987 to 9.5 years (from 11.3 years in 1984) and increase by 1993 illustrated the correspondent changes in gap in mortality from injuries, poisonings and violence, all of which types of mortality are particularly high for men.

## International comparison of mortality and excess male mortality

Excess male mortality in Russia was exceptionally high, therefore life expectancy of Russian males was ranked very low on the global scale. Mortality problems were particularly acute in Russia, and they were widely discussed. Researchers evaluated mortality as probably the highest in the world, in mid-1990s. Baskakova et al (2003 P.10) noted that in 2003 only African males lived less than Russian males, who barely reached retirement age (60 years), while in developed countries males lived 13-15 years more. However, due to the lack of demographic data many factors remained hidden.

Jean Bourgeois-Pichat and other researchers stated an excess male mortality in the working age was the primary principal factor in the general stagnation of life expectancy in the East (Shkolnikov, Mesle, 1995). Decrease in mortality in western countries were largely due to the following factors (Kozlov, 2013): significant improvement of environment protection and system of prevention of accidents, intensification of individual, not collective prevention of diseases and propaganda of healthy life style. In USSR and Russia these changes did not take place, which resulted in the existing lag from the Western countries.

Sholnikov and Mesle (1995) stated main characteristics of trends in mortality in working age over 1985-1995 period. Firstly, they assume long-term unfavorable mortality trend, secondly, mortality decrease and increase due to anti-alcohol campaign of 1985-1987,

and thirdly, sharp mortality increase of 1992-1993. The sharp increase of male mortality from injuries and violence differentiates Russia from Eastern European and Western countries.

## Regional variation in mortality

Regional variation of mortality (Figure 11) was observed to be very similar to the geographic patterns of life expectancy and the gender gap (Figure 4, Figure 9); the difference was that situation in the Far East was less favorable than for life expectancy. Mortality problems are more acute in the most of northern regions— first of all, due to untimely deaths from external reasons, especially in rural areas. Northern territories are characterized by young aged structure of mortality, high mortality from external factors and from diseases of exogenous etiology, in other words in the North there is still high capacity for mortality decrease due to unhealthy life style. In several northern regions high rates of child mortality is observed, with high share of mortality from accidents. In other words, mortality problems in North are grounded not on medical, but on social reasons. Some earlier studies showed that mortality did not demonstrate gender gap across regions. Kalabikhina (1999) argued that regional difference in life expectancy were similar for females and males, which allowed to tell about absence of significant regional factors, influencing only men or only women. A case of life expectancy in Northern-Caucasus region could be an exception.

Indicators of mortality in working age presents high interest for study of demographic potential of region. Among leading regions in life expectancy, mortality in working age in Siberia is even lower than on average in Russia, however, life expectancy is also lower. Compared to other regions it seemed obvious that in Siberia mortality of population influence demographic potential negatively.

Dynamics of mortality in federal districts and regions often did not follow trend of average mortality in Russia. Abdulmanapov (2011, P.7) demonstrated that no common trend in male or female mortality was observed between Dagestan region and average in Russia (Figure 12). While in Dagestan recently stable dynamics of decrease in mortality is observed, in Russia in most of years mortality rates increased.

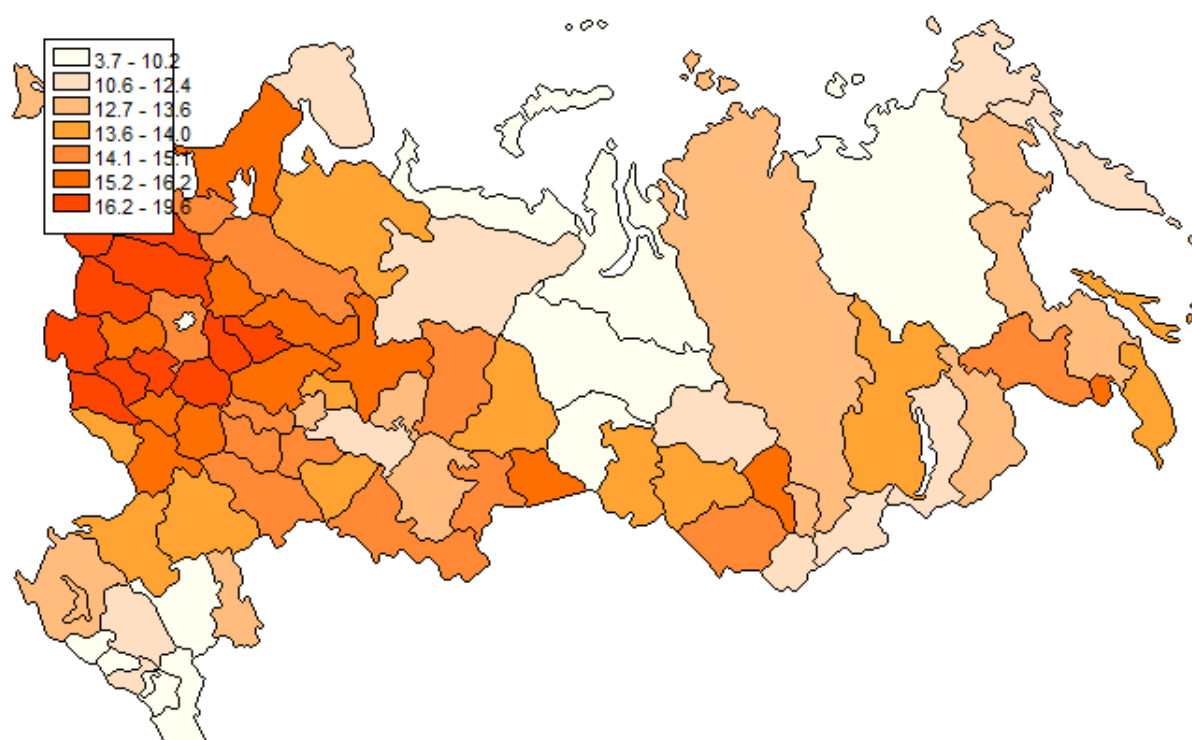


Figure 11. Map of mortality in Russia across regions, 2012 year.  
Source: Demographic yearbook of Russia 2013

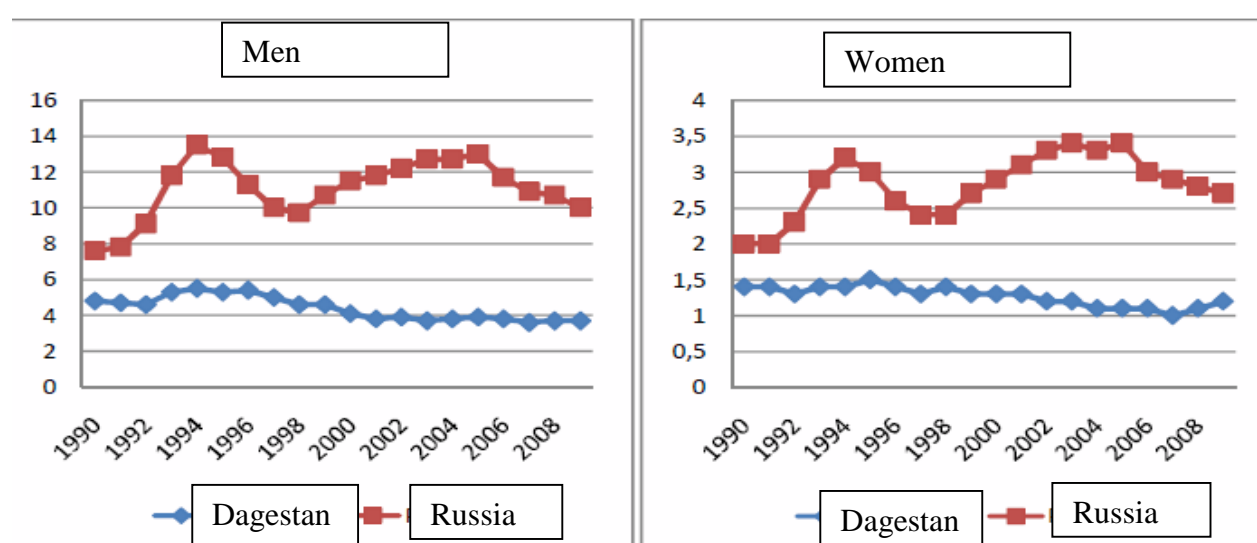


Figure 12. Trends in mortality for Dagestan regions and for Russia on average, 1990-2008.  
Source: Abdulmanapov, 2011. P.7.

## 2.2. Main reasoning behind gender gap in life expectancy and excess male mortality

Reasoning for excess male mortality rested in 2 dimensions: internal and external factors, where internal factors relate more to individual behavior and lifestyle, and external to environment and pre-determined factors. Among internal factors the following are named: physiological and biological differences of men and women, defining their mortality and morbidity, and exogenous factors generally mean these social and cultural conditions which are connected to gender stereotypes of behavior Alieva (2011, P.7; Belov and Gorokhov, 2013).

It is important to define the contribution of these two components. Internal and external factors are closely intertwined and their impact on health is hard to separate: for example, effect of alcohol abuse on health is related to external factors (social stress in society, biologic sensitivity to alcohol and addictiveness) and to internal factors (healthy lifestyle habits, risk-averse behavior). Kalabikhina (1999) stated that the sizes of impact of biologically predetermined and socially formed excess male mortality were difficult to define, as they possibly depended on ethnicity and on multitude of factors the given time. According to World Health Organization experts (2016a), main impact on health and life expectancy was made by lifestyle and ecology, which could be up to 70%, and the rest depends on genes and medical healthcare (Kolosnitsyna, Sitdikov, 2012, P.27), i.e. contribution of internal factors was considered to be as much as 70%. According to Report of Development of Human Potential in Russia (2010, P.71), impact of biological factors could contribute usually 5-7 years of the gender gap of life expectancy, and the rest derived from social-behavioral and economic factors, which is expected to be the larger part. It was confirmed by stability of high values of child and excess male mortality in old ages, which was the highest in the world, and by gap in mortality from external causes in working age between women and men. Kalabikhina (1995)

defined impact of biological factors on gender gap in Russia as 5 years in life expectancy at birth: if difference in life expectancy between females and males exceeded 5 years, social factors of mortality should be taken into consideration.

What is more, Belov and Gorokhov (2013) also added a group of “metaphysical” factors which related to Russian mentality. Among those they named extremely high social responsibility for country defense and ignorance of preserving life, which results in particularly high numbers of homeless males and male suicides, and death of external reasons. These factors were related in other researches to Russian mentality, which could depend on genes and social environment both and be connected to risky behavior, alcohol abuse and other. These factors will be discusses in sections of Internal factors.

Healthy lifestyle is a set of individual practices, norms and behavioral patterns, affecting health state. It includes such factors as nutrition, drug abuse, and in wider meaning it covers also working and living conditions, ecological situation, etc. (Kolosnitsyna, Sitdikov, 2012, P.27). Shaiakhmetova and Utiasheva (2011, P.45) defined a term ‘self-preserving behaviour’ to describe individual’s actions and attitudes mediating his health and life expectancy, and is subject to internal and external behavioral factors of preserving health.

## 2.3. External factors of mortality

In external impact on health, environmental factors which cover living standards, chronic and other diseases were mentioned by many sociologists and demographers. In this definition, biological (occurrence of diseases) and healthcare factors (treatment of diseases) are covered.

## *Biological factors*

Women were observed to lag in cardiovascular diseases. Alieva et al (2012, P.7) argued that women and men are different in their vulnerability in the most important mortality factors – cardiovascular diseases. According to medical researches, women had lower ferrum concentration level in their cells, which impacts ageing and destruction of cells.<sup>9</sup>

Men were observed to be more vulnerable to ageing of genes. Alieva (2011, P.7) and several other researchers referred to hypothesis of influence of genes on the gender gap in life expectancy: XX-chromosomes are “better” than XY-chromosomes in terms of ageing.

Risky behavior of men could be explained by hormonal state. One of factors that could explain higher risky behavior of men in working age is so-called testosterone storm for males between 20 and 30 years old, which could result in alcohol abuse, risky driving behavior, aggressions and weapon usage, extreme hobbies, etc (Alieva, 2011, P.7). Along with evolutionary factor noted by biologist Giodasyan (2009), low self-preserving and low risk aversion with ambitions of leadership were mentioned by biologist Savelyev (2005).

## *Healthcare system*

The gender gap in life expectancy was expected to depend on healthcare system to the degree of difference in self-preserving behavior (discussed in previous section) and usage of healthcare (see next section). According to Russian monitoring survey of the year 2006, Belyaeva (2009, P.39), healthcare satisfaction index was the lowest of all components of life quality. It was valued as unsatisfactory by men and women, all education groups, urban and rural citizens; by occupations only executive managers estimated healthcare as good, and specialists estimated it worse than others. Main three problems of healthcare told by Russians

---

<sup>9</sup> Point: editorial staff. (2008) *"Гены продолжительности жизни. Почему женщины живут дольше мужчин? [Genes of life expectancy. Why do women live longer than men?]"* Internet-journal Point, 08/08/2008. URL: [www.point.ru/news/stories/17376/](http://www.point.ru/news/stories/17376/)

(Russian monitoring survey of the year 2006, Belyaeva, 2009, P.39) were “difficulty to get to doctor and long queues” (41%), “insufficient qualification of doctors” (35%), and “prescript medicines are hard to get or too expensive” (23%). Healthcare system crisis was aggravated by extremely low salaries of doctors. This drawback resulted in shadow reimbursements of formally-free medical services and rent-oriented behavior of officials and practitioners of medical and preventive treatment facilities (Alieva et al, 2012, P.9).

Kozlov (2013) used sociological survey results to estimate quality of state medical services on 6 regions leading in life expectancy indicator in Siberia. The number of respondents satisfied with medical services varies from 12% in Khakasia region to 27% in Novosibirsk region. Among main disadvantages of healthcare system there were stated long queues to doctors, however most of respondents lived in territory not farther than 30-minutes’ drive to the nearest medical center and 60-minutes’ drive to hospital. It is widely known that many medical services are hardly accessible: medical help for cancer and cardio-vascular diseases, urologic help, prosthetics of knuckles. It is almost not accessible transplantation of tissues and organs. Many people with serious diseases cannot get medical help, and dispensary system should be abolished as it is not seen to be effective: initial diagnostics of diseases, distraction of practitioners on general mass screening (Bobylev et al, 2009).

## 2.4. Internal factors of mortality

Kozlov (2013) argued that in the recent years individual healthcare was crucial for decrease in mortality as well as accepting responsibility for health by population. Respondents in survey in Siberia stated that health is important (8.5 points of 11), nevertheless good attitude to health is socially desirable but often not supported with actual behavior. According to first



in its topic research ‘Influence of behavioral factors on health state (2008)<sup>10</sup>, Russians treated their own health carelessly, however, health itself is valued high, as much as family value. Though the majority (85.2%) agreed that people should care about health, only less than 25% respondents cared about health (in their behavior). Among internal there are lifestyle, bad habits, preventive and treatment medical measures (in which only individual treatment is included in current analysis).

### *Risky behaviour*

Respondents stated the expected reasons of excess male mortality (for decrease in mortality) in survey about healthcare in Siberia, by Research Center for Socio-Cultural changes IF RAN (Kozlov, 2013). They agreed that men are characterized with riskier behavior in everyday life than women. Siberia was characterized by higher risky behavior than on average in Russia: this factor was confirmed by high mortality from external reasons of Siberian males.

Doctor of Psychology Kozlov N. noted that mentality of Russians involves careless attitude to health and co-dependence of women and men: “Care about health is not a value, sport is strange, diseases are normal, however it is morally unacceptable to disregard disabled people, including those who obtained disability to their own carelessness towards health. Women search for rich and successful people, but they love disabled and weak, which results in co-dependence”<sup>11</sup>.

---

<sup>10</sup> ”Влияние поведенческих факторов на состояние здоровья населения. Основные результаты выборочного исследования [Influence of behavioral factors on health state of population. Main results of sampling research]”. Moscow, Tver, 2009. [http://www.gks.ru/free\\_doc/2008/demo/zdr08.htm](http://www.gks.ru/free_doc/2008/demo/zdr08.htm)

<sup>11</sup> Kozlov N.I. (2014)“ Российский менталитет [Russian mentality]”. Psychologos: encyclopedia of applied psychology. Accessed on 15-05-2016. [http://www.psychologos.ru/articles/view/rossiyskiy\\_mentalitet](http://www.psychologos.ru/articles/view/rossiyskiy_mentalitet)

## *Checks of health*

Men tended to overestimate life expectancy (compared to actual life expectancy) more than women do (Shaiakhmetova and Utiasheva, 2011), which may point to “more adequate perception by women of their health state and outward things”, and to external factors [unaccounted by men] which may influence men more intensively, hindering them to reach life expectancy. In general, men even in the older age tend to overestimate their health state compared to women of the same age. Men demonstrate higher share of “Very good” and “Good” estimates and lower share of “Bad” and “Very bad”. It can be explained the fact that men more rarely use medical care and may be less aware of their health state (Kiseleva, 2011). What is more, due to social roles men as “the stronger sex” less tend to complain about bad health state and declare health problems. What is more, considering higher male mortality compared to female mortality of the given age, there could occur selection effect which means that the men with better health survive till older ages.

What is more, many respondents mentioned that men treated their health more carelessly and rarely visit doctors, even when it is necessary (assessments by both males and females are similar) (Kozlov, 2013). Higher female morbidity and higher number of visits to doctors of women could be explained with the observation that women were more receptive to recognition and experience of physical discomfort, they more readily would tell about symptoms and accept the role of a sick person, because it was socially acceptable for them to feel unhealthy and seek for support (Braun, Panova and Rusinova, 2007).

## *Social stress*

Kalabikhina (1991) and other researchers stated that among reasons of excess male mortality in Russia there are low self-preserving behavior, excessive alcohol consumption and others, which come from social stress of males. Social and cultural factors rely traditionally on

patriarchal gender norms in Russian society. Shkolnikov and Mesle (1995) argued that collapse of USSR was entailed by failure of state paternalism, where obligations on “an unprecedented set of social guarantees to the Russian people” was abrogated, including promise of guaranteed housing, pensions, free medical care and so on. Therefore, the confidence of people in maintenance of quality of living standards and guaranteed promise of help of government in case of problems was destroyed. In the 1990s, people suffered severe social stress as since then they had to take care of themselves, and to put extensive efforts to maintain former standards of living. What is more, people relying on Soviet government’ promises were observed to have careless lifestyle to some extent, as problem solving was state promise.

Kalabikhina (2010) argued that if earlier it was widely acceptable for both men and women to work in public production, nowadays in society the aspiration to so-called traditional family rejuvenates: a husband is a breadwinner, and a wife is a housewife. Men did not succeed to enter a breadwinner role and to reconsider in relatively short time period models of employment and income generation. Many men could not stand competition rules in stirring market environment with the following characteristics: clearly marked criminality, uncontrolled hidden unemployment, undeveloped market infrastructure, weak governance of labor processes, devaluation of educational capital, and male social stress increased faster than that of females.

Measuring of social stress factor in mortality statistics was arguable. According to Kalabikhina (19991), social stress caused increase of male mortality from the following reasons: cardio-vascular diseases, accidents, murders and suicides. Particularly, coefficient of male mortality in the working age of suicides from 1990 to 1994 increased in 1.72 times to 96.8 cases per 100,000 males in working age. Belov and Gorokhov (2013, P.193) stated that on global scale suicidal death statistics were not observed to be associated with levels of

economic development, political stability or criminality level, while similarities are observed across countries with similar ethnical characteristics. For example, Slavic races are similar (World Health Organization, 2016b): in 2011, suicidal rate in Belarus was 25.3 per 100,000 people, in Ukraine 21.2, and in Russia 21.4. Many sociologists reckoned that social stress partly revealed itself in mortality from external causes. Bychkov (2015) discovered high negative correlation (-0.91) between life expectancy and mortality from external factors.

### *Alcohol and smoking*

According to RIA News, Russians live almost 10 years less than Europeans due to unhealthy habits, according to Darya Khalturina, co-chairman of the Alcohol Control Coalition (2013). Global Status Report on Alcohol and Health of the World Health Organization (2014) stresses two main factors to overcome: smoking and alcoholism. These two risk factors stay the highest in Russia among all the European population, regardless of existence of knowledge and technologies that allow to cope with them. In addition to these, another important factor is drug addiction, that influences health of working age population.

Russians smoke exceptionally much, and not less than 330,000 people die due to tobacco every year in Russia (Peto et al, 1986). Data in Tobacco Atlas (2015) revealed that while an average European smokes several cigarettes a day, a Russian smokes not less than a pack. According to many researchers, the overwhelming majority of smokers were men, and less share women smoke in Russia compared to other countries. Annual consumption of cigarettes per capita was higher than 2500 cigarettes in 2009 (WHO, 2010). Cigarette consumption in poorer countries has increased more than enough to offset the decreases seen in wealthier nations like France, Germany, the U.S. and Canada. In the past twenty years, for example, cigarette use in the Middle East and Africa has increased by just shy of 60% (Eriksen, Mackay, Schluger et al, 2015).

Russian experts in demography and medicine (for example, Anatoly Vishnevsky, Director of Institute of Demography of Higher School of Economics; Ria News, 2013), supported the opinion that low life expectancy of Russian males is caused by mass alcoholism. Up to 500,000 people die in Russia yearly due to alcohol abuse.<sup>12</sup> Russia keeps one of the highest levels in alcohol consumption with more than 12.5 liters of alcohol per capita, followed by Eastern Europe, according to the WHO (2014). Minimum alcohol consumption of less than 2.5 liters per capita is registered in North-Western and South-East Africa. In surveys about healthcare (Kozlov, 2013) high alcohol consumption was a primary reason of gender gap in life expectancy. In all surveyed regions this factor was assessed as significant. Women assessed this factor as more important one than men did. Important to mention that Russia kept the record level of strong alcoholic drinks consumption in the recent years. There is a lot of cheap low-quality alcohol sold in the market, and the intoxications by alcoholic surrogates are massive (Ria news, 2013).

Shkolnikov and Mesle (1995) relate the leading influence of accidental and violent causes of death and their exceptionally high levels in 1985-1992 to alcohol consumption. They argue that alcohol abuse in 'traditional' style of drinking large doses of alcohol with small amount of food in Russia results in loss of self-control and irresponsible or aggressive behavior, which lead to immediate consequences such as accidents.

## 2.5. Relationships between factors

Many researchers noted interconnections of groups of factors, such as healthcare and living conditions and complex effect of factors on health of state in general. Shkolnikov and Mesle (1995) argued that lowering of living standards and social disorganization had

---

<sup>12</sup> Nemtsov A.V., terekhin A.T. "Размеры и диагностический состав алкогольной смертности в России [Scope and diagnostic structure of alcohol mortality in Russia]". Narkologia. N 12, 2007.

underpinned a strike of mortality in 1990s in Russia. Deterioration of public health in Russia could not be explained by living standards only, as in other countries, including developing countries with much worse living standards male life expectancy was much higher. Shkolnikov and Mesle supposed that there was a complex interaction effect of the two factors, where negative influence of real living conditions reinforced group of socio-psychological conditions and vice versa.

Researchers noted interaction of social and economic variables, as people react on economic characteristics within their social and cultural settings, such as propensity for entrepreneurship, attitude to unemployment, reaction on low living conditions and other. Goffe (2006, P.56) states that regional imbalance of social development is a separate factor which influences economic dynamics of regions and whole country, and negativity of this factor increases significantly at crisis times. Nazarova (1998) demonstrated influence of structural characteristics of social-economic inequality on health of individuals.

### *Economic factor: Income and GDP*

There is strong behavioral connection of income bracket and impact of health in economic theory: each person spends his income according to his own preferences in goods and temporal consumption (over periods). In terms of life expectancy, one can observe individuals with addictive goods (tobacco, alcohol, etc.) which decrease life expectancy, and which tend to prefer today's consumption to future benefits, which may result in lack of individual investments in health (change to balanced nutrition, physical activity, etc.). A number of researches is devoted to connection between healthy lifestyle and temporal consumer preferences (Komlos et al, 2004, and other).

Though income and life expectancy are highly correlated on the global scale, this relationship is not significant across regions of Russia. Bychkov (2015) states the relationship

between life expectancy and level of economic development of country, based on statistics of GDP (PPA) across 186 countries. It could be described with exponential function with the growth limit ( $R^2=0.74$ ). For low GDP per capita values, even low marginal change results in significant increase in life expectancy. However, starting from GDP per capita equal to 6-7 thousands of USD PPA growth rates in life expectancy decrease. However, the research of Bychkov on relationship of individual income per capita and life expectancy across Russian regions did not confirm the hypothesis of existence of relationship. Researches of Nazarova (2001, P.51) did not reveal robust relationship between income level and self-evaluation of health; research of Ivanova (2000) did not reveal relationship between income and health indicators such as life expectancy. The following robust relationships of income and health variables could be named:

- *Individual income and mortality*: Mortality from external factors and of inflectional and parasitic diseases is sensitive to individual income level, and with increase of income such mortality decreases. Research of Bychkov (2015) demonstrated that 80% of death cases are due to circulatory diseases, neoplastic diseases and external factors.
- *Income and smoking*: Positive elasticity of tobacco on income is observed in all developed countries, though its absolute values tend to decrease (Andrews, Franke, 1991). In more developed countries, males are less vulnerable to smoking (Kolosnitsyna and Sitdikov, 2012, P.35), and the tendency that tobacco stops to be a normal good with higher income might be an impact of anti-tobacco campaigns in developed countries.
- *GDP and smoking*: In countries with high GDP per capita gender equality is often observed. However, relationship of income and smoking for males across countries is significant, while for females not (Kolosnitsyna, Sitdikov, 2012, P.34): in other words, not GDPpc per se influences female smoking, but their equality with men and their copying of male behavioral models.
- *Income and nutrition*: Low income results in improperly balanced nutrition (which leads, in particular, to child obesity) (Kolosnitsyna, Sitdikovm, 2012, P.29). In poor city districts there are less opportunities for physical activities and even for walks in

fresh air (Sallis, Glanz, 2006). Growth in income is associated with BMI in non-linear form (after reaching certain level of income, people start to control weight and sustain it stable) (Phillipson, Posner, 1999).

- *Income and alcohol:* Russian and foreign researchers state impact of income on structure of alcohol drinks consumed and positive relation with amount of alcohol consumed (Andrienko, Nemtcov, 2005). While in countries with higher amount of alcohol consumed high share of GDP spent on healthcare is observed, there is opposite relationship: with increase in alcohol consumption, due to higher morbidity, higher healthcare spending is necessary (Kolosnitsyna, Sitdikov, 2012, P.35).
- *Wage and diseases:* Kuzmich and Roschin (2008, P.36) argued that relatively worse health state impacted wage negatively, i.e. health state predetermines further consumer choices and investments in health. Mitchell and Burkhauser (1990) found that diseases and worse health state impacts male and female wages differently: presence of disease decreased male's hourly wage by 27.7%, and for females 42%, and yearly income – 19% and 27.7%, correspondently. At the same time, it entails number of working hours per year by 42% for men and 36.7% for women.
- *Income and lifestyle:* Bychkov (2015) concluded that higher income level secures better life quality, which results in changes in lifestyle of population, in behavioral factors, in individual attitude to health and death.

### *Social-economic factor: Urbanization and technology*

A number of researches connected development of technologies and migration to cities to changes in lifestyle and in health state. Kolosnitsyna and Sitdikov (2012, P.29) argued that urbanization entailed decrease and decrease in physical activity, and development of new technologies resulted in increase in alcohol and tobacco consumption (due to decrease in their relative price) and also decrease in physical activity (due to different character of work and leisure activities). Positive relationship is observed of fruits and vegetable consumption with level of urbanization, and negative one with share of population older than 65 years (Kolosnitsyna, Sitdikov, 2012, P.36). That might be the impact of healthy lifestyle propaganda



and advertising, as well as income contrasts between rural and urban population, younger and older ages.

### *Social factor: Education*

Panel regressions on macro level revealed the following relationships (Kolosnitsyna, Sitdikov, 2012, Pp.35-36): negative relationship of alcohol and unemployment (lagged) and healthier lifestyle in crisis times, negative relationship of alcohol consumption and share of old people, because of decrease in consumption with age and because people abusing alcohol die earlier; positive relationship of alcohol consumption and share of women, which could be due to early mortality of men caused by excess alcohol consumption, damaging health.

### *Political factor: Reforms*

Economic reforms often resulted in negative consequences such as high unemployment and increase of number of poor people, as well as financing of social sphere in minor priority and therefore increase morbidity (Shaiakhmetova and Utiasheva, 2011, P.44). Prices of alcohol and tobacco are observed to have ambiguous impact on their consumption (Andrienko and Nemtcov, 2005; Treisman, 2010; Denisova, 2010).

Shkolnikov and Mesle (1995) point strong influence of excess alcohol consumption on Russian mortality. Fluctuations of consumption after anti-alcohol campaign 1985-1987 were followed by increase in mortality and its acceleration in 1992-1993, due to social stress and relative slow increase in alcohol prices. Thus, between 1990 and 1994 consumer prices increased by 2,020 times for all goods and services, by 2,154 times for food and only 653 times for alcoholic beverages, which meant alcohol was three times relatively cheaper than other products.

As stated in RIA news, experimental anti-alcoholic campaign held in the end of 1980s contributed to increase of life-expectancy by 2 years and proved the significance of social programs (2013). However, later studies proved short-term effect of such campaigns (Grigoryev et al, 2014).

### *Demographic factor: Share of women*

In countries with high share of women, growth rates of gender gap are observed to be negative, and gender gap is much higher than average in the world. The global tendency stated by Chistyakova (2009, P.17) was that with equalizing number of men and women, gender gap was expected to decrease. Research of Chistyakova (2009) revealed relationship of share of women and such variables and natality, life expectancy and gender gap across regions of Siberian federal district and across specific regions and federal districts.

### *Cultural Factor: family and religion*

Family and social environment was important social factor in forming many lifestyle habits (Anderson, Butcher, 2006 and others). Farrel and Shields (2002, Pp. 335-348) found positive correlation in sports activity of parents and their children living together. Leonard and Mudar (2003, Pp.115-125) demonstrated found similar correlation for alcohol consumption levels. Researches of Luy (2009) and Poulain (2012) demonstrated that gender gap in mortality, and therefore in life expectancy, was lower for men and women living in religious communities.

## Chapter 3 – Data analysis

The third chapter gives overview of data and methodology on the topic of research and described collected data and methods of analysis. Factors of regression are pre-selected and studied separately in terms of dynamics and regional variation, and both cross-regional regression and time series regressions are considered to be robust.

### 3.1. Data collection and limitations

Due to insufficient demographic statistics, scope of research on the gender gap in life expectancy was often limited. Distortions and underestimations of certain numbers These distortions might impact analysis of causes of the gender gap in life expectancy.

#### *Lack of data*

Influence of gender and social structure on economic characteristics, lifestyle and development has been studied little in Russia by now. Chistyakova (2009, P.16) argued that economists, sociologists, psychologists, politicians and demographers drew insufficient attention to these questions.

Regarding official demographic statistics, few demographic researchers such as Kiseleva (2011) argued that there was a lack of official statistics published, for example, on mortality and state of health of different age groups. What is more, data was often underused and insufficiently analyzed on regional and federal level. Diachenko (2009) stated two main problems of usage of economic and social statistical data at municipal and regional level for development of federal target programs: lack of statistical data and insufficient data analysis.

## *Underestimation and data distortions*

Several underestimations of values of life expectancy and its gender gap were observed. Thus, Shkolnikov et al (2014a, P.12) argued that in 1950-1960s baby mortality and mortality in old ages were underestimated, which led to slightly higher life expectancy estimates till 1960s. They also mentioned that till 2012 narrower definition of live births was used in Russia compared to World Health Organization. Baby mortality was underestimated at least by 20%, and in the next year the estimate with new standard increased by 36%.

Mortality factors were distorted, which leads to underestimation of effect of factors of gender gap, such as alcohol abuse. Kolosnytsina and Sitdikov (2012, P.32) noted that alcohol consumed within shadow economy could 'add' 5-8 liters of ethanol to 11 liters of official statistics, in which Russia is comparable to Western and Eastern European countries. What is more, official dynamics on sales of alcohol didn't reflect dynamics of its consumption, besides even in global statistics (World Health Organization, OECD Health Data) such important characteristic as frequency of consumption was not taken into account.

Diagnostics of mortality reasons to identify gender gap problems also faced certain barriers. In the contrast with tradition of World Health Organization to register all diseases connected with death of patient, which was accepted in all civilized countries, mortality factor in Russia was traditionally defined by the last diagnosis of disease, accident or external factor of death. Thus, usually cardiovascular diseases stated when exact reason of death is unknown (Shkolnikov, 1999). Diagnostics for primary reason of death is carried out rarely, which in certain regions like Dagestan could be due to impossibility to transport patient to special medical facilities or due to religious motives (Alieva et al, 2012, P.6).

Improper diagnostics of causes of deaths resulted in distortions in mortality statistics. Researchers noted that data analysis has to rely on registration habits in countries (Shkolnikov,

Mesle, 1995). It seems that many deaths caused by acute effects of alcoholism are recorded in Russia as poisonings (by alcohol) or other accidents, without reference to alcoholism. Significant reduction in cardiovascular and other degenerative diseases during anti-alcohol campaign of the years 1985-1986 led to assumption that many deaths from alcoholism were previously recorded as acute heart disorders, according to immediate cause of death. Alcoholism has particularly significant effects on able-bodied men of middle age. In that age the highest mortality of men is due to so-called 'external causes': road accidents, murders and suicides, intoxication. What is more, according to Vishnevsky, in case working-age man dies because of alcoholism, family tries to conceal this and states cardiovascular diseases as the cause of death. Another example was that cancer mortality was often underestimated, as primary reasons of deaths were not investigated properly, and due to high radioactivity levels cancer mortality is expected to be high in some regions such as Dagestan (Alieva, 2011, P.6).

Shkolnikov et al (2014) and other researchers stated a problem of recent increase of a number of registered deaths with unknown age and unknown reasons, and of injuries of unclear intentions.

### *Survey data for life expectancy and health studies*

Surveying people for self-evaluation of health was widely accepted method of collecting data about health state, and it helped to overcome shortcomings of official statistics. Kiseleva (2011) stated advantages and disadvantages of this method. On the one hand, self-evaluation adequately reflected person's perception of his pathologies and how he had adapted to health restrictions. On the other hand, multitude of factors influenced health self-evaluation simultaneously, such as situational factors and health state of person in the period of survey, frequency of visits to doctor and employment status. For example, rare use of medical care and insufficient awareness of health state may result in reporting better health condition, while

regular use of healthcare may result in the opposite, because making medical tests increases probability of diagnosing diseases. People that continued to work in the older age may have higher self-evaluation of health due to necessity of continuing work, and non-employed may underestimate health state, justifying their leave from labor market.

Data analysis of self-evaluation data in Russia had restrictions in interpretation. Many researchers worldwide admitted that despite of some disadvantages, high correlation of self-evaluation of health with objective health state evaluation based on medical indicators. For example, Mossey and Shapiro (1982) demonstrated that self-evaluation of health as ‘bad’ more precisely forecasts mortality than estimate based on medical data. While a number of surveys about self-estimations were made in Russia, they lack researches on validity of data and robustness of this type of analysis. Ramonov (2011) stated that while in the world a specific field of research was devoted to adequacy of self-estimates of health to ‘real’ health indicators, there were only a few works abroad devoted to this problem about Russia.

### *Data collection*

Official Russian demographic statistics across regions was collected over the period of 1961-2014, and on the level of region data in the years 2010-2012 were used. Time series were used for analysis of dynamics, correlation and regression analysis, and cross-regional data were used for variation analysis and regressions of life expectancy and its gender gap,

The following sources were used (publications of Russian Federal Statistic Service-Rosstat): Regions of Russia: Social-economic indicators, 2013 and 2015; Demographic yearbooks of Russia 2002, 2011, 2012, 2013, 2015.

## 3.2. Data analysis methods

### *Multivariate analysis methods*

Life expectancy and its gender gap were observed to be influenced by a broad variety of factors, closely connected to each other. Analysis of such complex economic variable as regional growth could serve as example. Zarova and Kotiakova (2006, Pp. 59-60) used system of indicators to analyze it: indicators of development of human potential (15, including life expectancy), of quality of life (33) and environmental characteristics (3). What is more, presenting any of the factors influencing life expectancy, such as state healthcare system, also involves multidimensionality. Eremina and Kudelina (2014) adapted min/max method of healthcare efficiency evaluation (Canada) to regional healthcare in Russian federation. Among 12 indicators chosen there were individual expenditures on medical services, access to healthcare and satisfaction with quality of healthcare by population. Braun, Panova and Rusinova (2007) used general linear regression model to analyze gender differences in physical and psychological health, using 3 groups of indicators: social -structural (6), behavioral (4), social-psychological (10). However, such analysis is inapplicable to study life expectancy and gender gap and its variation, as surveys provide data on the level of individual, and life expectancy is generalized on federal or regional level.

Factor analysis could be done in any given group of factors to reduce number of factors. Zarova and Kotiakova (2006) They found high correlations between variables which pointed out close relationship between factors, and noted that such variables are not subject of direct observation and analysis, therefore they proceeded to principal components method to reduce dimensionality. In further analysis, however, regression on factor values was expected to give not significant results. Attempts to reduce dimensionality of model put risks on the quality of model, which were especially high, while side effects, causal relationships and effects between

broad sets of variables were complex: between healthcare, individual lifestyle, education, income, urbanization, nutrition, alcohol and tobacco abuse, migration, environment, gender inequality, etc.

### *Regional variation analysis*

Researches on regional aspects of indicators was usually done on the scope on one or several regions or federal districts, with focus on its historical background and specific set of characteristics (such as Abdulmanapov, 2011; Alieva et al, 2012; Shaiakhmetova and Utiasheva, 2011; Diachenko, 2009; Ovchinnikov and Kolesnikov, 2006, Ischenko, 2007). Most of researches that involved regional aspect covered tendencies and peculiarities for federal level and also a few outliers or specific cases (such as Leksin, 2006; Ivanova, 2010, 2000; Nazarova, 2014; Kiseleva, 2011).

Analysis of regional variation was previously done on federal districts' level. Thus, Eremina and Kudelina (2014, P.155) estimated efficiency of healthcare by federal districts (min/max of results, max/min of expenditures, min/max and their sum) and illustrated their results by matrix (Table 6), with accentuation on the two important aspects of healthcare: resources and their usage. Variation was high among districts, and conclusions were difficult to be drawn, as they mentioned. Far East and Urals were estimated as regions with low efficiency, and Northern-Caucasus as with high efficiency. Comparing federal districts to each other, ranking methods could be used. Zarova and Kotiakova (2006) used Spearman coefficient to investigate stability of regional growth across regions of Privolzhskiy federal district and grouped all regions by its Spearman coefficient and by chain rates of growth themselves. However, ranking analysis was not feasible for regional level.



Table 6. Matrix of efficiency of healthcare by min/max estimates.

Expenditure\ Result \	High	Medium	Low
(Min/Max)			
High	Central (5.76)		Far East (0.00), Urals (3.47)
Medium	Siberia (7.38)		North-Western (5.89)
Low	North-Caucasus (2.35)	Southern (3.82), Privolzhskiy (10.0)	

Source: Eremina and Kudelina, 2014, P.155.

## Introducing decomposition factor for causality analysis

While research on causality of gap in life expectancy required multidimensional system of interconnected factors, method of decomposing variable by certain factor or presenting in the dimension of other factor helped to find any associations. Mortality could be used as decomposing variable to demonstrate factors of life expectancy. Thus, Shkolnikov et al (2004) decomposed gap in life expectancy between Russia and USA by age and major classes of death to find out triggers of existence of the gap (Figure 13), and causes of mortality demonstrated their impact on the gender gap values. Grigoryev et al (2014) decomposed changes in life expectancy for females and males in Russia by age and mortality causes. There it was confirmed that external factors remain the main reason for excess male mortality and high the gender gap in life expectancy in international comparisons of Russia. Baskakova et al (2013) analyzed the dynamics of life expectancy and its gender gap splitting by values of life expectancy at birth and retirement. The gender gap in life expectancy was demonstrated to be

at birth was always higher than in retirement age, slightly or significantly and its difference grew from 0.4 years to 3.9 years (Table 7).

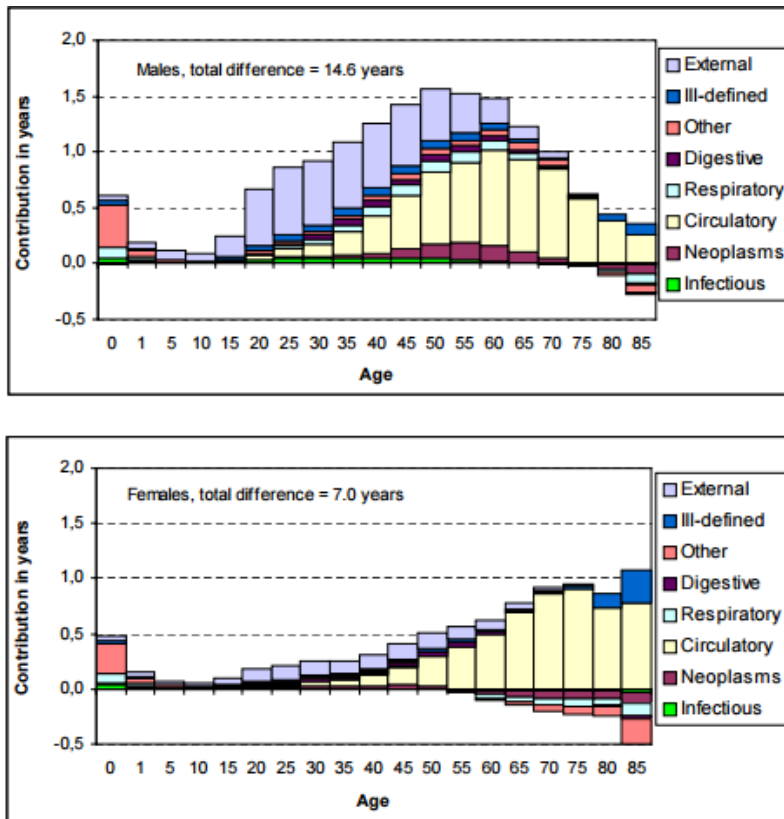


Figure 13. Decomposition of gap in life expectancy by mortality reasons, 2003.

Source: Shkolnikov et al, 2004, P.41. Based on: authors' calculations from Federal Russian Statistics Service and WHO Mortality Database, 2003.

Table 7. The gender gap in life expectancy from birth to retirement, 1950-2000.

The gender gap in life expectancy, females over males	At birth	At retirement (men=60 y.o., women=55 y.o.)
1950	8.9	8.5
1955.	8.5	8.5
1960	8.7	8.3
1965	8.7	8.2
1970	10.3	8.9
1975	10.8	8.9
1980	11.6	9.0
1985	10.6	8.8
1990	10.6	8.8
1995	13.4	9.3
2000	13.2	9.3

Source: Baskakova et al, 2013, P.10, based on Federal Russian Statistics Service (Goskomstat).

## *Data analysis method*

To study variation of the gender gap in life expectancy, statistics on variation (distribution) were calculated over the years 2010-2012. In cross-regional analysis, regions of all federal districts were pooled together and grouped by absolute values and growth rates. Regions were grouped by absolute values and time changes in urbanization factor.

Relationship of life expectancy and its gender gap was investigated: in correlation and time series regression (with and without time lag) over the period of 1961-2014, and in cross-section regression in the years 2012-2012.

The following factors were hypothesized to explain the gender gap in life expectancy: life expectancy, mortality, female-to-male ratio, urbanization. Their variation and dynamics was analyzed over the past 40-50 years (time periods of series are different, according to availability). Urbanization factor was found to be insignificant factor and was not included in cross-regional regressions. Correlation analysis between the other factors was done to ensure the lack of strong relationships between one another.

To analyze relationships of the gender gap in life expectancy with other variables for regional level, general linear models of univariate regression (on life expectancy) and multivariate (on life expectancy, mortality and female-to-male ratio) regressions of the gender gap in life expectancy were built.

### 3.3. Cross-regional differences in the gender gap in life expectancy

The gender gaps in life expectancy in Russia varied significantly across regions, from 5.35 years to 14.98 years, which was difference in 2.8 times (Table 8). Mean value was 11.25 years, while 50% regions had gender gap higher than 11.58 years.

Table 8. Regional variation of the gender gap in life expectancy, 2010-2013.

The gender gap in life expectancy across regions	Min	Max	Mean	Mode	Mode (#obs)	Median
2010	6.39	14.01	11.91	13.20	4	12.21
2011	6.95	13.90	11.67	12.60	7	12.04
2012	5.66	13.86	11.42	11.80	5	11.79
2013	5.35	14.98	11.25	12.20	6	11.58

Source: here and further data based on *Regions of Russia, 2015*; and *Regions of Russia: Social-economic indicators, 2013*; *Demographic yearbooks of Russia 2002, 2011, 2012, 2013, 2015*.

In 2010-2013 the range in the gender gap in life expectancy varied from 6.9 years in 2011 to 9.6 years in 2013, and coefficient of variation stayed remarkably high and increased by 14.2% in 2013. Variance and standard deviation increased as well (Table 9). While the range of the gender gap in life expectancy across regions increased by 26.4% from 2010 to 2013, mean value decreased over the period (Table 10). In other words, problem of regional differentiation became more acute, though on average gender gap dynamics is steadily positive, with the gender decreasing by 2-5% each year.

Figure 14 demonstrates that distribution of the gender gap in life expectancy is left-skewed, which demonstrates that in a number of 'depressive' regions the gender gap was particularly low and remained such over years. Modal interval slowly moved to mean value, which advanced distribution closer to normal curve. However, even approaching normal curve which would make the most of regions similar in the gender gap would not contribute to the goal of regional policy of universality and equal opportunities for all regions. Variation in the

gender gap was expected to remain high in the following years, indicating that the remaining gap between women and men in various connected spheres (living conditions, healthcare policy, gender policy) would stay high.

Table 9. Regional variation of the gender gap in life expectancy, 2010-2013

	Range	Variance	Standard deviation	Coefficient of variation
2010	7.6	2.11	1.45	12.2%
2011	6.9	1.93	1.39	11.9%
2012	8.2	2.28	1.51	13.2%
2013	9.6	2.56	1.60	14.2%

Table 10. Dynamics of the gender gap in life expectancy across regions in 2010-2013

	Growth by mean	Growth by range
2011	98.0%	91.1%
2012	97.8%	118.1%
2013	94.5%	117.4%
2013/2009	94.5%	126.4%

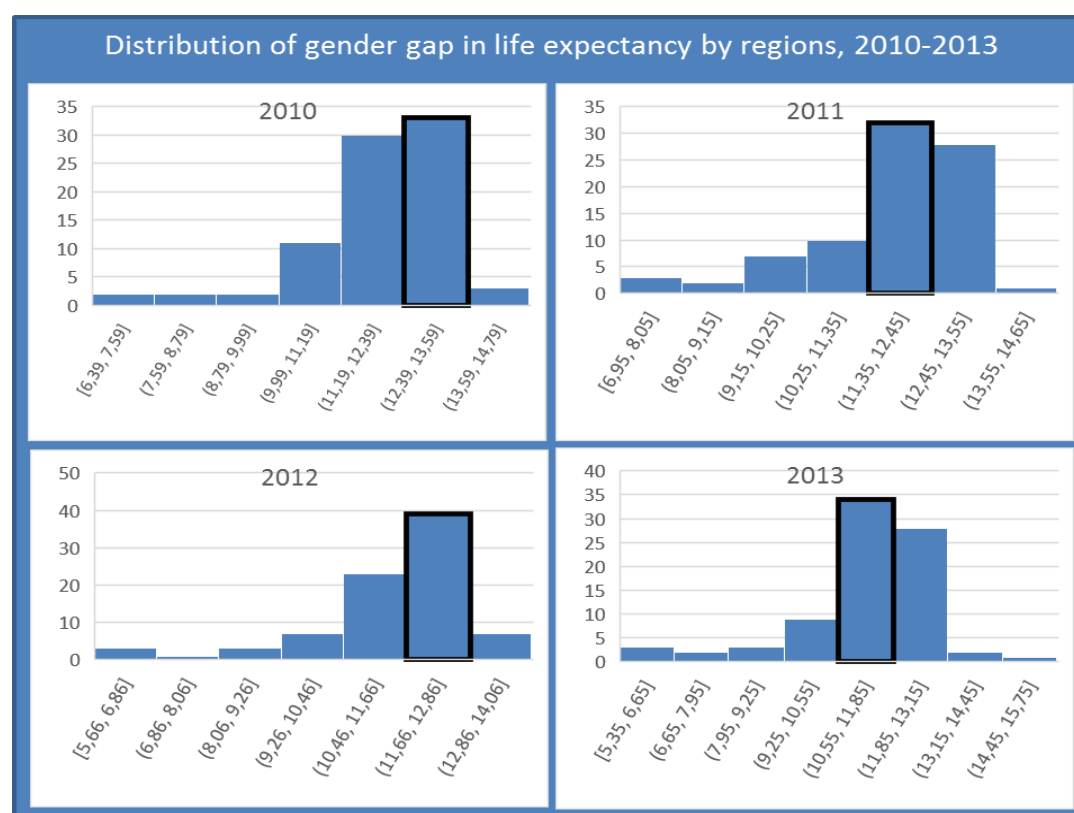


Figure 14. Distribution of the gender gap in life expectancy by regions, 2010-2013.

To analyze regional differentiation, regions were divided into 6 groups by their values in the gender gap in life expectancy and its dynamics in the years 2010-2013, and were ranked where possible (from 1 to 83 of total number) (Appendix 1).

- Group C was characterized by values less than 1 or 2 st.dev. values and decreasing of the gender gap in life expectancy in the last years. Ingushetia, Chechnya, and Moscow city demonstrated minimum values in Russia. Six regions of twelve in the group are located in Northern-Caucasus Federal District, and two in Urals. In the last years, only Ingushetia and Chechnya reduced gender gap significantly, and regions ranked from sixth to twelfth haven't succeeded much in reducing it. Further study of outliers may shed light on key factors in radical advances in closing the gender gap; while Northern Caucasus regions were characterized with traditional economics (Agriculture methods, and other) and lifestyle (social roles, and other), Moscow city was a country's driver of economic progress and innovations.
- Group D where growth values were higher than 1 st.dev. still stayed in the average diapason of the gender gap, and demonstrated good dynamics and were the main drivers of closing the regional gap (approaching distribution to normal), as their results in reducing the gender gap in life expectancy over the period were notable. Analysis of their factors of improvement may give clues to advancing politics in reducing the gender gap.
- Group E had growth rates lower than 1 st.dev., and regions were in risk group of increase of gender gap in life expectancy. In 2013 the gender gap increased in most of them, and analysis of factors or conditions that changed drastically for this year would help to avoid further regional differentiation. In 7 of 10 regions the gender gap increased over the period, which required special attention to these regions.
- Group F had particularly low values (the gender gap was lower than 1 or 2 st.dev., and growth rates were higher than 1 or 2 st.dev), and should be the main target for the regional policy in decreasing the gender gap. Regions ranked 69th-78th managed to decrease the gender gap and get closer to the average of the gender gap in Russia, however in the rest dynamics was negative and growth was particularly high in 2013. 6 regions of 15 in this group were situated in Central Federal District. Only in Novgorodskiy and Nenetskiy regions the gender gap increased over the period, and they contributed to increasing the range of the gender gap across regions in Russia, and they may require special measures to solve the problem.
- Group G was characterized with very unstable dynamics of growths, where analysis of external and internal shocks and factors may explain the differences.
- Group H included the remaining 29 regions, which values and growth rates stay between  $(-1/+1)$  st.dev. interval, and was not suggested to require special attention in further research.

It is notable that in the researches regions were not usually pooled all together to construct data analysis of variation on specific issue: researchers focused on one federal district, a few regions or a region (according to geographic location of researchers or their point of interest). This new approach in grouping regions in Russia would allow setting federal priorities in targeting problems of increase of life expectancy and decrease of gender gap, help better adjustment of regional policies in healthcare, demographic and family policy, social policy and retirement policy, labour policy, etc, on the federal level, levels of federal district and region. What is more, regions could 'learn' better factors of growth and risks of destabilization from regions-members of the same group.

As indicated in Table 11, most of regions of ethno-economies showed positive dynamics and obtained low or average values of the gender gap in life expectancy. However, one region belongs to group E, and one region to group G, two more belong to 'average' group O. These are ethno-economies, which were drivers of decrease of the gender gap in life expectancy and life expectancy as well (their correlation was demonstrated below).

*Table 11. Ethno-economies regions in grouping of all regions*

Group of regions	The gender gap	Dynamics of the gender gap	Ethno-economies, %	Ethno-economies regions
C	Low and very low values	High and very high positive dynamics*	58.3%	12
D	Values between 2 st.dev.	High positive dynamics	20%	10
E	Values between 2 st.dev.	High negative dynamics	10%	10
F	High and very high values	Unstable dynamics and high negative dynamics	0%	15
G	Values between 2 st.dev. And low values	Very unstable dynamics	14%	7
O	Values between 2 st.dev.	Values between 2 st.dev.	6.7%	29

\*Positive dynamics - decrease in gender gap, growth below 100%

## 3.4. Regressions of gender gap in Life expectancy in Russia

Regression and correlation analysis helped to explain regional variation in the gender gap in life expectancy in Russia. Time series over the period of 1961-2014 and cross-regional analysis (2010-2012 years) was done to analyze associations of each factor with independent variable – the gender gap in life expectancy. Regressions are done on level-on-level basis in linear function. Panel data and fixed-effects analysis was not possible due to lack of data.

### 3.4.1. Choice of factors for regression

As secondary analysis of scientific research and researches of political purposes showed, a few demographic factors seem to be closely related to the gender gap in life expectancy and could explain its variation: life expectancy, mortality, female to male ratio.

- Life expectancy remains one of the main targets of social-economic and healthcare policy of Russia. Following country growth and development, growth in life expectancy leads to (associated with) narrowing gender gap in mid-term and long-term, for many countries in the world, according to various researches.
- The gender gap in life expectancy in Russia was mainly explained with excess male mortality. Due to high correlation of average mortality and male (excess) mortality, the most of variation in male mortality was mirrored by total mortality, and on top of that it also captured female mortality and (regional) living conditions in general.
- Cross-country studies showed that demographic changes in country's development and growth is followed by change in female to male ratio, and its dynamics and regional differences are expected to correlate with the gender gap in life expectancy.
- Urbanization factor was expected to be correlated with adoption of healthy life style and impact gender gap. However, this factor was rejected, as its impact was only on rural and urban life expectancy, and it ceased to exist by in gender dimension currently in Russia.

Correlation analysis of factors showed strong correlation of average gender gap and mortality across regions (0.76-0.82 for 2010-2012 years), which referred to the reasoning of phenomena of excess male mortality in Russia. No strong correlation (more than 0.7 in absolute



value) was observed between factors in 2010-2012 except for mortality and gender gap, and this set of factors was found suitable for analysis (Table 11).

Table 12. Correlation of factors of regression

2010	The gender gap	Life expectancy	Mortality
Average Life expectancy	-0.58	1	
Mortality	0.82	-0.43	1
Women/Men ratio	0.39	0.25	0.62
2011	The gender gap	Life expectancy	Mortality
Average Life expectancy	-0.49	1	
Mortality	0.79	-0.39	1
Women/Men ratio	0.40	0.29	0.61
2012	The gender gap	Life expectancy	Mortality
Average Life expectancy	-0.51	1	
Mortality	0.76	-0.40	1
Women/Men ratio	0.37	0.29	0.61

## Life expectancy

Life expectancy peaked in 1986-1987 at 70.13 years and in 2013 at 70.93 years (absolute maximum in Russian history), then dropped significantly in 1994 year in peacetime after the collapse of Soviet Union (down to 63.98). The gender gap decreased over period and levelled at 11.18 years in 2013 year. It reached its maximum in 1994 at 13.59 years and experienced a decrease in 1967-1968 years at 9.64 years. Life expectancy at birth and its gender gap seemed to mirror the following demographic changes in 1961-2014 years: to illustrate that, gender gap was inversed to males over females (Figure 15). Indeed, main ups and downs in life expectancy (in 1986-1987, 1994, 1998) as well as plateaus and dynamics looked symmetric to the gender gap: with increase of life expectancy, gender gap narrowed, and opposite. Correlation analysis (Table 12) shows strong negative correlation between the gender gap in life expectancy and its factor. Lagging reaction of 1 year of the gender gap in life expectancy on changes in life expectancy is confirmed by slightly higher value of correlation (0.84 compared to 0.83), and other lags do not show higher value.

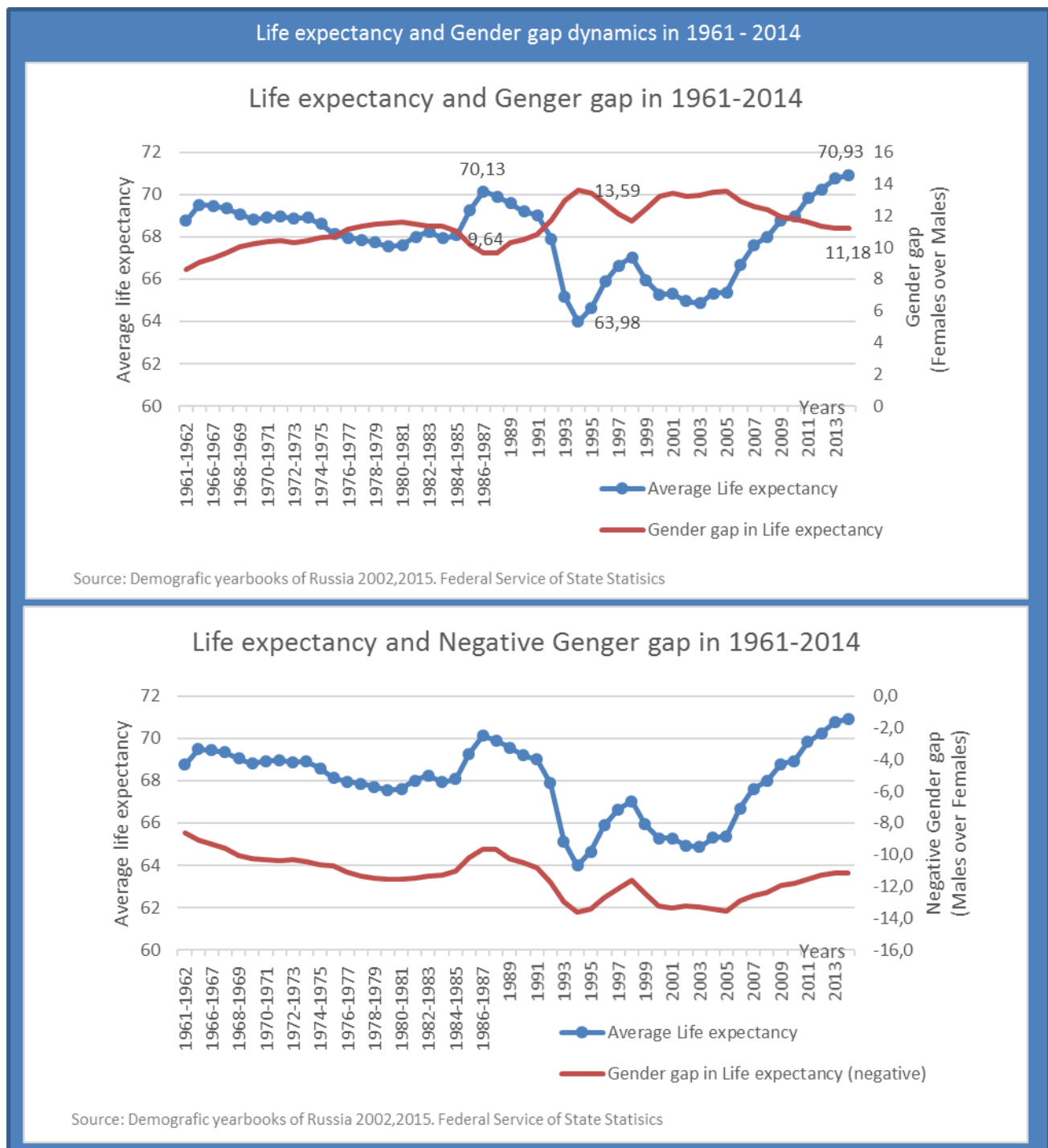


Figure 15. Life expectancy and gender gap dynamics in 1961-2014

Table 13. Correlation of the gender gap and life expectancy time series, 1961-2014 years

Correlation year on year	-0.82662
Correlation (Life expectancy -1 year)	-0.83653
Correlation (Life expectancy -2 year)	-0.75188
Correlation (Life expectancy +1 year)	-0.74923

The range in life expectancy seemed immense: from 57.49 years in Chukotskiy region and 60.45 in Tyva region to 74.71 in Ingushetia and 74.15 in Moscow city (2012), which was as much as 17 years. However, coefficient of variation was not high – 3.7-3.9% (Table 13), meaning that outliers were few and regional variation was not such acute problem, compared to the gender gap problem. Further study of life expectancy dynamics and factors in outliers could help to identify risk factors and factors of positive contribution, which should be addressed in healthcare and social-economic policies for federal and regional level. Coefficient of variation kept stable over period.

*Table 14. Regional variation of life expectancy across regions. 2010-2012*

	Range	Variance	Standard deviation	Coefficient of variation
2010	17.2	7.22	2.69	3.9%
2011	14.9	6.51	2.55	3.7%
2012	17.0	6.87	2.62	3.8%

## ***Mortality***

Mortality values (per 1000 people) increased till 2005 and reached 16.1 people per 1000, and then followed decreasing trend, down to 13.3 in 2013 (Figure 16). Mortality was characterized with high variation in the range was from 3.4 in Ingushetia and 5.4 in Yamalo-Nenetskiy region to 18.3 in Tverskiy region and 19.6 in Pskovskiy region in 2012 and with high coefficient of variation (19.7-22.9% in 2010-2012 years). Coefficient of variation decreased in 2010-2012 (Table 14).

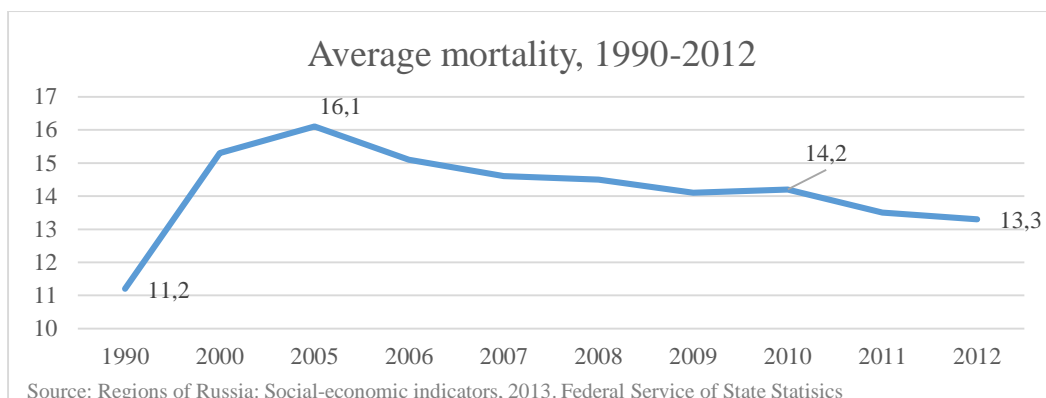


Figure 16. Dynamics of average mortality in 1990-2014

Table 15. Regional variation of mortality, 2010-2012

	Range	Variance	Standard deviation	Coefficient of variation
2010	16.7	10.65	3.26	22.9%
2011	15.4	8.94	2.99	22.1%
2012	17.0	6.87	2.62	19.7%

## Female to male ratio

Share of women in population was measured with ratio of number of females to 1000 males. Since 2010 year, share of women decreased steadily from 1163 to 1158 (Figure 17). The range of values across regions was between 245 and 270 in 2010-2012, and coefficient of variation did not exceed 5% in the given period (Table 15).

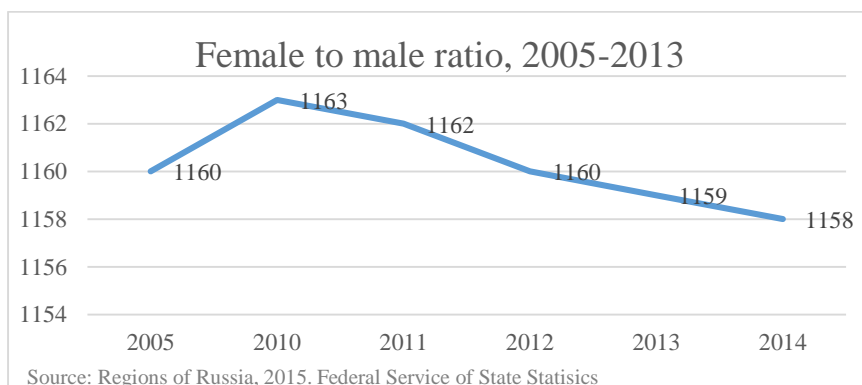


Figure 17. Dynamics of female to male ratio. 2005-2013

Table 16. Regional variation of female to male ratio, 2010-2012

	Range	Variance	Standard deviation	Coefficient of variation
2010	245.0	3044.88	55.18	4.8%
2011	267.0	3208.28	56.64	4.9%
2012	270.0	3234.35	56.87	5.0%

## Urbanization

Secondary analysis demonstrated that living conditions in urban and rural areas results in differences in life expectancy, due to substantial differences in healthcare facilities supplement, lifestyle, education and income characteristics and many other. Indeed, Figure 20 showed that average life expectancy in urban areas mirrors the trend in urban life expectancy over the period of 1961-2013. The hypothesis was that differences in social female and male roles and stress factors as well as self-preserving behavior would make urban/rural gap more acute, and for rural population gender gap is higher. It had to be rejected, as since 1993 convergence of trends seems complete, and urban/rural gender gap had almost completely disappeared, and no significant difference observed (Figure 18).

Correlation analysis of the gender gap and life expectancy for urban and rural areas (Table 16) showed that dynamics of urban gender gap and life expectancy and was very similar to dynamics of average gender gap. In the analysis of dynamics the gender gap in life expectancy and life expectancy (absolute difference in correlation coefficients was not more than 0.08), rural the gender gap didn't show similarity, which meant there was a factor that differentiated dynamics of rural gender gap from average dynamics.

### Dynamics of life expectancy and gender gap for urban and rural population, 1961-2013

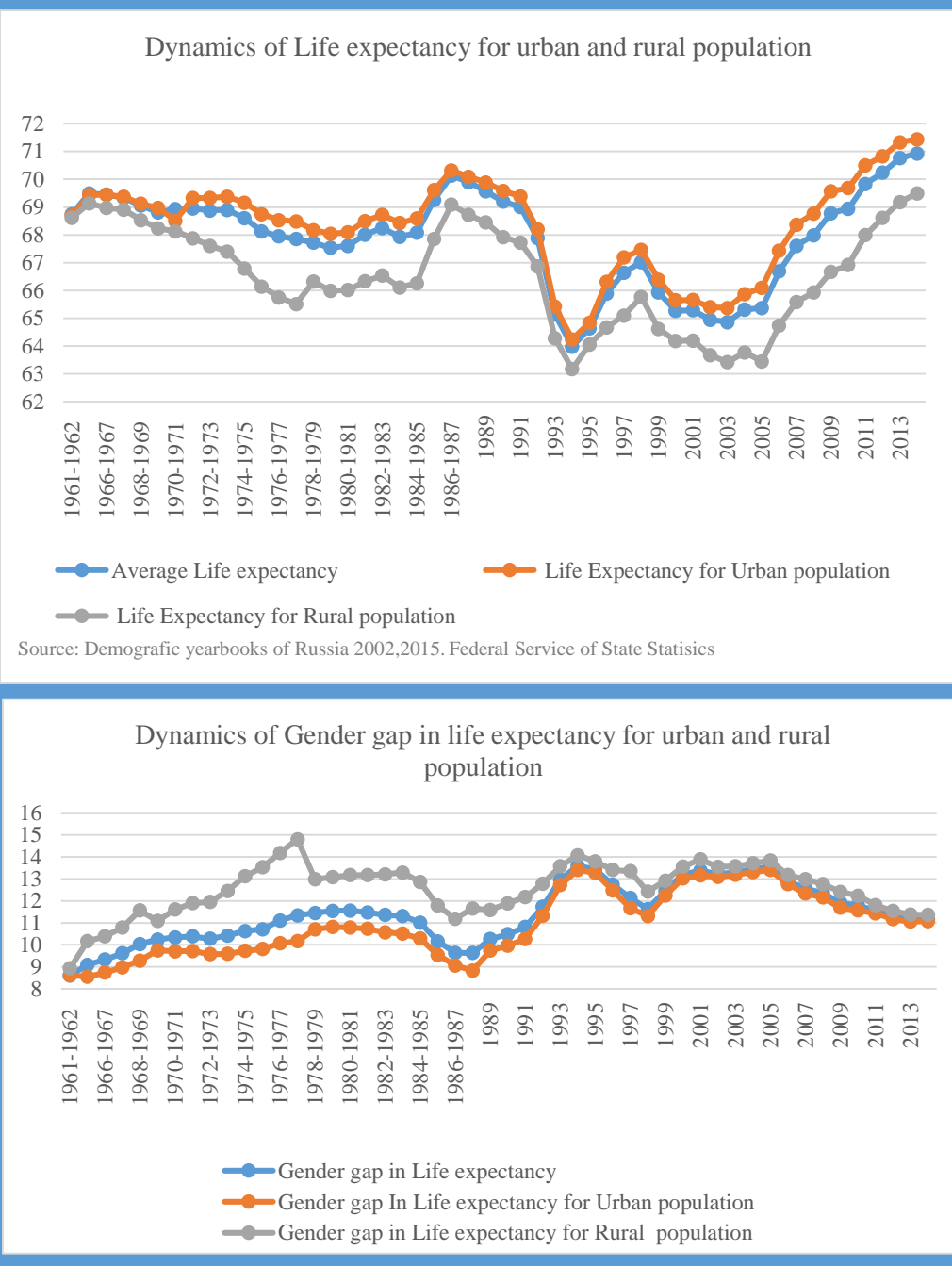


Figure 18. Dynamics of life expectancy and the gender gap for urban/rural population, 1961-2013

Table 17. Correlation analysis of the gender gap and life expectancy for urban and rural areas

	Correlation (The gender gap, LE)	Urban	Rural
2010	-0,58	-0,57	-0,45
2011	-0,49	-0,58	-0,27
2012	-0,51	-0,57	-0,26

Differences between the gender gap in rural and urban areas had been increasing from 1961 to 1979 (Figure 19), and then decreased sharply more than twice from 4.63 to 2.28 years, which may be reason of some changes in statistics' services operation and registration of deaths. Then it peaked again sharply in 1988, in the years where temporal effect of anti-alcohol campaign stopped and led to negative shock in mortality due to increase in alcohol consumption. In 1997, when life expectancy was on the rise, and the gender gap was falling, gap between rural and urban areas got sharply higher again. Since then, it followed negative trend and resulted in 0.28 years difference in 2013. This lead to conclusion that problem of urban and rural differences was no longer actual for gender gap, and could explain only minor part of existing regional differentiation, which was 9.60 years in 2013. Therefore, urbanization factor was excluded from regression analysis.

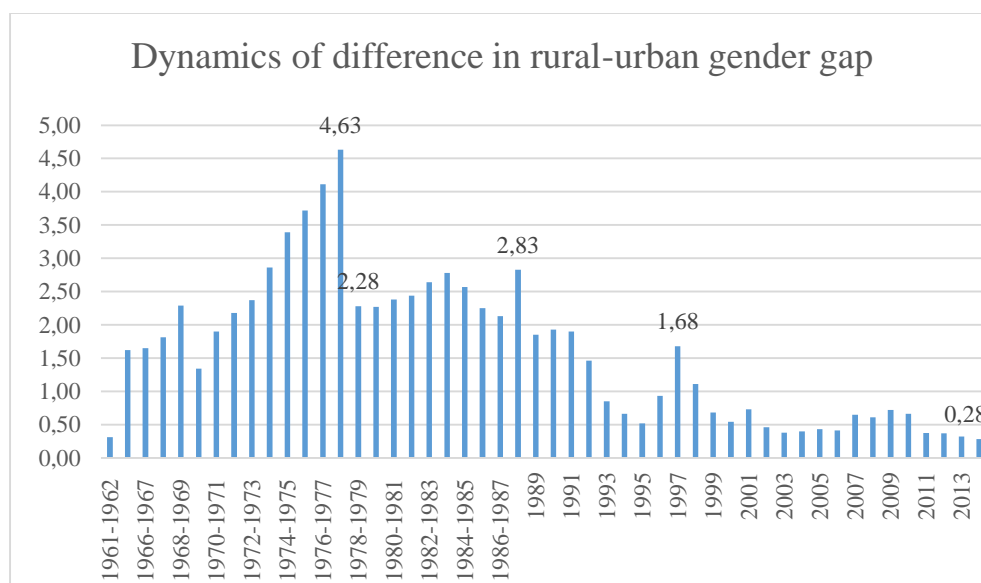


Figure 19. Dynamics of difference of rural/urban gender gap in 1961 – 2013

### 3.4.2. Regressions on gender gap on life expectancy

As gender gap of life expectancy showed high correlation with life expectancy, level-on-level regressions of these two variables were done.

## Time series regression

Life expectancy with 0 and 1 lag were used as a factor for The gender gap in Life expectancy over the period of 1961-2014 (48-49 observations), and all regressions demonstrated significant values of F-test. Regression with 0 and 1 lag both had coefficient which was not significant at 5% level; all other coefficients are significant at 1% level. Regression with no lag explained the highest percentage of variation (76% compared to 74% and 72%) (Table 17).

Averaging coefficients of these regressions, one can tell that increase in life expectancy by 1 year is associated with decrease in the gender gap in life expectancy by 1.57 years in the same year or year after (intercept is not a subject for interpretation).

Table 18. Time series regressions' results: the gender gap on life expectancy with time lags

Regression equation*	$GG_t = 54.52 - 0.63 \cdot LE_t$ $LE_t = 85.89 - 1.57 \cdot GG_t$	$GG_t = 50.96 - 0.6 \cdot LE_t + 0.01 \cdot LE_{t-1}$	$GG_t = 52.03 - 0.60 \cdot LE_{t-1}$
R2	0.76	0.74	0.72
F-test	142.12	66.29	120.76
Significance of F-test	0.0000	0.0000	0.0000
Coefficient of variable	-0.63	-0.60	-0.597448
St.dev.	0.05	0.05	0.054368
Coefficient of second variable		0.02	
St.dev. 2		0.01	
T-statistic of variable	-11.92	-11.34	-10.99
P-value	0.0000	0.0000	0.0000
T-statistic of third variable		1.95	
P-value 2		0.0570	
*GG - Gender gap, LE – life expectancy			

Regressions for the gender gap in life expectancy (estimated values) are demonstrated in Figure 20. Though they captured the dynamics quite well, the values and its deviations were significantly different in 1965-1979 and 2006-2014 years, and the decrease of 1988 wasn't explained.



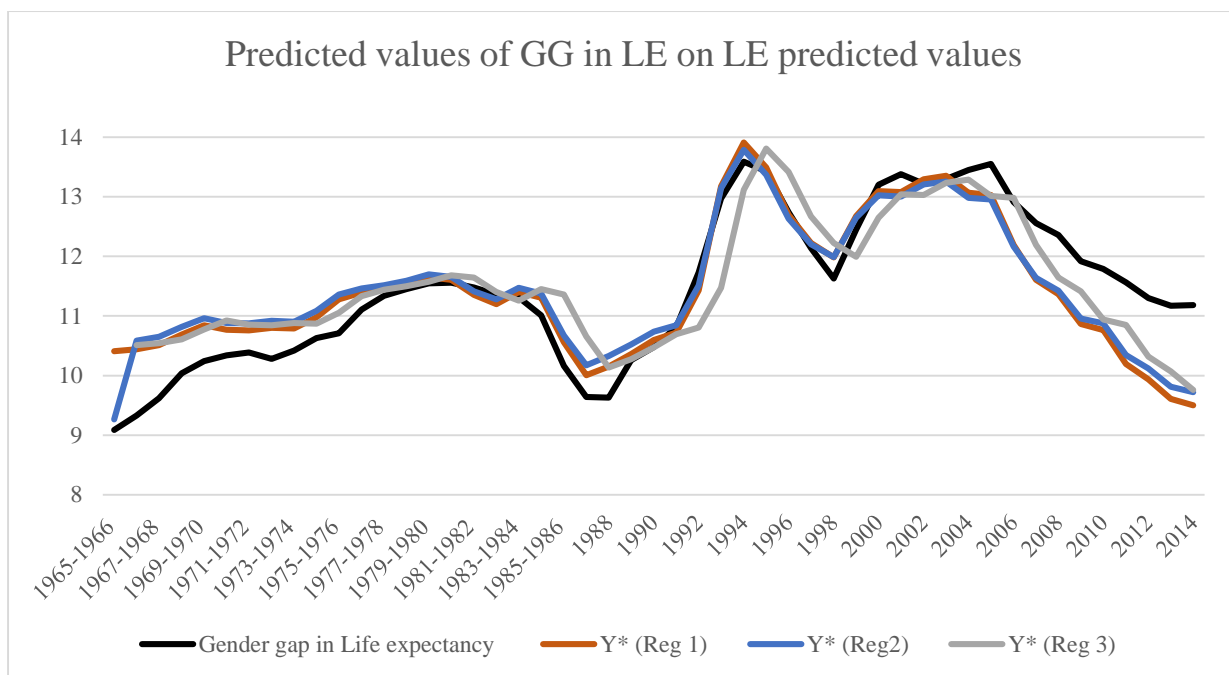


Figure 20. Predicted values of regression of the gender gap on life expectancy, 1961-2014

## Cross-section regression

While life expectancy explained up to 74% of variation in dynamics (which was relatively high share), cross-section regressions to explain regional variation in the gender gap for 83 regions, in 2010, 2011, 2012. All regressions passed Fischer test and t-test for the factors. Regressions for different years got similar variable coefficients, which were significant at 1% level. Regression in 2010 explained the highest variation, as indicated with the highest R2 (34%) and Fischer statistic (41.2) (Table 18).

Using coefficients of 2010-2012 regressions, the following interpretation can be made: comparing 2 regions in this year, the region with value of life expectancy higher by 1 year is expected to have the gender gap in life expectancy value lower by 0.27-0.31 years. (Intercept is no subject for interpretation). Figure 23 demonstrated which regions were not explained by regressions: Dagestan, Ingushetia, Chechnya, Yamalo-Nenetsky region and Moscow city are outliers in The gender gap in Life expectancy but not in LE; and Chukotsky region because it had particularly high negative association between life expectancy and gender gap (Figure 21).

Table 19. Cross-regional regressions of the gender gap on life expectancy in 2010, 2011, 2012

Regression equation	2010	2011	2012
	$GG_i = 33.3 - 0.31 * LE_i$	$GG_i = 29.97 - 0.27 * LE_i$	$GG_i = 31.65 - 0.29 * LE_i$
R2	0.34	0.24	0.26
F-test	41.20	25.25	27.78
F-test significance	0.0000	0.0000	0.0000
Coefficient	-0.31	-0.27	-0.29
St.dev.	0.05	0.05	0.06
T-statistic	-6.42	-5.03	-5.27
P-value	0.0000	0.0000	0.0000

\*GG - Gender gap, LE – life expectancy

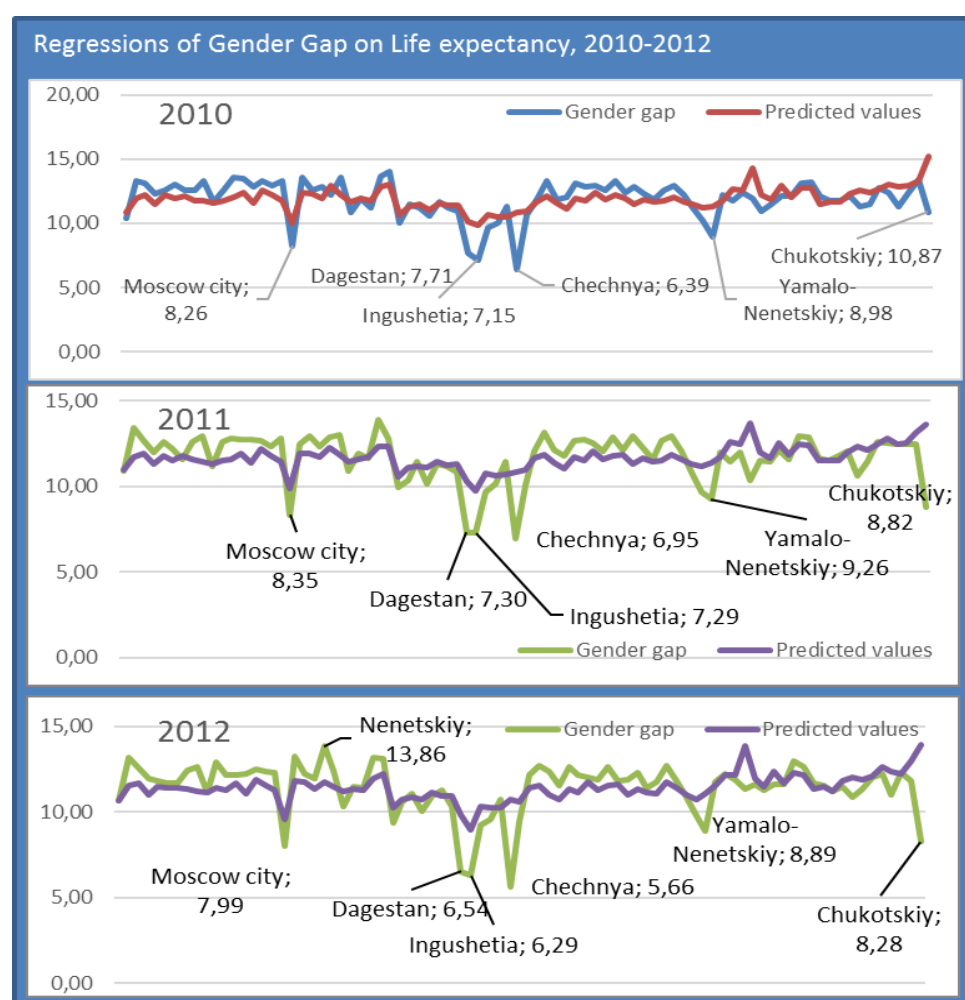


Figure 21. Cross-regional regressions of the gender gap on life expectancy, 2010-2012

### 3.4.3. The gender gap and life expectancy, mortality and female to male ratio

The regression on all three pre-selected factors was designed to explain higher variation in the gender gap in life expectancy than life expectancy did (up to 75%). Three regressions for 2010, 2011, 2012 were all found statistically significant by F-test, but explained less variation (63-75%). T-statistics for Female to Males ratio demonstrated low impact of this variables, so this variable was dismissed in the further analysis (Table 19).

Table 20. Cross-section regressions of the gender gap on life expectancy and mortality and female to male ratio across regions. 2010-2012

Regression equation*	2010 $GG_i = 17.6 - 0.18 * LE_i + 0.28 * M_i + 0.002 * FM_i$	2011 $GG_i = 15.15 - 0.14 * LE_i + 0.3 * M_i + 0.002 * FM_i$	2012 $GG_i = 16.66 - 0.18 * LE_i + 0.29 * M_i + 0.003 * FM_i$
R2	0.75	0.67	0.63
F-test	41.20	25.25	27.78
Significance of F-test	0.00	0.00	0.00
Coefficient of LE	-0.18	-0.14	-0.18
St.dev.	0.05	0.06	0.06
Coefficient of M	0.29	0.30	0.29
St.dev.	0.05	0.06	0.07
Coefficient of FM	0.00	0.00	0.00
St.dev.	0.00	0.00	0.00
T-stat. for LE	-3.57	-2.48	-2.80
P-value for LE	0.00	0.02	0.01
T-stat. for M	5.69	5.15	4.32
P-value for M	0.00	0.00	0.00
T-stat. for FM	0.70	0.62	0.82
P-value for FM	0.49	0.54	0.41
*GG - Gender gap, LE – life expectancy, M- Mortality, FM – Female to male ratio			

Regression of the gender gap on life expectancy and mortality did not demonstrate better result (R2=63-74%) after excluding female to male ratio, but better quality of regression

was noted by t-stats and F-tests (46-116 compared to 25-41) (Table 20). All coefficients were significant at 1% level. Again, the best quality of regression is for 2010 year. Overall, R<sup>2</sup> indicates that large share of variance (63-74%) of variation was explained, which improved the result of cross-section regression on life expectancy only (24-34%). According to regression analysis, one of the two regions who is characterized by life expectancy higher by 1 year, is expected to have gender gap lower by 0.11-0.15 years. One of the two regions with mortality higher by 1 is expected to have gender gap higher by 0.31.

Table 21. Cross-section regressions of the gender gap on life expectancy and mortality across regions. 2010-2012

	2010	2011	2012
Regression equation	$GG_i = 17.7 - 0.15*LE_i + 0.31*M_i$	$GG_i = 15.15 - 0.11*LE_i + 0.33*M_i$	$GG_i = 16.6 - 0.14*LE_i + 0.34*M_i$
R <sup>2</sup>	0.74	0.67	0.63
F-test	115.99	115.99	45.57
Significance of F-test	0.00	0.00	0.00
Coefficient of LE	- 0.15	- 0.11	- 0.14
St.dev.	0.03	0.04	0.04
Coefficient of M	0.31	0.33	0.34
St.dev.	0.03	0.03	0.04
T-stat. for LE	- 4.46	- 2.99	- 3.26
P-value for LE	0.00	0.00	0.00
T-stat. for M	11.26	10.12	9.01
P-value for M	0.00	0.00	0.00
*GG - Gender gap, LE – life expectancy, M- Mortality			

Figure 22 demonstrates 3-4 regions-outliers of the regressions. Compared to one factor regression of the gender gap on Life expectancy, mortality helped to capture regional variation of Dagestan, Ingushetia, Yamalo-Nenetsky regions. Still, there were differences in Moscow city, Chechnya, Chukostkiy regions and also Nenetsky regions which were not illustrated by mortality levels. Only Chechnya was region of Ethno-economies.

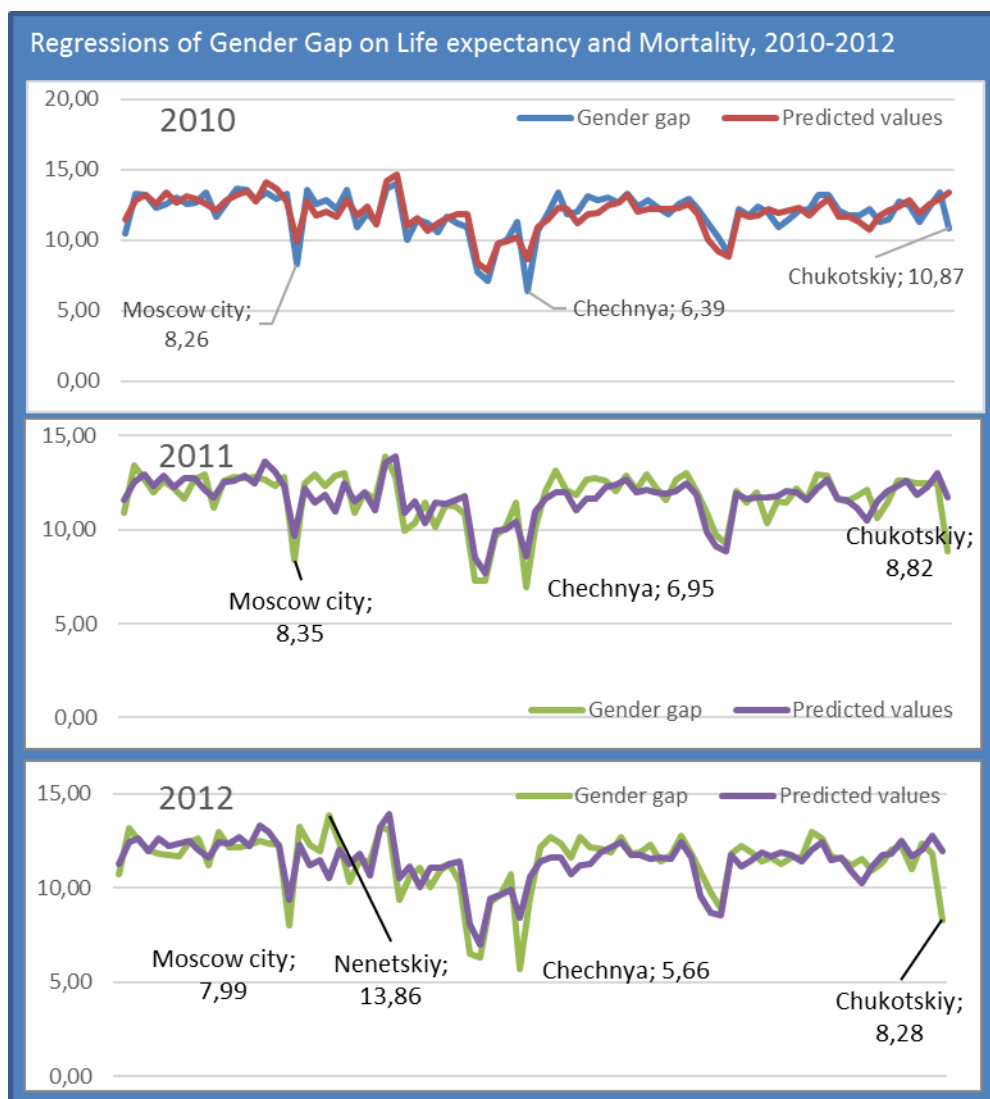


Figure 22. Cross-regional regressions of the gender gap on life expectancy and mortality, 2010-2012

### 3.4.4. Regression results

Though life expectancy growth was closely related to gender gap in its long-term dynamics of 1961-2014, regressions could not explain more than a third of regional variation in 2010-2012. Six regions were outliers in association of life expectancy and gender gap, and one region of ethno-economies. Urbanization factor was found insignificant in pre-selection analysis, and female to male factor was insignificant in cross-region regression which means they demonstrated weak association (urbanization: weak negative association; female to male ratio: weak positive association). Female-to-male ratio did not prove to be statistically

significant factor; its correlation with mortality (0.62) could lead to conclusion that they used to explain variations of similar nature.

Life expectancy together with mortality values captured more than 60% of variation. In other words, influencing these two factors could help to eliminate up to 60% of regional variation in the gender gap in life expectancy. However, still about 3-4 regions seem to depend on the other factors significantly in their statistical deviation in gender gap. Mortality was observed to have strong positive association, and life expectancy – strong negative association.

The findings on associations of these factors with the gender gap could help in designing healthcare, socio-economical and gender (federal) policies, and regional variation analysis helped to find insights for regional policy. In the next chapter policy implications of influence on gender gap are described, and recommendations based on secondary and primary data analysis results were made.

## Chapter 4 – Policy addressing the gender gap in life expectancy in regional aspect

The conclusive chapter addresses gives overview of healthcare and gender problems which could be addressed by regional and federal policies in Russia and their possible solutions for increasing life expectancy and narrowing gender gap in Russia. I suggest political measures in various fields to address the gender gap problem.

### 4.1. Necessity of complex policy

Demographers stated various problems existing in Russia nowadays, especially concerning gender policies. Some of the policies influencing the gender gap in life expectancy were not effective enough.

#### *Demographic and social programs*

Chistyakova (2009, P.16) argued that for long decades social-demographic policy wasn't carried out and it "took its course". Such "indifferent political attitude" resulted in negative tendencies and various disbalances, such as deepening regional differentiation in quality of life and development human potential.

In the beginning of XXI century various projects for support of health of population were created. In particular, in 2006 year national project "Health" began. Among the goals of "Concept of Demographic Policy till 2025 year" (2007) there were specific quantified measures not only in population size, but also in life expectancy: goal of reaching in 2014 year life expectancy of 65-70 years, 70 years in 2015 year, 75 years in 2025 year (Bychkov, 2015). The continuation of state policy of decrease in morbidity was creation of regional programs of healthcare modernization in 2011-2012 years.

Nowadays state launches long-term Federal Target Programs on increase of quality of life and support of medicine. Results can be evaluated as positive. First, decrease in morbidity is stable over the last 10 years, i.e. it can be considered as sustainable but not compensatory after excess mortality of population. Secondly, achievement of higher level of life expectancy. In 2012 year, life expectancy (70,24 average; 64.56 for males and 75.86 for females) reached record level of peak in 1986-1989 years (for female life expectancy, this was reached already in 2009), which was planned to reach only by 2015 (Bychkov, 2015). Third, significant decrease of mortality by reasons. Thus, the most significant was decrease of mortality from external factors over 2003-2012, then decrease of mortality of respiratory diseases, circulatory diseases, and so on. Reducing male mortality is key to increase life expectancy (Abdulmanapov, 2011, p.4-5) and decrease the gender gap, therefore mortality decrease should be targeted in demographic programs.

### *Gender inequality policies*

According to Kalabikhina (1991), even a few indicators in gender inequality like unemployment and life expectancy allows to conclude about necessity to study the problem of gender discrimination, in order to develop social measures and programs to even-out problems of females and males. Chistyakova (2010, p.16) argued that optimal level of gender stratification should be reached

By far gender policy has not been carried out by government to eliminate gender differences neither in labour market, not in healthcare and life expectancy (Bobylov et al, 2010). Gender inequality in life expectancy, education, unfavorable work conditions should be addressed in programs of development of human resources potential in Russia. Abdulmanapov (2011, p.4) that gender aspect was absent in priorities of demographic policy in Dagestan.



Two probable scenarios of development of gender policy and addressing gender problems in Russia were described: in optimistic one, “gender equality state policy is carried out, either as essential gender element of social programs, or as separate part of social policy, and inertial – “conservation of practice of development of policies without including gender component, with complete ignorance of widely accepted stereotypes about patriarchal family and of gender discrimination and violation of constitutional right on equal opportunities of men and women” , and a number 12 offered various measures on gender policy were noted as essential to be carried out in any scenario, (Bobylev et al, 2010, p.73). They cover increase of female wage in budget spheres, development of “ centers of help and trust hot lines” services separately for men and women, gender expertise of national laws, propaganda of egalitarian relationship between women and men both at level of family and in society.

### *Healthcare policy*

Researchers (Shkolnikov, Mesle, 2015) argued that lack of qualified specialized medical care may entail regional differences. Institutions that provide highly qualified specialized health care are traditionally situated in Moscow, St. Petersburg, and a few other big cities in Russia. Increase in transportation prices and necessity to pay for medical services results in “restricted access to advanced medical care for provincial residents”. What is more, in 1990s medical personnel was observed to work in the conditions of underfunding, which entailed low salaries, poor equipment of hospitals and poor organization, “even for continuation of normal functioning”.

Kozlov (2013) drew conclusion that problem of low life expectancy is not in lack of access to medical services. Indeed, in the context of concept of second epidemiological move which involves decrease in mortality primarily in working age, the problem of decrease in mortality cannot be addressed with increase in number of beds and medical personnel per

capita. Shkolnikov and Mesle (1995) argued that factor of number of physicians and hospital beds could not be of primary importance [for healthcare, mortality and life expectancy], because the general level is still high. For example, in 1993 in Russia there were 45 physicians per 10,000 inhabitants, while it was 25 in Sweden, 17 in Great Britain, 31 in Norway in 1998-1992. Kozlov (2013) suggested that higher mortality in working age in Siberia compared to average in Russia could be explained with lower quality of operation of hospitals and doctors in Siberia. However, it was rather difficult to measure precisely a quality indicator. There are quantitative indicators, according to which number of beds per 10,000 people of population has a high regional variation in Siberia and concentrates in regions with the lowest life expectancy, and the indicator value itself is higher than average in Russia. Therefore, the impact of the mentioned indicator on mortality in Russia almost doesn't exist. Correlation between life expectancy and number of doctors in the region is more observable. Again, provision of doctors in Siberia is also higher than on average in Russia, but life expectancy is lower.

### *Retirement policy*

Kalabikhina (2010) studied the effect of gender factor on division of retirement funds between genders. Relatively low male life expectancy leads to uneven distribution of retirement funds towards women. Life expectancy at birth was 57.5 years in 1994 and 59 years in 1996 with retirement age of 60 y.o. The probability that men aged 20 will survive till retirement was 70% in 1990 and 54% in 1995 (Kalabikhina, 1995). She states the most effective solution to discriminate reduction as follows: investment in narrowing the gender gap in life expectancy, in healthcare programs, in propaganda of healthy lifestyle and “normality” of egalitarian family, unlike manipulations with retirement age. Kalabikhina (2010) predicted highly probable retirement age increase to be introduced soon. The reasons behind it would be economical benefit for the state to pay employment pension rather than retirement pension.

## *Alcohol and tobacco policy*

In June 1985 Soviet government introduced 2.5-times restriction of state alcohol sales. Acts did not affect the motives and underlying factors of alcohol abuse, as Shkolnikov and Mesle (1995) stated. The effect on alcohol consumption and mortality was stronger for males than for females: 600,000 deaths of males and 300,000 deaths of females were avoided, in comparison with long-term trends in ASDRs (age specific death rates). In 1987 absolute minimum of mortality was reached, and the reversal to uprising trend began, and in 1992 alcohol consumption increased sharply from 12 to 14 liters of ethanol per capita and mortality as well.

## *Regional policy*

Kozlov (2013) argued that low life expectancy in Siberian Federal district and high mortality in working age are a barrier to accumulation and realization of demographic potential, and to development and modernization of the region. Not low life expectancy but rather conditions which keep it low are considered as barrier, because they influence migrational attractiveness of regions and low natality. Sachuk (2011) argued that regional differences in middle class forming could not be overcome unless accents in socio-demographic policy and the correspondent mandates were not moved from federal to regional policy.

## **4.2. Policy measures targeting life expectancy and its gender gap**

Difference by 2.8 times (9.6 years) in regional variation in the gender gap in 2013 in life expectancy pointed out to necessity of complex policy targeting this problem. Even though the gender gap decreased over the period of 1961-2014, following positive trend of life

expectancy, the most of regional variation could not be reduced not only by life expectancy but also mortality target, as regression analysis showed.

Demographers offered a variety of measures to improve life expectancy. Among the main reforms that could improve healthcare significantly are the following (Alieva, 2012, P.9):

1. Increase of government spending on healthcare to 6% of GDP;
2. Ensuring rational use of resources of medical and preventing treatment facilities and specialized medical centers, including equipment with innovative resources and technologies;
3. Priority to reconstruction and re-equipment of medical facilities rather than construction of new ones;
4. Introducing higher minimal standards on medical services;
5. Increasing role of insurance principles in medical services;
6. Increase of control of education institutes which provide unsatisfactory level of education;
7. Increase of salary of medical practitioners to the level of state officials;
8. Increase of material motivation with system of compensation and bonuses to sector and family doctors, specialists in diagnostics on early stage;
9. Developing state educational and pedagogic programs to increase level of medical literacy;
10. Setting measurable metrics for executive managers of medical facilities.

Measures to decrease mortality and improve health of population should be complex (Bobylev, 2010, P.98) and aimed on preventing of diseases. This should include:

- reducing tobacco and alcohol consumption;
- improving safety of transport system;
- providing wide access of fruits and vegetables at affordable price;
- city planning with sports facilities and public parks for active lifestyle
- developing technologies of early diagnostics of diseases, such as cancer.

Effect of designed and implemented economic policies should be measured. Shkolnikov et al (2014, P.21) pointed that state healthcare programs contributed to reduction of cardiovascular diseases' mortality, judging by time scope and features of its dynamics. For this one and other national healthcare for preventing and eradication of diseases like HIV infection and cancer programs monitoring and estimation of effectiveness were not carried out, that is why without data on scope and effectiveness on programs, effect it is not possible to evaluate.

Only state target program against tuberculosis in 2007 coincided with time period of reduction of its mortality.

I suggested political measures to influence the gender gap and the life expectancy influencing the two connected indicators, which were analyzed in previous section – mortality and life expectancy. Share of women in the population could be treated rather than indicator than cause of gender gap in life expectancy. Though urbanization differences stay significant for life expectancy regional gap, targeting this factor would not allow to reduce regional gap in female/male differences in life expectancy.

As life expectancy was closely related to quality of life and living conditions, and mortality was often analyzed in the aspect of structure of causes, policy measures in these two groups were offered.

Life expectancy was demonstrated in many studies to be correlated with such variables as education and income (Ramonov, 2011; Zarova, Kotiakova, 2006) Measures to target life expectancy are presented in Table 21.

Table 22. Suggested policy measures targeting life expectancy

Policy type	Target	Mechanism	Examples of possible reforms
Economic development policy	Income values	Reducing poverty level and increasing income per capita level would increase living conditions of people, help them allow to move to healthier lifestyle (nutrition, sports, etc) and to increase share of private spending on healthcare.	Increasing social benefits for poor people and allowing income tax reductions for certain categories of people

Education policy	Number of educated people	Improving education would result in better self-preserving behavior, which would have higher impact on men	Introducing courses on safety and medicine in middle-school, increasing number of schools in rural and urban areas
Gender policy	Social roles of men in society	Allowing men more freedom in social sphere and relieving stress could alleviate social tension and result in lower stress and higher economic productivity	Providing maternity leave for men as well as for women

Mortality indicator depends heavily on subjective factors, such as lifestyle and self-preserving behavior. Some of the causes of death which are particularly high in Russia (deaths from external factors, accidents and poisonings, alcohol-related deaths, etc) indicate clearly that many deaths could be avoided if people treated their health more seriously. Other deaths, such as injuries at workplace could be targeted with appropriate safety measures introduced by governmental organizations and obligatory norms. Political measures to target mortality are presented in Table 22.

To sum up, gender component should be embedded in various aspects of state policy in Russia, including healthcare, education and labor policy on regional and federal level. Regional policies should be adjusted according to the depth of the described gender and healthcare problems.

*Table 23. Suggested policy measures targeting mortality*

Policy type	Target	Mechanism	Examples of possible reforms
Healthcare policy	Healthy lifestyle propaganda	Supporting healthy habits could help to decrease many avoidable diseases	Increasing excise taxes on tobacco and alcohol

Labour policy	Improving working conditions	Increasing safety norms will reduce number of accidents on dangerous jobs and allow men to rest more, improving their self-preserving behavior	Allowing more social benefits for sick leave at work, safety standards in specific jobs
Gender policy	Supporting traditional maternal role of women	Promoting self-care for pregnant women would reduce child mortality	Propaganda or state restriction on smoking/alcohol for pregnant women, on abortions

# Conclusion

The gender gap in life expectancy in Russia was the highest in the world in 2015 at (WHO, 2016) at 11.6 years, and this acute problem should be addressed for realization of demographic potential of Russia and its regions. Reasons for exceptionally high excess male mortality were studied in gender aspect to investigate contributing factors to decreasing the gender gap. Three main groups of factors were discovered: external (biological, environmental), internal (socio-cultural, individual) and mental.

The regional gender gaps in life expectancy varied 5.35 years to 14.98 years in 2011-2013, which was a difference in 2.8 times, and an average coefficient of variation was considered to be high at 12.87%. Distribution was an unimodal left-skewed curve. High regional variation was predetermined historically, and is expected to increase in future due with taking place growth and development of regions. Variation and difference between ‘extreme’ values of life expectancy and its gender gap were forecasted to increase in range.

Regions of ethnical economies were identified as outliers which were resistant to adverse shocks in Russia, followed trends different from average. They had notably ‘good’ indicators of life expectancy and its gender gap: in 2013 the gender gap in ethno-economies was 2.1 years lower than average in Russia. In cross-regional study, an unusual method of pooling all 83 regions together was expected to help in designing regionally adjusted gender policy. Six groups of regions by values of the gender gap in life expectancy and its growth rates were formed, and ethnical economies also demonstrated themselves as a driver of decrease in the gender gap.



Data analysis results on hypotheses testing demonstrated the following:

- strong negative association between life expectancy and gender gap, in correlation, time series and in cross-regional regressions;
- strong positive association between of gender gap and mortality in correlation and regression analysis;
- weak positive association between gender gap and female-to-male ratio (insignificance of T-test in cross-section regression);
- weak negative association between urbanization factor and the gender gap (low values of effect of urbanization in pre-selection analysis of factors).

Influencing mortality and life expectancy factors could help to eliminate up to 60% of regional variation in the gender gap in life expectancy. However, still about 3-4 regions seem to depend on the other factors significantly in their statistical deviation in gender gap.

Political implications of addressing the problem of the gender gap in life expectancy were described. Political measures in several policies such as healthcare and labour policy were offered for including gender component in future Russian policies.

# References

## Russian-language sources

- Abdulmanapov, P.G. (2011). *"Продолжительность жизни населения и резервы ее повышения в республике Дагестан [Life Expectancy and Reserves for Its Increase in the Republic of Dagestan]"*, Upravlenie Ekonomicheskimi Systemami: Elektronnyi Nauchnyi Zhurnal, no. 36 (12) 1-14.
- Akhmetov V.Ya., and Berdnikova G.I. (2009) *"Этноэкономика и ее роль в устойчивом развитии регионов [Ethno-economies and its rols in sustainable development of regions]"*. Materials of Russian Applied-Science Conference: Sustainable development of territories: theory and practice. Ufa, Gilem, 2009. PP.32-37.
- Alieva Z.M., Magomaev M.M., Omarova Kh.G. et al. (2011). *"Показатели и причины смертности населения России и Дагестана [Indicators and reasons of morbidity of Russia and Dagestan]"*, Izvestiya Dagestanskogo gosudarstennogo pedagogicheskogo universiteta. Obshestvennyye i gumanitarnyye nauki, no. 3 (2012), <http://cyberleninka.ru/article/n/pokazateli-i-prichiny-smernosti-naseleniya-rossii-i-dagestana>.
- Andrienko YU. V., Nemtcov A.V.(2005) *"Оценка индивидуального спроса на алкоголь [Estimation of individual demand on alcohol]"*. Centr ekonomoicheskikh I finansovykh issledovaniy i razrabotok v Rossiyskoy Ekonomicheskoy Shkole. Moscow. January, 2006. Preprint N 89.
- Bashkireva A.S. (2010) *"Демографические и профессиональные риски депопуляции работающего населения в России (аналитический обзор) [Demographical and professional risks of depopulation of working population in Russia (analytical report)]"*, Uspekhi gerontologii 23, N 1: 32-39.
- Baskakova, V.N., Baskakov, and A.L. Lelchuk, (2003) . *"Гендерные аспекты российской пенсионной системы [Gender aspects of Russian pension system, Genderное равенство: поиск решения старых проблем]"*. (Moscow: MOT, 2003), <http://www.actuary-al.ru/dta/h038.pdf>.
- Belov V.B. and Rogovina A.G. (2014) *"Основные медико-демографические показатели здоровья населения России к 2013 году [The basic medic demographic factors of population health of Russia up to 2013]"*, Problemy socialnoy gigieny, zdavookhraneniya i istorii mediciny, no. 6: 18-22.
- Belov V.I., and Gorokhov V.N. (2013). *"Мужская смертность в России [Male mortality in Russia]"*, Vestnik Tambovskogo universiteta, Gumanitarnyye nauki, No. 5(121): 190-97.
- Belyaeva, L.A. (2009) *"Уровень и качество жизни: проблемы измерения и интерпретации. [Living conditions: problems of estimation and interpretation]"*, Sotsiologicheskie issledovaniia, No. 1: 33-42.

- Bobylev S.N., Mau V.A., Ovcharova L.N. et al. (2010) *Доклад о развитии человеческого потенциала в Российской Федерации 2010. Россия в 2015 и после: Мониторинг достижения целей развития тысячелетия [Report on Human Potential Development in Russia 2010. Russia in 2015 and after: Monitoring of Achievement of Development Goals of Millenium]*. Accessed on 20-04-2016.  
<http://www.undp.ru/nhdr2010/NHDR2010draft.pdf>
- Braun, DZh.V., Panova L.V. and Rusinova N.L. (2007) *"Гендерные различия в здоровье [Gender differences in health]"*, Sotsiologicheskie issledovaniia. Sotsiologia sem'i. Gendernye issledovaniia. Moscow, Russian Federation, No. 6 (June 2007): 114-22.
- Bychkov A.A. (2015) *"Изучение смертности населения России [Research on mortality in Russia]"*, Molodoy uchenyi, no. 7: 357-60.
- Chistyakova V.E. (2009) *"Гендерное равновесие как индикатор устойчивости социально-экономической системы [Gender aspect equilibrium social-economic deveopment]"*, Vestnik Rossiyskoy Akademii estestvennykh nauk, Ekonomicheskaya, No. 4: 15-22.
- Eremina, S. and Kudelina, O. (2014) *"Эффективность системы здравоохранения. Региональный аспект [Effectiveness of healthcare system. Regional aspect]"*, Obshchestvo i e'konomika. Moscow, Russian Federation, no. 4 (April): 141–57.
- Federal Service of State Statistics. (2002, 2011,2012, 2013, 2015) *Demographic yearbook of Russia* [http://www.gks.ru/bgd/regl/B15\\_16/Main.htm](http://www.gks.ru/bgd/regl/B15_16/Main.htm)
- Federal Service of State Statistics. (2016) *Official statistics: Demographics: demographic forecasts till 2030 year*. Accessed on 15/05/2016.  
[http://www.gks.ru/wps/wcm/connect/rosstat\\_main/rosstat/ru/statistics/population/demography/#](http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/population/demography/#)
- Federal State Statistics Service. (2016) *Household Income, Expenditure and Consumption of households in 2015*. Accessed on 15-05-2016.  
[www.gks.ru/wps/wcm/connect/rosstat\\_main/rosstat/ru/statistics/publications/catalog/doc\\_1140096812812](http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1140096812812)
- Federal State Statistics Service. (2015) *Regions of Russia: social-economical indicators*. Official statistics: Publications: Catalogue of Publications. Accessed on 15-04-2016.  
[http://www.gks.ru/wps/wcm/connect/rosstat\\_main/rosstat/ru/statistics/publications/catalog/doc\\_1138623506156](http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1138623506156)
- Giodasyan, V. (2016) *"Почему русские мужчины умирают так рано? [Why Russian men die so early?]"* Portal Bizhelp.ru. <http://bishelp.ru/rich/anatomia/pochemu-rossiyskie-muzhchiny-umirayut-tak-rano>. Date of access 05-05-2016.
- Goffe,N. (2006) *"Социальные проблемы. Социальная составляющая экономического развития: региональный аспект [Social problems. Social component of economic development: resional aspect]"*, Mirovaia ekonomika i mezhdunarodnye otnosheniia, May 31, PP. 53-61.

- Ischenko A.N. (2007) "*Региональные особенности демографических процессов в России [Regional characteristics of demographic processes in Russia]*," *Izvestiya Sankt-Peterburgskogo universiteta ekonomiki i finansov*, no. 4: 93–102.
- Ivanova A.E. (2013) "*Потребность населения в долголетию и степень ее реализации [Need of population in longevity and degree of its realization]*" *Sotsiologicheskiye issledovaniia*. No 2. P.120-128.  
<http://ecsocman.hse.ru/data/2014/05/05/1251339419/13Ivanova.pdf>
- Ivanova A.E. (2000) "*Продолжительность жизни, свободной от инвалидности, в России и за рубежом: проблемы сравнительного анализа [Disability-free life expectancy in Russia and abroad: problems of comparative analysis]*," *Sotsiologicheskie issledovaniia. Sociologiia mediciny*, no. 12 (December 1, 2000): 80–89.
- Ivanova E.I. (2010) "*Смертность российских мужчин (причины и региональные различия) [Russian males' morbidity (problems and regional differences)]*," *Sotsiologicheskie issledovaniia. Demografiya. Migratsiia*. Moscow, Russian Federation, No. 5 (May): 87-99.
- Kalabikhina, I.E. (2010) "*Экономико-демографическое развитие России: гендерный аспект [Economical-demographical development of Russia: gender aspect]*" Report on Economics Doctor Thesis. Moscow State University.
- Kalabikhina, I.E. (1991) "*Гендерные аспекты продолжительности жизни и безработицы в России [Gender aspects of life expectancy and unemployment in Russia]*," *Belorussky ekonomicheskii zhurnal*, no. 1: 46-53.
- Kalabikhina I.E.. (1995) "*Социальный пол и проблемы населения. [Social gender: economic and demographic behavior]*". Moscow, Moscow State university, 1995. P.41.
- Kiseleva E.S. (2011) "*Продолжительность жизни и здоровье населения старшего возраста в России [Life expectancy and health of older population in Russia]*," *Vestnik Moskovskogo universiteta. Otrastlevaia i Regional'naia E'konomika*. Moscow, Russian Federation, E'konomika, no. 2: 93-100.
- Kolesnikov YU.S. (2003) "*Этноэкономика в судьбах модернизации Юга России [Ethno-economies in the fate of modernization of Southern Russia]*". *Ekonomicheskii vestnik Rostovskogo gosudarstvennogo universiteta*. I / No.2, 2003.  
<http://ecsocman.hse.ru/data/507/148/1217/journal1.2-3.pdf>
- Kolosnitsyna, M. and M. Sitdikov, (2012) "*Макродетерминанты здорового образа жизни [Macrodeterminants of healthy lifestyle]*," *Mirovaia e'konomika i mezhdunarodnye otnosheniia. E'konomika, E'konomicheskaiia teoriia*. Moscow, Russian Federation, No. 2 (February): 27-37.
- Kozlov V.A. (2013) "*Продолжительность жизни населения как фактор снижения демографического потенциала регионов [Life expectancy of population as a factor of decrease of demographic potential of Siberian Federal district]*," *Regiony v period modernizatsii: sotsialnyie instituty (II International Theoretical and practical*

conference, Nizhnyi Novgorod: High school of Economics, 2013), 41-47,  
<http://khamovniki.ru/upload/iblock/c9d/c9d8d0559dd741eb6d1b6b4ebcddeb98.pdf#page=41>

Kuzmich O.S., and Roschin S.YU. (2008) "*Лучше ли быть здоровым? Экономическая отдача от здоровья в России [Is it better to be healthy? Economic effect of health in Russia]*," Economic Journal of HSE. Practical analysis, no. 1: 29–55.

Leksin V. (2006) "*Региональная экономика. 'Региональные столицы' в экономике и социальной жизни России [Regional economics. 'Regional capital cities' in economic and social life in Russia]*," Voprosy ekonomiki, no. 7 (July 31, 2006): 84-93.

Loshakova YU.P. (2013) "*Региональные особенности гендерного неравенства [Regional differences of gender inequality]*," Sotsiologicheskie issledovaniia. Fakty. Kommentarii. Zametki. Moscow, Russian Federation, no. 5 (May): 134-37.

Nazarova I.B. (2014) "*Здоровье и качество жизни жителей России [Health and quality of life of residents in Russia]*," Sotsiologicheskie issledovaniia. Sotsiologiya zdorov'ia i meditsiny. Moscow, Russian Federation, no. 9 (September): 139-45.

Nazarova I.B. (1998) "*Субъективные и объективные оценки здоровья населения [Subjective and objective factors of health self-evaluations]*" Sotsiologicheskii zhurnal. №3/4.

Nemtsov A.V., Terekhin A.T. (2007) "*Размеры и диагностический состав алкогольной смертности в России [Scope and diagnostic structure of alcohol mortality in Russia]*". Narkologia. N 12.

Nilov V.M. (2012) "*Социальные изменения и здоровье населения: некоторые итоги и перспективы исследований [Social changes and health state of population: some conclusions and perspectives of research]*" Sotsialnyie issledovaniya. N 8. P. 111 - 126.

Oschepkov, A.YU. (2006) "*Гендерные различия в оплате труда в России [Gender differences in wages in Russia]*," Economic Journal of HSE. Practical analysis, no. 4: PP.590–619.

Ovchinnikov V.N. and Kolesnikov YU.S. (2006) "*Региональные проблемы. Этноэкономика как фактор развития [Regional problems. Ethno-economies as a factor of development]*," Problemy prognozirovaniia, no. 1 (February 28): 118-23.

Order by Government of Russian Federation N 1618-p. (2014) "*Концепция государственной семейной политики до 2025 года [Concept of State Family Policy till 2025 year]*". Signed on 25-08-2014. Moscow, Russia.

Order by President of Russian Federation N 1351 (2007). "*Концепция демографической политики Российской Федерации на период до 2025 года [Concept of Demographic Policy of Russian Federation till 2025 Year]*." Signed on 09-10-2007. Moscow, Russia.

- Payne, S. (2009) “Каким образом системы здравоохранения могут содействовать достижению гендерной справедливости? [In what ways can healthcare systems contribute to gender justice?]” WHO: analysis of healthcare politics and systems. Short analytical review 12.
- Pechura O.V. (2010). “Этноэкономика региона: теоретико-методологический аспект [Ethno-economies of the region: theoretical-methodological aspect]”. Vestnik Chelyabinskogo gosudarstvennogo universiteta, Ekonomika. No 3 (184). PP.56-60.
- Ramonov A.V. (2011) “Ожидаемая продолжительность здоровой жизни как интегральная оценка здоровья россиян [Healthy life expectancy as an integral estimate of health of Russians],” Economic Journal of HSE, no. 4: 497–518.
- RIA News,. (2013) “Эксперты о том, чем вызвана низкая продолжительность жизни мужчин в РФ [Experts' opinion about the reasons of low life expectancy in Russian Federation]”. RIA News, 14/03/2013. URL: <http://ria.ru/society/20130314/927267229.html>
- Sachuk D.I. (2011) “Региональные аспекты изучения российского среднего класса [Regional aspects of research on middle class in Russia],” Vestnik Moskovskogo universiteta. Moscow, Russian Federation, Sotsiologiya i politologiya, No. 2: 93-100.
- Savelyev, S. (2005) “Есть ли у мужчин шанс? [Do men have a chance?]” Portal PROZdorovye. <http://www.prozdor.ru/2005-11-29/207-est-li-umuzhchin-shans.html>. Date of access 05-05-2016.
- Shabunova A. A. (2010) “Здоровье населения в России: состояние и динамика [Health of population in Russia: current status and dynamics]”. Institute of social-economic development RAN. Vologda.
- Shaiakhmetova, R.R. and Utiasheva I.B. (2011) “Ожидаемая продолжительность жизни в представлениях населения Башкортостана [Life expectancy in view of population of Bashkortostan],” Sotsiologicheskie issledovaniia. Sotsial'naia politika. Sotsial'naia struktura. Moscow, Russian Federation, no. 6 (June).
- Shkolnikov V.M., Andreev, E; McKee, M; Leon, D et al. (2014) “Рост продолжительности жизни в России 2000-х годов [Rising of the life expectancy in Russia of the 2000s].” Demographicheskoye obozrenie, No 2, PP. 5-37. <https://demreview.hse.ru/2014--2/137663852.html>
- Tapilina V.S. (2003) “Социально-экономическое неравенство регионов и здоровье населения [Social-economic inequality of regions and health of population]”. Rossiya, kotoruyu my obretaem. Nauka: Novosibirsk.
- Zarova E.V., and Kotiakova, M.A. (2006) “Качество экономического роста региона: методологические аспекты статистического исследования [Quality of economic growth: methodological aspects of statistical research],” Voprosy statistiki. Kachestvo i ustoychivost' regional'nogo razvitiia: territorialnyi aspekt, no. 5: 51–67.

## English-language sources

- Anderson P.M., Butcher K.F. (2006) *"Childhood Obesity: Trends and Potential Causes"* The Future of Children. V. 16. N1.
- Andrews R.L., Franke G.R. (1991) *"The Determinants of Cigarette Consumption: A Meta-Analysis."* Journal of Public Policy & Marketing. V. 10. 1991. N 1. P. 81-100.
- Arber S. (1991) *"Class, paid employment, and family roles: Making sense of Structural Disadvantage, gender and health status"*. Social Science and Medicine. V 32, No 4, 1991, PP 425-436.
- Arber S., and Cooper H. (1999) *"Gender differences in health in later life: The new paradox?"* Social Science and Medicine. 1999 January, N 48(1). PP. 61-76.
- Cutler D., Lleras-Muney A. (2010) *"Understanding Differences in Health Behaviors by Education "*. Journal of Health Economics. V. 29. P. 1-28.
- Denisova I. (2010) *"Adult Mortality in Russia"*. Economics of Transition. V. 18. N 2. P. 333-364.
- Erickson M., Mackay J. et al. (2015) *Tobacco Atlas*. Fifth edition. 2015.  
[http://3pk43x313ggr4cy0lh3tctjh.wpengine.netdna-cdn.com/wp-content/uploads/2015/03/TA5\\_2015\\_WEB.pdf](http://3pk43x313ggr4cy0lh3tctjh.wpengine.netdna-cdn.com/wp-content/uploads/2015/03/TA5_2015_WEB.pdf)
- Farrell L., Shields M. (2002) *"Investigating the Economic and Demographic Determinants of Sporting Participation in England"*. Journal of the Royal Statistical Society. V. (June): 165.. No 2, PP. 335–348.
- Grigoryev P., Mesle F., Shkolnikov V.M. et al. (2014) *"The Recent Mortality Decline in Russia: Beginning of the Cardiovascular Revolution?"* Population and development review 40(1): 107–129 (March)
- Komlos J., Smith P.K., Bogin B. (2004) *"Obesity and the Rate of Time Preference: is There a Connection?"* Journal of Biosocial Science. V. 36. No 2. P. 209-219.
- Leon D. A., L. Chenet, V.M. Shkolnikov, S. Zakharov, J. Shapiro, G. Rakhmanova, S. Vassin, M. McKee. (1997) *"Huge variation in Russian mortality rates 1984-94: artefact, alcohol, or what?"* 1997.
- Leonard K., Mudar P. (2003) *"Peer and Partner Drinking and the Transition to Marriage: a Longitudinal Examination of Selection and Influence Processes"*. Psychology of Addictive Behaviors. V. 17. P. 115-125
- Luy M. (2009). *"Unnatural deaths among nuns and monks: is there a biological force behind male external cause mortality?"*, Journal of Biosocial Science 41: 831-844.
- McDonough P. and Walters V. (2001) *"Gender and health: reassessing patterns and explanations"* Social Science and Medicine. Feb;52(4): PP. 547-59.
- McMichael A.J., M. McKee., V. Shkolnikov, T. Valkonen. (2004) *"Mortality trends and setbacks: global convergence or divergence?"* Apr 3;363(9415):1155-9.

- Mitchell J.M., Burkhauser R. (1990) *"Disentangling the Effect of Arthritis on Earnings: A Simultaneous Estimate of Wage Rates and Hours Worked"*. Applied Economics. 22. P. 1291-1310.
- Mossey, J. M. and Shapiro E. (1982) *"Self-Rated Health: A Predictor of Mortality among Elderly,"* American Journal of Public Health, no. 72 (August): 800–808.
- Nazarova I. B.(2000) *"Self-Rated Health and Occupational Conditions in Russia"*. Social Science & Medicine, 51(9):1375-85.
- Peto R., Lopez A.D., Boreham J., Thun M., Heath C.Jr. (1986) *"Mortality from tobacco in developed countries: indirect estimation from national vital statistics. Tobacco: A Major International Health Hazard"*. Lyon (France): International Agency for Research on Cancer: PP.87-101.
- Philipson T.J., Posner R.A. (1999) *"The Long-Run Growth in Obesity as a Function of Technological Change"*. NBER Working Paper. No 7423
- Poulain M. (2012) *"The Longevity of Nuns and Monks: A Gender Gap Issue Investigated with new Belgian Data"* Population Association of America 2012 Annual Meeting Program. San Francisco, April 2012.
- Sallis J.F., Glanz K. (2006) *"The Role of Built Environments in Physical Activity, Eating and Obesity in Childhood"* The Future of Children. V. 16. N 1. P. 89-108.
- Shkolnikov V., M. McKee., D. A. Leon (2001). *"Changes in life expectancy in Russia in the mid- 1990s"*. Lancet, Mar 24;357(9260):917-21.
- Shkolnikov, V.M. and Mesle F. (1995) *"The Russian Epidemiological Crisis as Mirrored by Mortality Trends / RAND,"* in Russia's Demographic Crisis" (RAND Conference, Moscow, Russia: RAND, 1995), 113-63.
- Specter, M. (1994) *"Climb in Russia's Death Rate Sets Off Population Implosion,"* New York Times, March 6.
- Treisman D. (2010) *"Death and Prices: The Political Economy of Russia's Alcohol Crisis"* Economics of Transition. V. 18. 2010. N 2. P. 281-331
- The World Bank. (2016) *Data: GDP per capita, PPP (constant 2011 international \$)*. Accessed on 15-05-2016.  
<http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD?display=default>
- World Economic Forum. (2015) *The Global Gender Gap Report 2015*. World Economic Forum: Reports.  
[http://www.who.int/gho/publications/world\\_health\\_statistics/2016/en/](http://www.who.int/gho/publications/world_health_statistics/2016/en/)
- World Health Organization. (2016a) *Global Health Observatory data repository: Life expectancy, data by country*. Accessed on 20-04-2016.  
<http://apps.who.int/gho/data/node.main.688>



World Health Organization (2016b). *World Health Statistics 2016: Monitoring health for the SDGs*. Global Health Observatory (GHO) data.  
[http://www.who.int/gho/publications/world\\_health\\_statistics/2016/en/](http://www.who.int/gho/publications/world_health_statistics/2016/en/)

World Health Organization (2015). *Life expectancy at birth, 2015, both sexes*. World Health organization: Interactive Graphs.  
[http://gamapserver.who.int/gho/interactive\\_charts/mbd/life\\_expectancy/atlas.html](http://gamapserver.who.int/gho/interactive_charts/mbd/life_expectancy/atlas.html)

World Health Organization. (2014) *Global Status Report on Alcohol and Health*. 2014. URL:  
[www.who.int/ru/](http://www.who.int/ru/)  
[http://www.who.int/substance\\_abuse/publications/global\\_alcohol\\_report/en/](http://www.who.int/substance_abuse/publications/global_alcohol_report/en/)

Zuianek J. and Mannell R. (1998) *"Life-cycle squeeze, time pressure, daily stress, and leisure participation: A Canadian perspective"*. Society and Leisure.

# Appendix 1 – Grouping of regions by the gender gap in life expectancy

Table 1. Groups of regions by the gender gap in life expectancy

Region	The gender gap in life expectancy				Growth year on year			Group
	2010	2011	2012	2013	2011	2012	2013	
Ingushetia	7.15	7.29	6.29	5.35	102%	86%	85%	C-1
Chechnya	6.39	6.95	5.66	5.78	109%	81%	102%	C-2
Dagestan	7.71	7.30	6.54	6.49	95%	90%	99%	C-3
Moscow city	8.26	8.35	7.99	7.86	101%	96%	98%	C-4
Chukotskiy	10.87	8.82	8.28	7.77	81%	94%	94%	C-5
Stavropolskiy	10.67	10.09	9.48	9.36	95%	94%	99%	C-6
Karachaevo-Cherkessiya	10.05	10.16	9.61	9.12	101%	95%	95%	C-7
Kabardino-Balkaria	9.71	9.67	9.25	9.05	100%	96%	98%	C-8
Saint-Petersburg	10.03	9.92	9.38	8.95	99%	95%	95%	C-9
Yamalo-Nenetskiy	8.98	9.26	8.89	9.35	103%	96%	105%	C-10
Khanty-Mansiysk	10.21	9.70	9.76	9.81	95%	101%	101%	C-11
Krasnodarskiy	10.59	10.12	10.06	10.11	96%	99%	100%	C-12
Kostromski	12.57	11.60	11.70	10.99	92%	101%	94%	D-13
Volgogradski	11.19	11.20	11.26	10.46	100%	101%	93%	D-14
Mordovia	11.85	12.11	12.35	11.60	102%	102%	94%	D-15
Buryatia	12.41	12.01	11.92	10.74	97%	99%	90%	D-16
Sakhalinskiy	12.38	12.44	12.33	11.36	100%	99%	92%	D-17
Ivanovski	12.54	12.60	11.81	11.52	100%	94%	98%	D-18
Kaluzhski	13.00	12.18	11.72	11.08	94%	96%	95%	D-19
Osetiya	11.31	11.44	10.73	10.60	101%	94%	99%	D-20
Penzenski	12.84	12.95	11.90	12.05	101%	92%	101%	D-21
Ulyanovski	12.56	12.65	11.73	11.66	101%	93%	99%	D-22
Komi	12.59	12.96	12.27	12.17	103%	95%	99%	E-59
Belgorodski	10.44	10.89	10.70	10.46	104%	98%	98%	E-60
Khakasiya	10.97	11.48	11.61	11.19	105%	101%	96%	E-61
Altai	11.75	11.41	12.25	11.96	97%	107%	98%	E-62
Kamchatski	11.33	10.62	10.90	11.48	94%	103%	105%	E-63
Kalmykia	11.23	11.44	11.05	11.60	102%	97%	105%	E-64
Kurganski	12.95	12.97	12.74	13.04	100%	98%	102%	E-65
Chuvashia	12.87	12.73	12.17	12.60	99%	96%	104%	E-66
Kaliningradski	10.90	10.88	10.35	10.60	100%	95%	102%	E-67
Sverdlovski	12.22	12.04	11.83	12.22	99%	98%	103%	E-68
Ryazanski	13.61	12.77	12.17	11.84	94%	95%	97%	F-69
Yaroslavl	13.27	12.78	12.32	12.12	96%	96%	98%	F-70

Kemerovskiy	13.23	12.88	12.62	12.54	97%	98%	99%	F-71
Nizhegorodskiy	13.27	12.87	12.67	12.69	97%	98%	100%	F-72
Evreyskiy	13.39	12.43	11.85	12.82	93%	95%	108%	F-73
Vologodskiy	13.56	13.01	12.43	12.42	96%	96%	100%	F-74
Smolenskiy	13.52	12.75	12.19	12.04	94%	96%	99%	F-75
Vladimirskiy	13.17	12.65	12.59	12.66	96%	100%	101%	F-76
Tverskiy	13.34	12.69	12.48	11.75	95%	98%	94%	F-77
Lipetskiy	13.35	12.93	12.62	12.21	97%	98%	97%	F-78
Irkutskiy	13.16	12.91	13.00	12.96	98%	101%	100%	F-79
Bryanskiy	13.28	13.43	13.18	12.98	101%	98%	98%	F-80
Mariy-El	13.35	13.14	12.73	13.31	98%	97%	105%	F-81
Novgorodskiy	13.68	13.90	13.21	13.86	102%	95%	105%	F-82
Nenetskiy	12.21	12.86	13.86	14.98	105%	108%	108%	F-83
Orlovskiy	12.62	12.61	12.95	11.56	100%	103%	89%	G
Murmanskiy	11.21	11.65	11.40	10.05	104%	98%	88%	G
Karelia	13.59	12.48	13.28	11.88	92%	106%	89%	G
Pskovskiy	14.01	12.80	13.13	12.24	91%	103%	93%	G
Adigeya	11.46	10.34	10.61	10.42	90%	103%	98%	G
Tyva	11.97	10.33	11.38	11.14	86%	110%	98%	G
Magadanskiy	11.29	12.45	11.03	10.93	110%	89%	99%	G

Colouring of cells for regions' grouping

negative' indicator	8,82	107%	90%
more than	+ 1 st.dev.	+ 2 st.dev.	+3 st.dev.
positive' indicator	8,28	7,71	6,29
les than	- 1 st.dev.	-2 st.dev.	-3 st.dev.

## Appendix 2 - Cross-section analysis of urbanization factor

To investigate whether urbanization factor can explain regional variance of the gender gap in life expectancy, let us look on its distribution across regions. In all years distribution was almost symmetric, centered around 0, and in 2012 a few outliers in high and low values appeared. The range increased from 5.28 years in 2010 to 13.35 years, and with the exception of outliers (Chukotskiy -6.31; Nenetskiy +7.04) increased to 6.41 years in 2012, and the regional variance increased. However, average value dynamics doesn't indicate this problem and shows positive dynamics of narrowing the gap, as it has decreased from 0.38 years in 2010 to 0.27 years in 2012.

Distribution analysis confirms also that urbanization factor cannot be used for regional variance analysis also, because its range is small and is close to normal distribution. Especially with hypothesis of higher gender gap for rural areas compared to urban areas, i.e. that difference of The gender gap in Life expectancy between rural areas and rural areas, and indeed in 35 regions the difference between rural and urban gender gap still remains positive and high, varying from 0.49 to 7.04 years in 2012 (Figure 1).

In a significant number of regions where opposite was observed, which is illustrated in Figure 2. In 13 regions urban gender gap in Life expectancy was higher than rural, and most of regions are not highly urbanized; that could be explained with the fact that males that moved to urbanized areas adapted worse to social pressure and new social roles and haven't improved lifestyle to make it healthier (which is usual effect as demonstrated in various studies as the main important for The gender gap behavioral factor), so that The gender gap in Life expectancy increased for them, which could be marked as 'abnormal'. In 2012 year 15 regions

situation sign of Urban/Rural difference also got negative, and further research may reveal what were the factor that caused such shift for many regions that year.

*Figure 1. Distribution of Urban/Rural the gender gap in life expectancy by regions. 2010-2012*

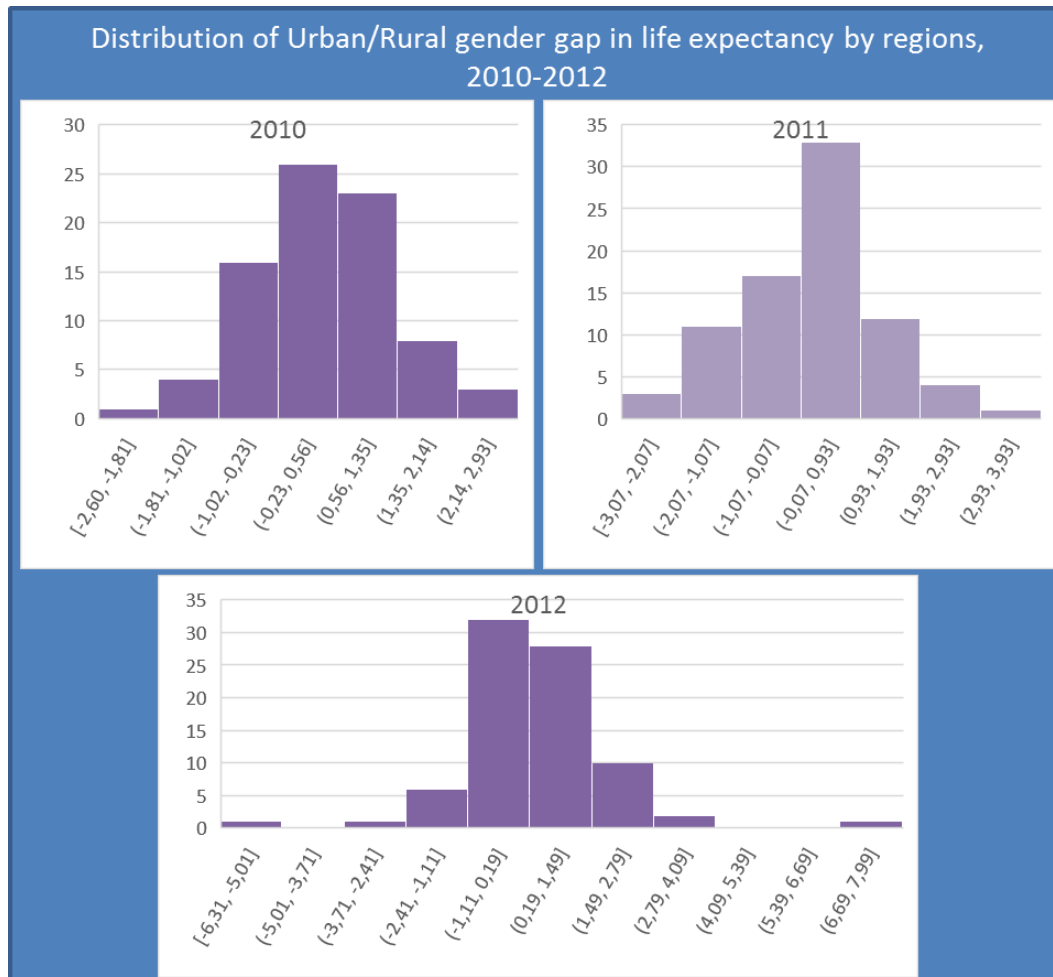


Figure 2. Rural and urban differences in the gender gap in life expectancy. 2010-2012

