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POPULATION AGING FEATURES: ANALYSIS OF REGIONAL DIFFERENTIATION

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The article presents an analysis of the demographic characteristics of population aging in different regions of Russia with a study of middle age and its dynamics. The aim of the study is to analyze the regional characteristics of population aging and differentiation according to this process to assess its impact on the quality of life and human potential of territories. The scientific novelty lies in the application of a dynamic approach that takes into account not only the level of average age, but also its growth rate, which makes it possible to identify new types of demographic trajectories. The first part of the article discusses research on the analysis of aging processes in Russian regions using various classification and grouping methods. For comparison, examples of international approaches to the typification of aging territories by both macro-regions and regions within the country are given. The second part analyzes the average age of the population and its dynamics in Russian regions for the period from 2010 to 2024. The study revealed regional differences in the levels and rates of increase in the average age of the population due to factors of fertility, mortality, migration and cultural characteristics. The oldest regions are concentrated in the Central and Volga Federal Districts, where the average age is highest, while the regions of the North Caucasus Federal District and the Republic of Tuva show a low average age due to high birth rates and traditional family values. An analysis of gender and territorial differences shows that women age more slowly than men, and the urban population as a whole ages faster than the rural population. Within the framework of the

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classification, seven groups of regions are identified according to the level and dynamics of average age, which makes it possible to systematize the features of the demographic situation in different parts of the country. In conclusion, the article draws conclusions on the situation with the aging of the population in the Russian Federation and formulates proposals for a differentiated regional policy.

Population aging, regional differentiation, elderly population.

Introduction

In Russia, there is a tendency to increase the share of elderly people in the total population. The share of citizens over 65 was about 24% in 2023 according to Rosstat; and by 2046 it is projected to increase to 27% (Wang, 2025). According to the forecasts of the World Bank, the aging of the Russian population will continue in the coming decades, which is associated, in particular, with an increase in life expectancy. By 2030, older people will make up almost a third of the country's population. Such a situation may require reforming the pension system and redistributing resources in favor of healthcare and social support for the elderly.

The increase in population aging was influenced by the second demographic revolution, which began in Western Europe in the late 18th and mid-19th centuries (Kolesov, Kalachikova, 2023). It was caused by the development of the capitalist mode of reproduction due to the development of trade, technology and industry. As a result of the revolution, there was a significant decrease in mortality while reducing the birth rate after its significant growth, which led to an increase in life expectancy. As a result, the number of people who have reached retirement age has increased dramatically in the 20th century. Russia is also facing these demographic changes.

In terms of the demographic burden of people over 65, Russia ranks 49th among more than 200 countries and territories (Petrosyan et al., 2019). Similar indicators can be seen in developing countries that completed demographic transition early. These are the countries of Latin America and the Caribbean, where the population of European origin prevails, as well as relatively young European countries, where Catholic Christianity has traditionally been strongly influenced. Latin American countries are similar to Russia in that they are experiencing accelerated population aging, associated with a simultaneous decrease in the number of young age groups and an increase in life expectancy at older ages.

Demographic changes in Russia are also caused by a decrease in the birth rate and mortality, as well as an increase in the life expectancy (Barsukov, 2018). In a situation of simultaneous reduction in the number of deaths and births, the change in the age structure was manifested in a decrease in the share of children and a constant increase in the share of the elderly. The main reason for the aging of the Russian population in the 20th century was a sharp decline in the birth rate, which caused aging to occur faster than in most developed countries. From 1959 to 1989, the share of people over the age of 60 increased from 9% to 15.3% (Popova, Zorina, 2024).

Migration processes, along with the natural movement of the population, have a significant impact on regional differences in age structure. The age selectivity of migration is particularly noticeable, since young people of working age are the most mobile. As a result, the donor regions are losing the most economically active part of the population, which, in turn, accelerates their demographic aging. At the same time, recipient regions can temporarily "rejuvenate" due to the influx of young people (Mkrtchyan, 2014).

Since the end of the 20th century, the age structure of the Russian population has undergone significant changes. From 1989 to 2010, the share of elderly people (65 years and older) more than doubled, from 9.6% to 20.7% (Antipova, Trifonova, 2017). The composition of the regions with the highest proportion of elderly people has changed slightly in dynamics. These are mainly the regions of Central Russia. However, whereas in 1989 only 25 regions had less than 7% of the population over 65 years of age, in 2010 in all constituent entities of the Russian Federation this figure exceeded 7%, and in 63 regions the share of elderly people began prevailing over the share of children. The geography of such territories is extensive and generally coincides with the main settlement area. The types of regions with very old and elderly populations are represented in the European part of the country and beyond the Urals, with this band narrowing to the east.

Among the macro-regions in the period from 1990 to 1998, the Far Eastern Federal District experienced the most significant increase in the aging coefficient (1.16 times) (Shabunova, Barsukov, 2015). At the same time, the growth rate in the Central Federal District was the lowest (1.06 times). During this period, the share of elderly people in the Far Eastern Federal District remained the lowest among all federal districts of the Russian Federation. In the period from 2007 to 2013, most of the macro-regions of Russia faced a "wave of aging". The most noticeable increase in the aging coefficient was observed in the Far Eastern Federal District (1.23 times). The North Caucasus Federal District, on the contrary, showed the smallest increase in the proportion of elderly people, which is why it became the youngest macro-region. For 23 years, from 1990 to 2013, the Central Federal District remained the "oldest" macro-region in Russia.

Overcoming demographic aging is one of the main tasks for the sustainable development of Russian regions. It has a significant impact on the quality of life of citizens and the human potential of territories. The increase in the share of elderly people is changing the structure of consumer preferences, placing new demands on healthcare systems, social services and the labor market, which, in turn, affects the socio-economic situation in the regions. The aging trend of the population requires a revision of society's attitude toward the elderly and the fight against ageism. Surveys show that the main problems for the older generation are poverty and low pensions, deteriorating health and illness, a sense of uselessness and loneliness (Dobrokhleb, 2021).

The aim of this study is to analyze the differentiation of regional trends in population aging and to systematize regional groups of the Russian population aging according to the nature and intensity of demographic aging. This will allow assessing how the differences in this process affect the threats and opportunities for human potential and living standards in different Russian regions.

Research on the differentiation of demographic aging

The research results conducted by A.N. Petrosyan demonstrate that the most intense aging of the population is observed in regions with a low share of elderly people (Petrosyan et al., 2019). This applies to the republics of the eastern part of the North Caucasus, where the rural population predominates, as well as to the Siberian and Far Eastern republics. The northern regions, which are oil production areas, as well as the regions of the Russian North and the Far East, are also aging rapidly. In most regions of Russia, where about two thirds of the country's population lives, aging occurs relatively evenly, with small differences within this group. The main difference between the regions is the division into north and south. In the regions of the Far North and in territories equated to them

(including most of the regions of the North of the European part of Russia, Siberia and the Far East), the share of working pensioners is higher. At the same time, there are fewer working pensioners in the southern (more rural) regions.

To analyze the processes of population aging in Russian regions, researchers use various methods of grouping and classification. S. Bukher developed a system of correlations between 10 indicators and a composite index of population aging in Russia, where subjects were divided into four groups depending on the intensity of population aging (Bukher, 2016). The regions were sorted by 10 indicators in ascending or descending order, depending on how the indicator affected the aging process. The distribution by group turned out to be uniform: 21 regions fell into the "very elderly" category, 20 into the "elderly" category, 19 into the "young" category, and 23 into the "very young" category. The "very elderly" group includes the regions of the European part of Russia, mainly from the Central Federal District (Tula, Ryazan, Voronezh, Tambov regions, etc.). The "very young" group includes the regions of the North Caucasus Federal District (Chechen Republic, Republic of Ingushetia, etc.) and the Asian part of Russia (Chukotka Autonomous Area, Republic of Tyva, etc.).

E.V. Chistova proposed her own method for determining the stage of demographic aging of the population at the regional level (Chistova, 2017). Her approach is based on four principles. The first principle is to determine the aging stage of the population using a developed system of thresholds. This system includes parameters such as the level of aging, its depth, factors and speed. Indicators of the level and depth of aging describe the current situation, while indicators of factors and speed characterize the trends and prospects of this phenomenon in the region. The second principle is the conventionality of the age limit. In the developed method, it is set at the retirement age. The third principle is to correlate the population of each region with one of the four stages of demographic aging (young population, aging population, old population and deeply old population). The fourth principle is to assess the dynamics of demographic processes in the regions. To do this, the actual values of the indicators are compared with the 1990 levels, which allows obtaining a long time period, avoid the demographic crisis in the 1990s, and align the results with generational theory.

The correlation of regions with the stages of demographic aging showed that 60% of the constituent entities of the Russian Federation have an old and deeply old population (Chereshnev, Chistova, 2017). Only 10 regions, including the regions of the Far North, the North Caucasus and Siberia, have a predominantly young population. This population structure may be due to "rejuvenation" due to migration, high birth rate and natural growth. There are 23 regions of the Russian Federation with an aging population, mainly in the regions of Siberia and the Far East, where the proportion of elderly people is small due to regional peculiarities and migration outflow. Thirty-four regions of the Russian Federation have an older population, mostly regions with relatively high production potential. The 16 regions of the central part of Russia have a deeply old population. A characteristic feature of this stage is the aging of the older population or the "deepening" of aging.

In 2019, before the outbreak of the pandemic, the situation with the distribution of regions by age group looked different (Vorob'eva et al., 2022). The first group with a young population included three regions with high birth rates: the Republic of Tyva, the Chechen Republic and the Nenets Autonomous Area. The second group with an aging population includes 13 regions, mainly from the Ural, Far Eastern and North Caucasian federal districts. The third group with the old population includes 52 regions, covering

almost all federal districts. The fourth group with a very old population included 17 regions representing almost all regions of the Central Federal District. From 2017 to 2019, the number of regions with an older population increased significantly. However, the comparison may not be entirely correct, since in 2019 it was conducted only according to the total fertility rate.

O.O. Sekitski-Pavlenko conducted a classification of regions based on the calculation of the aging index. As a result, a system was created that includes 6 main types and 18 subtypes describing the transformation of the age structure in different Russian regions (Sekitski-Pavlenko, 2023). Depending on the age structure, regions can be divided into six categories: moderately old, old, very old, on the verge of old age, young and very young. In 2022, more than 80% of the country's regions had an old age structure. At the same time, one third of all regions (32 constituent entities) belonged to the category with a moderately old age structure. The old industrial regions of Northwestern, Central Russia and the Urals have a predominantly old age structure with varying degrees of aging intensity. The very young age structure is typical only for the Republic of Tyva and the Chechen Republic, that is, for mono-ethnic and subsidized regions of the country. Both urbanized economically developed regions and low-urbanized subsidized regions are distinguished by their young age structure.

Based on the analysis of data on the proportion of people over the working age in the total population, life expectancy and the depth of aging (share of people over 75 years of age in the total elderly population), V.G. Dobrokhleb and N.A. Kondakova identified seven clusters (Dobrokhleb, Kondakova, 2022). The first list includes 12 regions, including the major cities of Moscow, Saint Petersburg and Sevastopol, as well as the subjects of the North Caucasus and Southern Federal Districts. In these regions, every fifth person is elderly, and life expectancy is above average. The second cluster includes only two regions – the Republics of Dagestan and Ingushetia. The population here is young, but life expectancy is high, and the proportion of people over 75 is also significant. The third cluster includes 21 regions. Its characteristics are similar to the first one, but the life expectancy here is slightly lower. The fourth cluster includes the republics of Tyva, Sakha (Yakutia), the Chechen Republic, the Tyumen Region and the Khanty-Mansi Autonomous Area. The population here is young, but life expectancy and the depth of aging are lower than in other clusters. The fifth cluster includes two regions of the Far North – the Yamal-Nenets and Chukotka autonomous areas, where there is an outflow of the population who have completed their work, which contributes to the "rejuvenation" of the population. The sixth cluster includes 13 regions, including the territories of the Far North, as well as the republics of Kalmykia, Altai, Khakassia, the Kamchatka Territory, Sakhalin and the Jewish Autonomous Region. The proportion of the elderly population here is high, and life expectancy is below average. The seventh cluster is the most numerous. It includes 30 regions located relatively compactly. In this cluster, the proportion of the elderly population and the depth of aging are high with an average life expectancy.

An analysis of the methods of classifying Russian regions by population aging shows the predominance of the division of subjects according to the ratio of the number of the elderly to the entire population or persons under working age. There is a tendency with the predominance of the aging process in the central and northern regions of Russia. They are characterized by a high share of people over the working age. The young population has regions with high birth rates and/or high migration flows.

Thus, research on the impact of population aging on the quality of life and human potential can be divided into three main groups. The first

one covers works studying the socio-economic burden associated with demographic changes. A.N. Petrosyan and co-authors, as well as S. Bukher, note that the population aging has a different impact on the labor market depending on the region (Petrosyan et al., 2019; Bukher, 2016). In the northern industrial regions, there is a high share of working pensioners, which helps to compensate for the shortage of personnel. At the same time, in the southern, predominantly rural regions, this share is significantly lower, which exacerbates the burden on the economically active population. The second group of studies focuses on the quality of life of the elderly. For example, the classification by V.G. Dobrokhleb and N.A. Kondakova makes it possible to identify regions where the health system faces the most pressing challenges in maintaining active longevity. In some clusters, low life expectancy indicates difficulties in accessing quality medical care, while in other regions, a high proportion of the elderly population requires increased volumes of geriatric care and palliative care (Dobrokhleb, Kondakova, 2022). The third category of research considers aging as a factor influencing spatial development. Works of V.A. Chereshnev and E.V. Chistova and O.O. Sekitski-Pavlenko demonstrate that regions with a high level of population aging, such as Central Russia, are facing a reduction in human capital and a decrease in innovation potential. In contrast, young regions such as Chechnya and Tyva have a demographic dividend, but their development is limited by a lack of jobs or a low level of education (Chereshnev, Chistova, 2017; Sekitski-Pavlenko, 2023).

There is a division of territories according to the degree of population aging and at the global level. M. Mustafina classified subregions and individual countries according to two criteria: the expected time when the share of the population aged 65 and over will reach 14% (before 2050 or in the period up to 2100), and the level of quantum and tempo population aging (Mustafina, 2020). As a result, she identified six types of aging processes: "early aging with low quantum and tempo"; "early aging with high quantum and tempo"; "early aging with very high quantum and tempo"; "late aging with low quantum and tempo"; "late aging with high quantum and tempo"; "late aging with very high quantum and tempo". The lowest rates of aging are observed in the more developed subregions of the world, such as Europe, North America and Australia/New Zealand. These regions belong to the first type. Northern and Southern Africa, which belong to the fourth type, will also age, but with a later onset and relatively low rates. Most of Asia and America, which belong to the second and fifth types, are already aging or will age with high rates. The highest rates of aging are observed in Western Asia and in countries such as Albania and Singapore. These regions belong to the third and sixth types. Afghanistan is estimated to age at its highest rates in the second half of the 21st century.

In the study by I. Kiniorska et al., their own classification of territories with an imbalance in the age structure of the population from 2008 to 2021 was developed (Kiniorska et al., 2023). In total, four groups of countries were identified in Europe. The first group (type A) includes countries where the proportion of people aged 65 and over exceeds 19.3%; the second group (type B) includes countries where the share of people aged 65 and over increased by 3.7 percentage points compared to previous years; the third group (type C) – countries that meet the criteria of types A and B; the fourth group (type D) includes countries that do not meet the criteria of types A and B. In this classification, the proportion of elderly people (19.3%) is calculated as the arithmetic mean for the analyzed group, and the level of increase in the proportion of this age group is expressed as the average difference over the observation period from 2008 to 2021.

Nine countries were included in type A, which accounted for 25% of the total. They form three subgroups in Northern (Baltic States and Sweden), Southern (Italy, Spain, Croatia) and Western (Belgium, Germany) Europe. Most of these countries entered the stage characterized by the presence of an old population in the first half of the 1990s, with the exception of Estonia and Lithuania, where this process began in the first five years of the 21st century. Liechtenstein, Poland, Slovakia, Malta, Ireland and Cyprus are classified as type B. This is the smallest group that will face a sharp increase in the proportion of elderly people in the future. The most pronounced aging is observed in the type C group, which includes twelve countries (33.3% of the total) located in different parts of the continent. The most compact group of them are the countries of Eastern (Bulgaria, Hungary, Romania) and Southern (Greece, Serbia, Slovenia) Europe, which have been suffering from demographic decline for many years. Most of the countries in this group reached the stage of a very old population back in the 1990s, mostly in the second half of the decade. The Type D group includes nine countries. Among them, the states of Northern (Iceland, Norway, Great Britain) and Western (Austria, Luxembourg, Switzerland) Europe predominate. They do not meet the criteria of other types due to the partial rejuvenation of the demographic structure due to intensive migration processes.

L. Šídlo, B. Šprocha, and M. Klapková used both standard indicators (the aging index, the share of people aged 65 and older, etc.) and promising ones (the share of the population with a life expectancy of 15 years or less, the estimated median age, etc.) to determine the main patterns of population aging in Europe (Šídlo et al., 2019). In order to identify the regions most and least affected by population aging, a cluster analysis was conducted. As a result, Europe was divided into five clusters, from the oldest to the youngest. When using standard indicators of demographic aging, the oldest cluster contained 28 regions. However, when using promising indicators, only 13 regions remained in this cluster. This is due to the way standard indicators are being developed and the upward shift in the age structure. With both indicators, the "old" cluster has regions from Germany, Spain, Italy, and Portugal. When using standard indicators, the "old" cluster contained 88 regions, and when using promising ones – 64. These are mainly regions of Germany, Italy, Spain, Portugal, Romania, Croatia, Hungary, Sweden, Latvia and Lithuania. Using standard indicators, the "young" cluster contained 16 regions, mainly in Ireland, Great Britain and Norway. Using promising indicators, this cluster is expanding to include the territories of Norway, France, Poland and Denmark. The "young" cluster contains more regions and includes both western and eastern regions. The rest of Europe's regions fall into the "middle" cluster, such as the Czech Republic.

Some studies consider the classification of regions within the country according to the level of population aging. G. Qi, Z. Wang and C. Wang studied the evolution of population aging in the Bohai Ring area from 2000 to 2020 (Qi et al., 2025). The deepening trend of population aging and the severity of the spatial clustering characteristics of the region were shown. Y. Wu, Y. Song, and T. Yu assessed spatial differences and the drivers of Chinese population aging using two-stage nested Theil decomposition, ESDA, and spatial econometric models (Wu et al., 2019). The results showed that spatial differences in population aging were noticeable at different scales, and there are different factors in the regions that influence this process. T. Inoue and N. Inoue conducted a non-hierarchical cluster analysis using two statistical indicators of population aging (share of elderly people and index of change in the number of elderly

people), after which they combined small areas into seven clusters (Inoue, Inoue, 2024). There have been shifts in the reduction of the elderly population and its share, especially in areas with a high proportion of the elderly population and a long-term decline in fertility. M. Brajuskovic and co-authors studied regional differences in the northern, central and southern parts of Montenegro (Brajuskovic et al., 2018). They found that the process of demographic aging of the population in all regions of Montenegro intensified and developed slowly but steadily. L. Vidovichova and M.P. Kafkova applied the regional active longevity index in the context of the Czech Republic (Vidovichova, Kafkova, 2016). The first place was taken by the capital Prague with a high level of employment, which is an important indicator in the index.

Research methods

The study of existing classifications and typologies demonstrates the variety of indicators used to describe the regional characteristics of population aging. However, most of these approaches rely on structural indicators at a specific point in time, such as the share of the population over a certain age, which does not always fully reflect the dynamics of the process. The paper proposes to use the average age of the population and the rate of its change to study the differences between regions. The average age takes into account the impact of all demographic processes, including fertility, mortality and migration. A decrease in the birth rate and an increase in life expectancy directly lead to growth in the average age, which makes it a sensitive indicator of the general population aging. Unlike some complex indexes, the average age is easy to interpret. It allows for direct comparisons between regions. The rate of change in average age makes it possible to assess not only the current state, but also the dynamics of demographic changes. The high growth rate indicates intensive and possibly problematic aging associated with a sharp decline in the birth rate and/or the migration outflow of young people.

The empirical basis of the study was the official data from Rosstat on the age structure for the period from 2010 to 2024. The data were taken for 80 regions of the Russian Federation, except for those integrated into another subject (Nenets, Khanty-Mansi and Yamal-Nenets autonomous areas) and new regions of the country since 2014 (Republic of Crimea, Sevastopol, Donetsk and Lugansk people's republics, Zaporozhye and Kherson regions). To determine how the population aging is taking place in different regions, a comparison of the average age of the population and its growth rate was carried out. At the first stage, all subjects will be ranked according to each indicator, after which three homogeneous groups will be formed using equal intervals: "high" (with the highest values), "average" and "low" (with the lowest values). For example, according to the average age of the entire population, "high" includes regions with values from 44.69 to 39.72, "average" – from 39.71 to 34.74, "low" – from 34.73 to 29.76; according to growth rates, "high" includes regions with values from 11.94 to 8.1%, "average" – from 8.09 to 4.26%, in "low" – from 4.25 to 0.42%. This method allows not only identifying extreme cases, but also characterizing the mass of regions occupying the middle positions. The subsequent cross-tabular analysis of the distribution of regions in these groups allows determining stable combinations of the level and dynamics of aging. The results are presented for the entire population, for men and women, as well as for urban and rural residents.

At the second stage, a comprehensive grouping will be carried out to systematize regional trajectories, taking into account the gender and type of settlement. Each group will include regions with similar characteristics in terms of the ratio of average age and its growth rate. This

allows identifying clusters of regions with similar models of demographic aging, taking into account its internal structure and gender aspects.

Results

In the period from 2010 to 2024, an increase in the average age of the population was observed in all constituent entities of the Russian Federation *(Tab. 1)*. The highest value of this indicator remained in the Central Federal District, and the lowest in the North Caucasus. The Central Federal District has the lowest dynamics of changes in average age and its growth rate. This may be due both to the earlier aging of the population in the 20th century, which slowed down the pace, and to the influx of young people from other regions, especially to Moscow. In the Siberian and Volga federal districts, on the contrary, there is a high dynamics and high rates of increase in the average age of the population due to migration outflow and a decrease in the birth rate.

An increase in the average age of the population in the Volga Federal District has led to changes in the top ten regions with the highest value of the indicator. If in 2010 it included 8 regions from the Central Federal District and 2 from the Northwestern Federal District, then in 2024 – 7 regions from the Central Federal District and 3 from the Volga Federal District *(Tab. 2)*.

Table 1. Dynamics of changes and increase in the average age of the population in the federal districts from 2010 to 2024

Federal district	Average age of the population, years			
	2010	2024	Dynamics (2024–2010)	Growth, %
Siberian	37.4	40.0	+2.6	7.0
Volga	39.0	41.5	+2.5	6.4
Far Eastern	36.7	38.9	+2.2	6.0
Northwestern	39.8	42.2	+2.4	6.0
North Caucasus	34.0	36.0	+2.0	5.9
Ural	37.8	39.8	+2.0	5.3
South	39.4	41.4	+2.0	5.1
Central	41.0	42.5	+1.5	3.7
Note: federal districts are ordered by the increase in the average age of the population. According to: Population of the Russian Federation by gender and age. Available at: https://rosstat.gov.ru/compendium/document/13284				

Table 2. Top 10 regions with the highest average age of the population in 2010 and 2024

Region	Average age of the population (2010), years	Region	Average age of the population (2024), years
Tula Region	42.2	Tambov Region	44.7
Ryazan Region	41.8	Tula Region	44.5
Tambov Region	41.6	Republic of Mordovia	44.0
Voronezh Region	41.4	Ryazan Region	43.8
Moscow	41.4	Penza Region	43.6
Saint Petersburg	41.3	Kirov Region	43.5
Tver Region	41.1	Ivanovo Region	43.4
Pskov Region	41.1	Smolensk Region	43.4
Penza Region	41.1	Vladimir Region	43.2
Ivanovo Region	41.0	Tver Region	43.2
According to: Population of the Russian Federation by gender and age. Available at: https://rosstat.gov.ru/compendium/document/13284			

The highest rates of average age of the population are observed in the Tambov and Tula regions, as well as in the Republic of Mordovia because in these regions, the share of people over 65 is high due to the low birth rate and high mortality.

In the regions of the North Caucasus, Siberian and Far Eastern federal districts, the minimum average age of the population remains *(Tab. 3)*, especially in the Chechen Republic, the Republic of Tyva and the Republic of Ingushetia. These regions are characterized by high birth rates and relatively low mortality rates, which are influenced, among other things, by local traditions and customs related to the family. For example, large families and early marriages are common in the North Caucasus. There is a difference in differentiation between the oldest and youngest regions of Russia. Among the ten oldest, the age difference is less than two years, while among the ten youngest, the difference reaches almost eight years. Consequently, most regions have similar conditions and trends, which makes them more homogeneous in terms of aging.

In the period from 2010 to 2024, the average age of the population increased significantly in the regions of the Northwestern, Far Eastern and Volga federal districts *(Tab. 4)*. In the Komi

Table 3. Top 10 regions with minimum average age of the population in 2010 and 2024

Region	Average age of the population (2010), years	Region	Average age of the population (2024), years
Chechen Republic	27,8	Chechen Republic	29,8
Republic of Tyva	29.1	Republic of Tyva	30.7
Republic of Ingushetia	29.6	Republic of Ingushetia	31.2
Republic of Dagestan	31.4	Republic of Dagestan	34.4
Republic of Sakha (Yakutia)	33.1	Republic of Altai	35.5
Republic of Altai	33.3	Republic of Sakha (Yakutia)	35.6
Chukotka Autonomous Area	33.3	Chukotka Autonomous Area	36.0
Trans-Baikal Territory	34.8	Republic of Buryatia	36.9
Republic of Buryatia	34.9	Kabardino-Balkarian Republic	37.5
Republic of Kalmykia	35.4	Trans-Baikal Territory	37.6
According to: Population of the Russian Federation by gender and age. Available at: https://rosstat.gov.ru/compendium/document/13284			

Table 4. Top 10 regions with the maximum and minimum increase in the average age of the population from 2010 to 2024, %

Region	Increase in the average age of the population	Region	Increase in the average age of the population
Komi Republic	11.9	Moscow Region	0.4
Republic of Karelia	10.9	Republic of Adygea	2.5
Republic of Kalmykia	10.0	Saint Petersburg	3.0
Jewish Autonomous Region	10.0	Kaluga Region	3.3
Arkhangelsk Region	9.9	Moscow	3.6
Sakhalin Region	9.8	Krasnodar Territory	3.8
Republic of Dagestan	9.4	Voronezh Region	3.8
Republic of Mordovia	8.6	Yaroslavl Region	3.9
Kirov Region	8.5	Novosibirsk Region	3.9
Murmansk Region	8.4	Sverdlovsk Region	4.2
According to: Population of the Russian Federation by gender and age. Available at: https://rosstat.gov.ru/compendium/document/13284			

Republic, the republics of Karelia, Kalmykia and other regions, the population is declining and the birth rate is decreasing, which leads to an aging population. In the regions of the Central and Southern federal districts, on the contrary, there is a low growth rate of average age. The reasons for this phenomenon are different: a slowdown in growth in the already old regions (Kaluga, Voronezh, and Yaroslavl regions), a relatively high birth rate (Krasnodar Territory), migration of young people (Moscow and Saint Petersburg), as well as territorial changes (Moscow Region).

There is no noticeable difference in the average age of men and women in different regions. In the subjects of the Central and Volga federal districts, representatives of both genders have a high average age *(Tab. 5)*. The average age of women exceeds men by 5–6 years, which is explained by their physiological characteristics and a more cautious lifestyle.

More obvious differences can be observed between the urban and rural populations *(Tab. 6)*. In the regions of the Central Federal District, the average age of the urban population is higher than in other regions. At the same

Table 5. Top 10 regions with the highest male and female average age in 2024

Region	Male average age, years	Region	Female average age, years
Tambov Region	41.8	Tula Region	47.2
Tula Region	41.2	Tambov Region	47.1
Republic of Mordovia	41.2	Ryazan Region	46.6
Penza Region	40.6	Ivanovo Region	46.5
Moscow	40.5	Republic of Mordovia	46.5
Kirov Region	40.5	Vladimir Region	46.2
Ryazan Region	40.4	Smolensk Region	46.2
Voronezh Region	40.2	Pskov Region	46.1
Leningrad Region	40.2	Penza Region	46.1
Saratov Region	40.2	Kirov Region	46.1
According to: Population of the Russian Federation by gender and age. Available at: https://rosstat.gov.ru/compendium/document/13284			

Table 6. Top 10 regions with the highest average age of urban and rural populations in 2024

Region	Average age of urban population, years	Region	Average age of rural population, years
Tula Region	44.4	Kirov Region	48.1
Tambov Region	44.1	Republic of Mordovia	46.5
Ryazan Region	43.3	Republic of Karelia	46.1
Penza Region	43.1	Ulyanovsk Region	45.8
Orel Region	43.1	Ivanovo Region	45.7
Smolensk Region	43.0	Tambov Region	45.6
Ivanovo Region	42.9	Arkhangelsk Region	45.4
Moscow	42.9	Kostroma Region	45.3
Vladimir Region	42.7	Vladimir Region	45.2
Tver Region	42.7	Pskov Region	45.2
According to: Population of the Russian Federation by gender and age. Available at: https://rosstat.gov.ru/compendium/document/13284			

time, the average age of the rural population is higher in the regions of the Northwestern and Volga federal districts. In general, the average age of the rural population exceeds the average age of the urban population due to the migration of young and working-age people from villages to cities. In the Tula, Tambov and Ryazan regions, the average age of the urban population is higher than in other regions. This indicates that the age of the region largely depends on the urban population. The Kirov Region, the republics of Mordovia and Karelia have the highest average age of the rural population. They are characterized by a decrease in the number of young people in rural areas and low migration attractiveness.

In the regions of the Northwestern Federal District and some regions of the Asian part of Russia, there is a significant increase in the average age of urban residents *(Tab. 7)*. This is especially noticeable in the republics of Komi, Karelia and Mordovia, which may be due to unfavorable geographical and climatic conditions that force people to move to other regions. Similar trends can be observed in rural areas. The largest increase in the average age of residents was recorded in the Kirov and Arkhangelsk regions, as well as in the Republic of Karelia. In general, the growth rate of the rural population is higher than that of the urban population. This indicates that the proportion of elderly people in villages is increasing.

The low increase in average age in the Central Federal District is more pronounced for rural population than for urban population *(Tab. 8)*. In Kursk, Ryazan, Kaluga and other regions, the increase in average age is slowed down by the high birth rate in rural areas compared to urban areas, as well as earlier aging of the population. In the southern regions of Russia (Republic of Adygea, Krasnodar Territory) and Siberia (Republic of Tyva, Novosibirsk Region), there is a slowdown in the rate of increase in the average age among the urban population, which may also be associated with a higher birth rate.

In 2024, nine regions of Russia had a high average age of the population, which has increased significantly since 2010 *(Tab. 9)*. Four of them are located in the Northwestern Federal District (Komi Republic, Republic of Karelia, Arkhangelsk and Murmansk Regions), two each in the Far Eastern (Sakhalin and Magadan regions) and the Volga region (Republic of Mordovia and Kirov

Table 7. Top 10 regions with the highest increase in the average age of urban and rural populations from 2010 to 2024, %

Region	Increase in the average age of urban population	Region	Increase in the average age of rural population
Komi Republic	11.8	Kirov Region	17.9
Republic of Karelia	10.0	Arkhangelsk Region	15.3
Republic of Mordovia	9.5	Republic of Karelia	14.3
Tomsk Region	9.5	Chukotka Autonomous Region	14.3
Jewish Autonomous Region	9.2	Republic of Mari El	13.6
Sakhalin Region	9.2	Sakhalin Region	13.1
Arkhangelsk Region	8.6	Komi Republic	12.7
Tambov Region	8.1	Primorye Territory	12.6
Magadan Region	8.0	Republic of Kalmykia	12.4
Tyumen Region	8.0	Khabarovsk Territory	11.8
According to: Population of the Russian Federation by gender and age. Available at: https://rosstat.gov.ru/compendium/document/13284			

Table 8. Top 10 regions with minimal increase in average age of urban and rural population from 2010 to 2024, %

Region	Increase in the average age of urban population	Region	Increase in the average age of rural population
Moscow Region	-1.0	Kursk Region	2.0
Republic of Adygea	0.9	Ryazan Region	2.1
Krasnodar Territory	1.0	Pskov Region	2.3
Republic of Tyva	2.4	Kaluga Region	2.5
Saint Petersburg	3.0	Tver Region	3.6
Novosibirsk Region	3.2	Nizhny Novgorod Region	3.8
Yaroslavl Region	3.3	Bryansk Region	3.8
Kaluga Region	3.6	Belgorod Region	4.0
Moscow	3.6	Republic of Adygea	4.0
Sverdlovsk Region	3.6	Lipetsk Region	4.1
According to: Population of the Russian Federation by gender and age. Available at: https://rosstat.gov.ru/compendium/document/13284			

Table 9. Distribution of regions by average age of the population and its growth over the period from 2010 to 2024

Growth / Average age	High	Average	Low	Total
High		40	10	59
Average	3	14	0	17
Low	1	3	0	4
Total	13	57	10	80

Note: for the average age of the population, "high" – from 44.69 to 39.71 years, "average" – from 39.7 to 34.74, "low" – from 34.73 to 29.76; for the growth in the average age of the population, "high" – from 11.94 to 8.1%, "average" – from 8.09 to 4.26%, "low" – from 4.25 to 0.42%.
Source: own compilation.

Region) federal districts, one in the Siberian Federal District (Tomsk Region). In these regions, there is a noticeable increase in the proportion of elderly people and a decrease in the birth rate, which leads to a decrease in the proportion of young people. Most regions have a high average age of the population and an average growth rate (40 regions, or 50%). In most of them, the average age of the population was already high, so it did not grow so much. No region is characterized by an average age of the population at an average or low level along with low growth. This means that currently there is nowhere a high share of young people (with a high birth rate) at the same time as a low proportion of the elderly (with a low mortality rate). Low average age is observed only in four regions, three of which are located in the North Caucasus Federal District (Chechen Republic, Republic of Dagestan, Republic of Ingushetia), and one more in the Siberian Federal District (Republic of Tyva).

In most regions, the average age of women and its growth rate is also higher than that of men *(Tab. 10)*. In 76.3% of regions, the average age of women is high, while for men this indicator is 68.9%. This indicates that the proportion of older women is increasing due to a longer life span. In 25% of regions, the average age of men is growing slowly (8.9% for women). This may be due to a higher mortality

Table 10. Distribution of regions by average age of men and women and its increase over the period from 2010 to 2024

Growth / Average age	High		Average		Low		Total	
	Men	Women	Men	Women	Men	Women	Men	Women
High	8	10	29	44	18	7	55	61
Average	4	4	17	11	1	0	22	15
Low	1	1	1	3	1	0	3	4
Total	13	15	47	58	20	7	80	

Note: for the average age of men, "high" is from 41.83 to 37.47 years, "average" is from 37.46 to 33.1, "low" is from 33.09 to 28.74; for the average age of women, "high" is from 47.17 to 41.63 years, "average" is from 41.62 to 36.09, "low" – from 36.08 to 30.55; for the growth in the average age of men, "high" – from 10.96 to 8.28%, "average" – from 8.27 to 5.59%, "low" – from 5.58 to 2.91%; for the growth in the average age of women, "high" – from 12.36 to 7.88%, "average" – from 7.87 to 3.41%, "low" – from 3.4 to -1.07%.
Source: own compilation.

rate among men. The Republic of Tyva has a low average age of men and its slow growth from 2010 to 2024, which may be due to the high birth rate in the region and the migration of young men.

An analysis of data on the average age of the population and its dynamics in cities and villages shows significant differences in grouping *(Tab. 11)*. In 63 regions, there is an increase in the average age of citizens, and in 79.4% of them this indicator is quite high. Rural residents are characterized by a low increase in average age in 38 regions, of which 57.9% also have a high average age. This may be due to the large variation in the values of the average age increase from 1.97 to 17.92%, which led to low rates in many regions. It is noteworthy that there is no coincidence between the low average age and the low rate of its increase in the place of residence (the urban population is the Republic of Tyva, the rural population is the Kabardino-Balkarian Republic, the Republic of Altai and the Republic of Ingushetia). On the other hand, a high average age and its rapid growth are typical for both urban and rural residents in the regions of the Northwestern Federal District (Komi Republic, Republic of Karelia, Arkhangelsk Region).

Table 11. Distribution of regions by average age of urban and rural population and its growth over the period from 2010 to 2024

Growth / Average age	High		Average		Low		Total	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
High	10	5	50	10	5	22	65	37
Average	1	1	11	18	0	13	12	32
Low	0	1	2	5	1	3	3	9
Total	11	7	63	33	6	38	80	78

Note: for the average age of urban population, "high" is from 44.42 to 39.21 years, "average" is from 39.2 to 34.01, "low" is from 34 to 28.8; for the average age of rural population, "high" is from 48.11 to 42.19 years, "average" is from 42.18 to 36.28, "low" – from 36.27 to 30.36; for the growth in the average age of urban population, "high" – from 11.82 to 7.53%, "average" – from 7.52 to 3.25%, "low" – from 3.24 to -1.04%; for the growth in the average age of the rural population, "high" – from 17.92 to 12.6%, "average" – from 12.59 to 7.29%, "low" – from 7.28 to 1.97%.
Source: own compilation.

As a result of grouping the values by 80 regions, 7 groups were identified. There were five regions in the first group: the Republic of Mordovia, the Kirov Region, the Republic of Karelia, the Arkhangelsk Region and the Komi Republic *(Figure)*, characterized by a high average age and rapid growth of this indicator among both men/women and urban/rural populations. In these regions, an increase in the proportion of elderly people, a decrease in the birth rate and a decrease in the number of young people are most noticeable.

The second group turned out to be the most numerous, it included 27 constituent entities of the Russian Federation. These are mainly regions located in the European part of the country in the Central, Northwestern and Volga federal districts. However, there are also representatives of the Far East (Magadan and Sakhalin regions). These regions are characterized by a high average age of the population with an average increase. They are stable in terms of demographic aging, as it began earlier in them than in other regions. The second group also includes subjects where the average age of the rural population is growing slowly, while the increase in the average age of the entire population remains high or average.

The third group includes 23 constituent entities of the Russian Federation, which are mainly located in the southern part of the country. The federal cities of Moscow and Saint Petersburg are also included here. The regions of this group are characterized by either low growth rates of the average age of the population with its high value (Voronezh, Yaroslavl, Kaluga, and Sverdlovsk regions), or

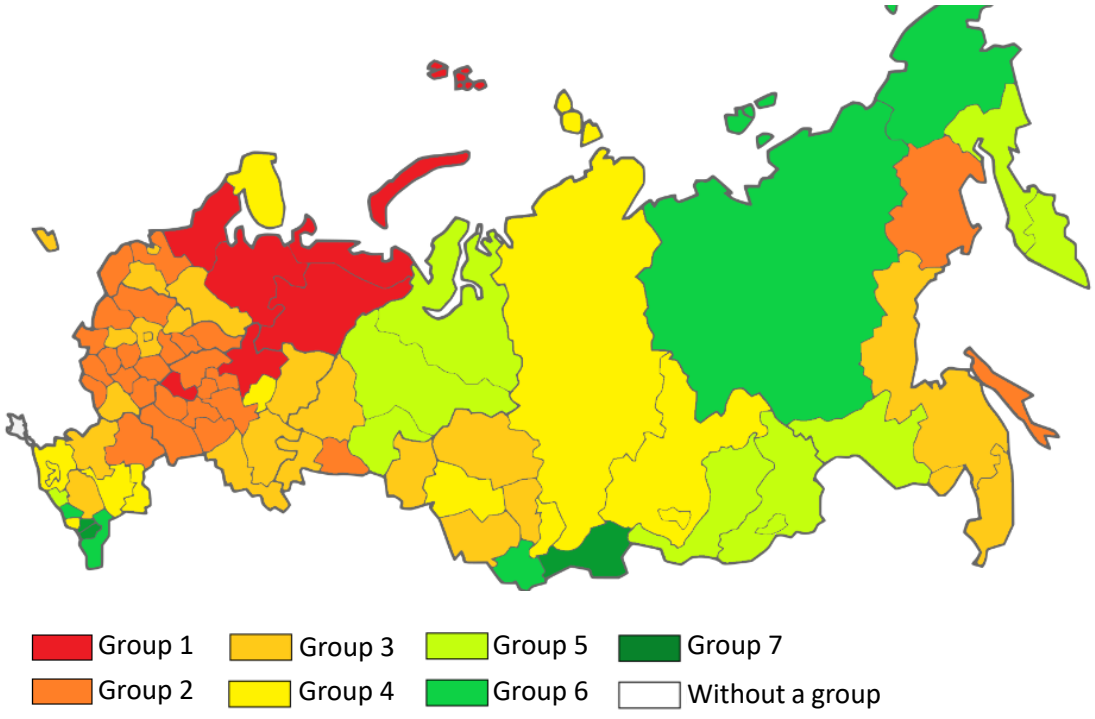

Figure. Grouping of Russian regions by average age and growth rate

Note: group 1 – high average age and rapid growth of this indicator; group 2 – high average age with an average increase; group 3 – low growth rates of average age with a high value or average indicators of the average age of the rural population with a higher average age of the urban population; group 4 – variety of indicators, but in in general, the average values of the average age and its growth rate (however, the average age of the urban population is high); group 5 – average values of the average age and its growth rate; group 6 – low average age of rural residents with relatively low growth rates; group 7 – low average age and growth rates.

Source: own compilation.

average indicators of the average age of the rural population with a higher average age of the urban population (Kemerovo, Tomsk, Rostov, and Kaliningrad regions). In the former regions, there is a slower change in the age structure, while in the latter, fertility rates are lower, mortality is higher, and migration activity is lower.

The fourth group included 11 constituent entities, mainly from the Southern (Krasnodar Territory, Republic of Adygea, Astrakhan Region) and Siberian (Novosibirsk Region, Krasnoyarsk Territory, Republic of Khakassia) federal districts. These regions differ in a variety of indicators, but generally show average values of the average age of the population and the rate of its increase. However, the average age of the urban population remains high, especially among women.

The fifth group includes six constituent entities of the Russian Federation: the Kamchatka Territory, the Amur Region, the Karachayevo-Circassian Republic, the Tyumen Region, the Trans-Baikal Territory, and the Republic of Buryatia. These regions are characterized by average rates of middle age, including for the urban population. In these countries, the birth rate is not so high as to significantly rejuvenate the population, and the death rate is not so low as to significantly age it, so the average age remains moderate.

The sixth group included five constituent entities of the Russian Federation: the Kabardino-Balkarian Republic, the Chukotka Autonomous Area, the Republic of Sakha (Yakutia), the Republic of Altai, and the Republic of Dagestan. These regions are characterized by a low average age of rural residents, as well as relatively low growth rates. This indicates that they are dominated by a young population that is slowly aging. The reasons for this may be a high birth rate or traditional lifestyle.

The seventh group included only three regions: the Chechen Republic, the Republic of Ingushetia, and the Republic of Tyva. They are characterized by low rates of the average age of the population and its growth; high birth rate, which leads to a high share of young people in the total population. This is due to traditional values, religious beliefs, and cultural characteristics that contribute to slowing down the aging process.

Conclusion

The study confirmed the trend toward a gradual increase in the average age of residents throughout the Russian Federation and an increase in the aging process of the population. The relatively young population is concentrated in the North Caucasus Federal District and in the regions of the Asian part of Russia, while the elderly population prevails in the European part of the country due to the low birth rate. An analysis of data on average age and its growth rates in various regions has shown that in half of the subjects from 2010 to 2024, there was a significant population aging, which is manifested in a high average age and high growth rates. This is especially pronounced in the regions of the Volga region, the Northwest and the Far East, where high mortality and a decrease in the birth rate contribute to the population aging.

By gender, the average age of women is higher than that of men, which is associated with a higher life expectancy for women. The share of older women is growing faster, which increases gender inequality in the age characteristics of the population. The average age of men increases more slowly, which may be due to higher mortality among men, especially in young and middle age. In terms of place of residence, the urban population is aging faster than the rural population, but rural areas have a higher average age of the population. This is due to the migration of young people from villages to cities.

All this confirms that demographic aging in Russia is not just a statistical trend, but a significant factor that affects the quality of life and human potential in various regions of the country. An analysis of the regions by average age and the rate of its increase allowed identifying groups with unique characteristics of population aging. In the first group, which includes the regions with the most intense aging of residents (Komi Republic, Republic of Karelia, and others), there is a rapid decline in the number of working-age people and an increase in the demographic burden. This creates serious challenges for the health and social care system. To mitigate these problems, it is necessary to adapt the environment for the elderly and attract migrants.

In the second group, represented by the regions of Central Russia, population aging has become a familiar process. The main problems here are a decrease in innovation activity and a shortage of pension provision. The quality of life of the older generation directly depends on the effectiveness of social support and the development of the silver economy sector. The groups, which include the youngest regions (the subjects of the North Caucasus, the Republic of Tyva), have significant demographic potential. However, solving the problem of the youth demographic burden requires significant investments in education and the creation of new jobs. The lack of employment opportunities for young people can lead to social tension and the outflow of the most active part of the population.

To overcome the negative effects of aging and strengthen human potential, a differentiated regional policy is needed, taking into account the specific characteristics of each group of territories. In regions with intensive aging, it is necessary to consider economic incentive measures aimed at preserving and attracting young people. In the old regions, the efficiency of the social service system should be improved and modern active longevity programs should be introduced. In young regions, it is important to focus investments on the advanced development of human capital, including the construction of new schools and kindergartens, the creation of additional education centers and the development of targeted training programs for priority sectors of the region's economy.

In the future, research should focus on quantifying the impact of aging on such indicators as the availability of medical services, the level of poverty among the elderly, and the volume of transfers from regional budgets to the social sphere. It is also necessary to study in more detail the causes of differences between regions in the degree of population aging (correlation and factor analysis of the causes of changes in the average age of the population as an indicator of the demographic well-being of the region, migration, and economic factors) and to assess how changes in these differences may affect demographic aging.

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