


Measuring Population Ageing in Russian Regions: A Step-by-Step Approach

Elena V. Vasilyeva ^a

Institute of Economics, Ural Branch of Russian Academy of Sciences, Yekaterinburg, Russia


Keywords: Ageing Population, Age Structure, Fertility, Mortality, Migration, Region.

Abstract: The article assesses the process of population ageing in Russian regions. The analysis was carried out using an algorithm of step-by-step assessment, which was developed based on the demographic approach. This algorithm correlates the population under study with one of the ageing stages taking into account such criteria as the proportion of the elderly population and reproduction trends. The assessment was made on statistical data provided by Rosstat. According to the results, the population is ageing across all Russian regions, although this process is extremely uneven. The population is younger in those Russian subjects, where either the process of demographic transition is in the initial stages or the reproduction of the population is determined by migration. In the majority of Russian subjects, the process of population ageing occurs ‘from below’, determined by a decline in fertility rather than a decline in mortality. At the same time, in many regions, mortality among women is shifting markedly to later ages, contributing to a higher feminization of the ageing population. It is only in Moscow that an older age structure has been formed. Here, the life expectancy of the elderly population continues to grow. Given a gender gap, the population ageing was assessed separately, excluding the male mortality. The adjusted assessment showed that (1) 8 Russian regions are characterized by the ageing population ‘from below’ (both men and women); and (2) the ageing process ‘from above’ occurs in 66 Russian regions, where women of 55 years and older have a relatively high life expectancy associated with social, cultural and economic factors forming a healthy lifestyle and self-preserving behaviour. The revealed specifics of population ageing in Russian regions should be considered when developing state policies aimed at improving the living standards of the elderly population. The priority tasks should be health preservation of the population (particularly relevant for men), higher living standards and improved working conditions.

1 INTRODUCTION

The ageing of the population is a global demographic trend affecting all societal levels. Due to the significant regional heterogeneity of Russia, the ageing of the population here is uneven (Dobrokhleb and Barsukov, 2017). An increase in the proportion of the elderly population in some Russian regions may indicate the presence of socio-economic problems, rather than demographic trends. Therefore, the knowledge of the current age structure is important for revising state policies aimed at improving the living standards of the elderly population. The purpose of this research is to assess the level of population ageing in Russian regions.

According to the definition of population ageing, its most obvious measure should be the proportion of the elderly in the total population (ageing coefficient). However, from the standpoint of decision-making, it is important to consider not only the process of population ageing, but also its underlying reasons. Since declining fertility and mortality have a different impact on population ageing, the adaptation mechanisms to the resulting negative changes should be flexible (Kapelushnikov, 2019). Moreover, population ageing can be accompanied by both an increase in the demographic burden on the working-age population and its decline, depending on the growing or reducing proportion of children (Vishnevsky and Scherbakova, 2019). Therefore, the policy measures taken in response to population

^a <https://orcid.org/0000-0002-0446-1555>

ageing should be based on changes in the age structure, i.e. considering the type of ageing. When the population is ageing 'from below', the health of the population becomes the major focus. Therefore, primary measures aim to improve the efficiency of the healthcare system and the living and working conditions of the population. When the population is ageing 'from above', the state should target the education system, creation of new employment opportunities and raising the retirement age. All these measures create the conditions for the potential of the elderly population to be fully realized.

Nevertheless, the use of conventional indicators based on fixed threshold values (60, 65 years or retirement age) is justified, because they form a basis for social programmes and normative documents regulating the life of elderly people, including pension legislation. These indicators are supported by state statistical data and require no additional calculations, thus allowing a regional and international comparative analysis. Therefore, an approach to measuring population ageing should include both conventional indicators and those describing the reasons for changes in the age structure. Taking this into account, the author developed an approach for assessing population ageing.

2 RESEARCH METHODOLOGY

On the basis of theoretical and empirical studies, in particular, the theory of demographic transition, a scheme for assessing population ageing was developed (Figure 1). This scheme is a step-by-step assessment algorithm, which considers the reasons underlying changes in the age structure based on statistical data provided by Rosstat.

By analogy with the ageing scale proposed by the United Nations, three main stages of the age structure are distinguished: young, ageing and old populations. Since the causes of ageing are of fundamental importance, the types of ageing are also highlighted: an ageing population 'from below', an ageing population 'from above', as well as an ageing population under the influence of external factors (natural disasters, epidemics, military operations, etc.). The population under study is correlated with one of these stages taking into account the criteria characterizing the proportion of the elderly population and trends in population reproduction. Thus, a certain stage of population ageing is revealed step by step as follows:

- first step – identification of the population with a young age structure;
- second step – identification of the population whose age structure is formed under the influence of external factors;
- third step – identification of the population ageing 'from below';
- fourth step – identification of the population ageing 'from above';
- fifth step – identification of the population with an old age structure (Vasil'eva, 2021).

The basic criterion in this approach is the population ageing rate, which uses the working age as the age limit. According to the current legislation of the Russian Federation, the working age for men and women comprises 16–59 and 16–54 years old, respectively. Such a limit of the old age facilitates the collection and processing of data, as well as their economic interpretation. Taking into account the level of dependency ratio (Avraamova et al., 2017) and the optimal proportions between workers and retirees (The ratio of workers ..., 2018), the following scale in terms of the proportion of the population over working age in the total population is proposed:

- young population – 20% or less;
- ageing population – 20 to 25%;
- old population – 25% and more.

Since young population is determined only on the basis of the ageing coefficient, other stages of population ageing require additional criteria to characterize trends in the natural reproduction of the population. These criteria include fertility and mortality. The fertility rate of the population and its reproductive attitudes are taken into account through the total fertility rate. The threshold value of this indicator is determined by the level of simple reproduction, i.e. 2.1 children per one woman. Since the mortality rate determines population ageing only in older age groups, the stages of ageing are determined based on the value of life expectancy considering the gender context. The threshold value of this indicator is determined taking into account international trends (Life expectancy ..., 2019) and actuarial calculations that implement the insurance principle of equivalence of pension rights and obligations (length of service and the period of life) (Solov'ev, 2012): for men – 20 years, for women – 25 years old.

Since the rate of ageing is influenced by the direction and intensity of population migration, the 6th step determines the presence of such an effect on each of the identified stages. When the inflow or outflow of migrants exceed 0.5% of the population, the ageing process either intensifies or slows down.

The described step-by-step algorithm enables one to assess the level of population ageing, at the same time as considering its underlying reasons. This

facilitates the development of strategic decisions aimed at improving the living standards of older generations.

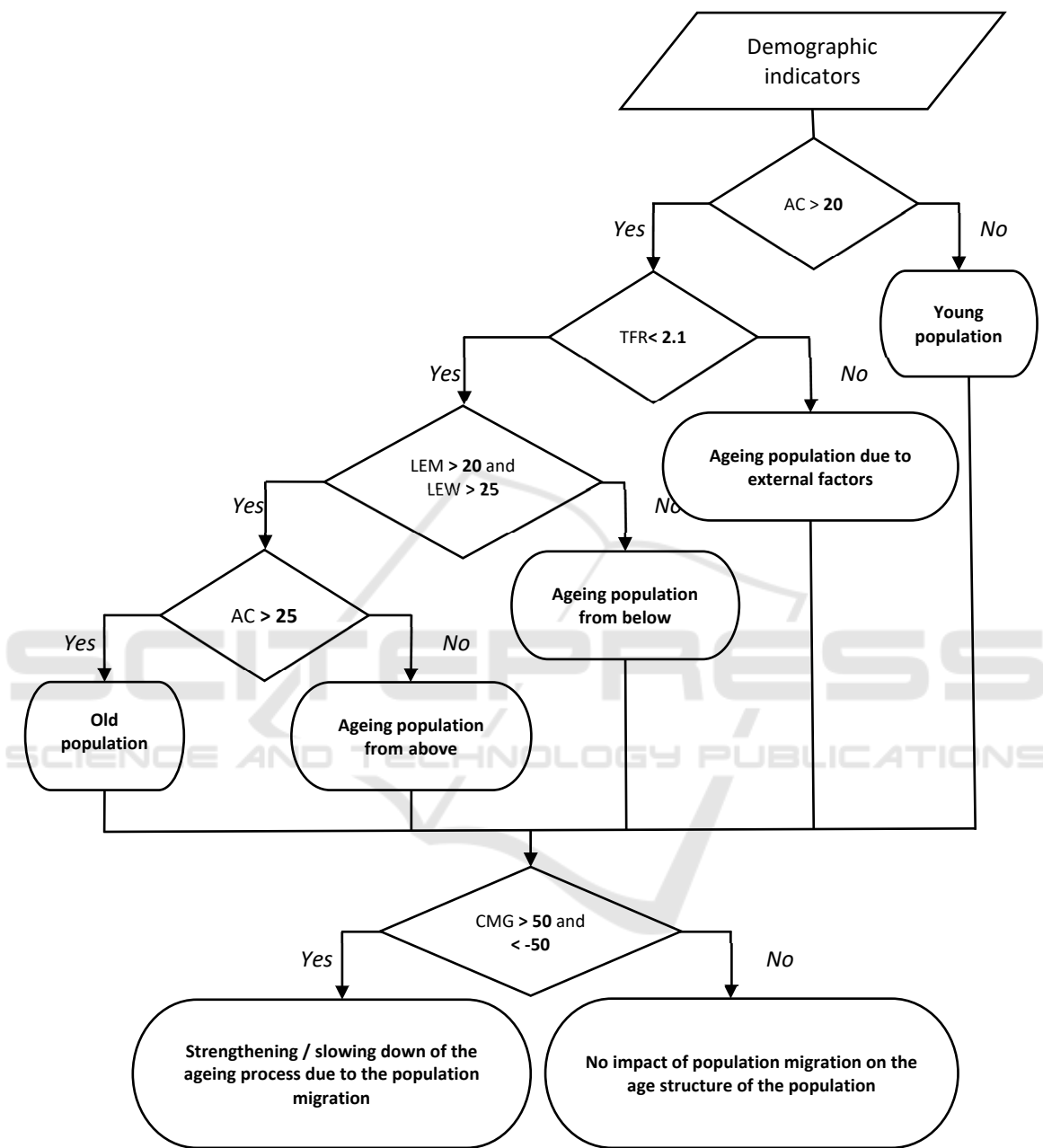


Figure 1: Population Ageing Assessment Scheme.

Note: AC – ageing coefficient (proportion of the population over working age in the total population), %; TFR – total fertility rate, the number of children per woman; LEM – life expectancy of men having reached the age of 60 years, years; LEW – life expectancy of women having reached the age of 55 years, years; CMG – coefficient of migration growth, people per 10 thousand people.

Source: Authoring.

3 RESEARCH METHODOLOGY

The ageing of the population in Russian regions was assessed taking into account its level and the underlying reasons. Only 10 subjects of the Russian Federation, including the Far North, 3 republics of the North Caucasus and 2 subjects of Siberia, are characterized by a young age structure.

In these RF subjects, the ageing coefficient is the lowest in Russia. In 2018, this coefficient ranged from 10.4% (Chechen Republic) to 18.5% (Republic of Altai and the Nenets Autonomous Okrug), which can be explained by the regional specifics. On the one hand, the Far North regions (the Republic of Sakha, Nenets, Yamalo-Nenets, Khanty-Mansi and Chukotka Autonomous Okrug) are industrialized areas with a relatively high level of wages, which determines the inflow of young labour migrants (Mkrtychyan and Florinskaya, 2018). On the other hand, the harsh natural and climatic conditions here make retirees to move to more favourable regions, both independently and under programmes funded by the state and enterprises (Karachurina and Ivanova, 2017). This internal migration contributes to the rejuvenation of these subjects.

The subjects of the North Caucasus (the Republics of Ingushetia, Dagestan and the Chechen Republic) and Siberia (the Republics of Altai and Tyva) are characterized by a high fertility rate typical of rural populations in agrarian regions with more traditional families. Moreover, if the total fertility rate in the Republics of Ingushetia and Dagestan differs slightly from the national average and is below the level of simple reproduction, the Republics of Altai, Chechnya and Tyva show its highest level in Russia (in 2019, 2.3, 2.6 and 3.0 children per one woman, respectively). This indicates the incompleteness of demographic transition in these subjects. In addition, the Republics of Altai and Tyva are characterised by a high mortality rate, including infant mortality, which reflects an unsatisfactory medical-demographic and socio-economic situation.

The population in the majority (74 out of 85 subjects) of Russian subjects is classified as the population ageing 'from below', i.e., the ageing process occurs due to a decrease in the fertility rate, while maintaining a high mortality rate in older age groups. In Russia, there is a significant gender gap in the life expectancy of the population (Belov and Rogovina, 2014; Smirnova, 2014), which exceeded 11 years in the Bryansk region in 2018. Given this gender gap, the population ageing was assessed separately, excluding the male mortality.

First, the adjusted assessment showed that 8 RF subjects are characterized by the ageing population 'from below' (both men and women): Far East (Zabaykalsky, Kamchatka and Primorsky Krai, Amur, Magadan and Sakhalin oblasts and the Jewish Autonomous Oblast) and Murmansk Oblast. According to the analysis of the spatial patterns of mortality in Russia (Andreev, 1979), such an unfavourable demographic situation in these regions have persisted since the 1970s. However, although the inequality between the regions is decreasing due to a reduced contribution of external factors in younger and middle age groups and diseases of the circulatory system in middle age groups, the regional gap in mortality in older ages is growing (Danilova, 2017). This is largely because some Russian regions started a new stage of epidemiological transition (Vishnevsky, 2014) ("second epidemiological revolution", "sanitary transition", "cardiovascular revolution"), reducing mortality from non-infectious causes. Conversely, other regions have not yet succeeded in limiting the role of external death factors.

Second, the ageing process 'from above' occurs in 66 RF subjects, where women of 55 years and older have a relatively high life expectancy associated with social, cultural and economic factors (Ivanova, 2010; Roshchin, 2005) forming a healthy lifestyle and self-preserving behaviour. In almost all countries of the world, women live longer than men; therefore, as a rule, the population ageing process is accompanied by its feminization (Arber, 2016). In these RF subjects, the difference between the life expectancy of men and women who have reached 60 and 55 years, respectively, is about 10 years.

Taking into account all the criteria, it is only in Moscow that the old population structure has developed. Although the ageing coefficient here is not the highest among other regions, in 2018, 27.2% of the population was older than the working age. In terms of this indicator, Moscow ranked the 30th among all RF subjects. However, compared to other RF subjects with an ageing coefficient of over 25% (in 2018, this number was 45), the Moscow population is ageing as a result of a decreased mortality among the elderly rather than an increased fertility. In Moscow, the life expectancy of men who have reached 60 years exceeded 20 years, which is associated with the availability and quality of medical services, as well as health-preserving behaviour of the population.

A high migration outflow of the population is observed from the subjects of the North-West, Far North and Far East, as well as from the border

regions. These regions are considered unfavourable due to the climatic conditions and low living standards. In Russia, centres of attraction for migrants were formed: national (Leningrad, Moscow and Kaliningrad Oblast, Sevastopol, Moscow and St. Petersburg) and regional (Tyumen Oblast, the Republics of Ingushetia and Adygea). The centre-peripheral migration movement is determined by various, in particular, economic factors. As noted by Becker G. (Becker, 1993), the migration decision is made by weighing the potential advantages and costs, as well as by comparing the current standard of living with the expected one. Therefore, the unsatisfactory quality of life in peripheral regions forms a negative migration balance, which makes younger populations to migrate to more prosperous central regions.

4 CONCLUSIONS

According to the conducted analysis, the process of population ageing is observed across the entire territory of Russia. However, this process is extremely uneven between Russian regions. Thus, younger RF subjects are those, where either the process of demographic transition is in the initial stages or the reproduction of the population is determined by migration. In most RF subjects, the process of population ageing occurs 'from below', with its reason being a decline in fertility rather than a decline in mortality. At the same time, in many regions, mortality among women is shifting markedly to later ages, contributing to a higher feminization of the ageing population. An older age structure was formed only in Moscow, where the life expectancy of the elderly population is steadily increasing.

The revealed specifics of population ageing in Russian regions should be considered when developing state policies aimed at improving the living standards of the elderly population. The measures of the so-called silver economy, such as provision of geriatric services and creation of new jobs friendly to older people, can only be effective when the overall mortality rate is decreased and shifted to later ages. Therefore, the priority tasks should be health preservation of the population (particularly relevant for men), higher living standards and improved working conditions.

ACKNOWLEDGEMENTS

The article was prepared with the support of the Russian Foundation for Basic Research (Grant No. 19-010-00373 «Security and pseudo-security of the economic development of Russian regions influenced by multidirectional trends»).

REFERENCES

- Andreev, E.M. (1979). Life expectancy in the USSR: Differential Analysis, *Life Expectancy: Analysis and Modeling*. Moscow, Statistics, pages 7-31.
- Arber, S. (2016). Gender and Ageing in Global Context: Role of Marital Status. translated from English by E.V. Vyugovskaya, A.A. Ipatova, *Monitoring of Public Opinion: Economic and Social Changes*, 2: 59-78.
- Avraamova, E.M., Karavay, A.V., Loginov, D.M. (2017). *Adaptive Population Strategies: between Survival and Development*. Moscow, RANEPa.
- Becker, G. (1993). The Economic Way of Looking at Behavior, *The Journal of Political Economy*, 101(3): 385-409.
- Belov, V.B., Rogovina, A.G. (2014). The basic medical demographic indicators of population health of Russia up to 2013. *Problems of Social Hygiene, Public Health and History of Medicine*, 6: 18-22.
- Danilova, I.A. (2017). Interregional Inequality in Life Expectancy in Russia and its Age and Cause of Death Components, *Social Aspects of Population Health*, 5.
- Dobrokhleb, V.G., Barsukov, V.N. (2017). Demographic Theories and the Regional Aspect of Population ageing, *Economic and social changes: facts, trends, forecast*, 10(6): 89-103.
- Ivanova, E.I. (2010). Mortality rate among Russian men. *Sociological studies*, 5: 87-99.
- Kapelyushnikov, R.I. (2019). The phenomenon of population aging: Major Economic Effects, *Economic policy*, 14(2): 8-63.
- Karachurina, L.B., Ivanova, K.A. (2017). Migration of the Elderly Population in Russia (According to the 2010 Population Census), *Regional Studies*, 3(57): 51-60.
- Life expectancy at the age of 0, 1, 15, 45 and 65. *Demoscope Weekly*, <http://www.demoscope.ru/weekly/app/app4011.php>
- Mkrtchyan, N.V., Florinskaya, Yu.F. (2018). Labor Migration in Russia: International and Internal Aspects, *Journal of the New Economic Association*, 1(37): 186-193.
- Roshchin, S.Yu. (2005). Are Women equal to Men? (Part II). *Demoscope Weekly*, 221-222, <http://www.demoscope.ru/weekly/2005/0221/tema05.php#21>.
- Smirnova, A.V. (2014). Gender analysis as a tool for assessing human capital (on the example of demographic processes), *Woman in Russian Society*, 3: 46-53.

- Solov'ev, A.K. (2012). Long-term forecasting of the development of Russia's pension system: Factors and conditions. *Studies on Russian Economic Development*, 3(23): 271-281.
- The ratio of workers and retirees in Russia will reach 3: 1 by 2030. *TASS*, <https://tass.ru/ekonomika/5404140>.
- Vasil'eva, E.V. (2021). Regional assessment of aging of the population of Russia, *Regional Economics: Theory and Practice*, 19(1): 139–168.
- Vishnevsky, A.G. (2014). Mortality in Russia: the Second Epidemiological Revolution that never was, *Demographic Review*, 4(1): 5-40.
- Vishnevsky, A.G., Shcherbakova, E.M. (2019). Demography: Pros and Cons of Raising the Retirement Age, *Journal of the New Economic Association*, 2(42): 148-166.

