

## POPULATION AGING AND ITS DEMOGRAPHIC EFFECTS

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Aging is a destructive physiological process that increases with age and results in the decrease in the body's adaptive capacity. Aging is irreversible, however, it can be prolonged for many decades though maintaining active longevity. The study was aimed to assess ageing in terms of demography and analyze demographic policy in the Voronezh region. The study involved assessment of the major demographic parameters of the population, such as mortality, birth rate, population, and life expectancy. The data were provided by the territorial agency of the Federal State Statistics Service in the Voronezh region (Voronezhstat). It has been found that in recent years (2015–2021) birth rate has decreased by 1.4 times, life expectancy has decreased by 4.1 years, and mortality has increased by 1.5 times (2019–2021). Today, the population of elderly people is growing. This results in the situation when mortality exceeds birth rate. Population aging observed in the Voronezh region is rapid. To improve the major parameters, the demographic policy outlined in the document "On Approval of the Concept of Demographic Policy in the Voronezh Region for the Period up to 2025" has been implemented that is focused on improving both birth rate and the quality of life of the population. The project has not yet brought any desirable result, however, activities in this field contribute to improvement of major demographic indicators.

**Keywords:** aging, demographic policy, mortality, fertility, population, life expectancy

**Author contribution:** Ionova AS — data acquisition and analysis; Skrebneva AV, Melikhova EP — study planning, literature review, data interpretation.

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## СТАРЕНИЕ НАСЕЛЕНИЯ И ЕГО ДЕМОГРАФИЧЕСКИЕ ПОСЛЕДСТВИЯ

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Старение — это нарастающий с возрастом разрушительный физиологический процесс, который приводит к снижению адаптационных способностей организма. Старение — процесс необратимый, однако он может быть пролонгирован (удлинен) на многие десятилетия за счет поддержания активного долголетия. Целью исследования было оценить процесс старения применительно к демографии и проанализировать демографическую политику Воронежской области. В ходе исследования изучены основные демографические показатели населения, такие как смертность, рождаемость, численность населения и ожидаемая продолжительность жизни. Данные подготовлены территориальным органом Федеральной службы государственной статистики по Воронежской области (Воронежстат). Установлено, что за последние годы (2015–2021) рождаемость снизилась в 1,4 раза, ожидаемая продолжительность жизни уменьшилась на 4,1 года, а смертность увеличилась в 1,5 раза (2019–2021). В настоящее время имеет место увеличение численности пожилых людей, которое приводит к превышению смертности над рождаемостью. Процесс старения населения Воронежской области протекает интенсивно. Для улучшения основных показателей реализована демографическая политика, изложенная в документе «Об утверждении концепции демографической политики Воронежской области на период до 2025 года», которая направлена не только на повышение рождаемости, но и на улучшение качества жизни населения. Пока проект не принес желаемых результатов, однако работы, которые ведутся в этом направлении, вносят свой вклад в улучшение основных демографических показателей.

**Ключевые слова:** старение, демографическая политика, смертность, рождаемость, численность населения, ожидаемая продолжительность жизни

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Aging is an extensive process that has already embraced almost all spheres of government. The data provided by the UN show that the global population of elderly people in 2000 was 600 million people, while in 2021 it exceeded 761 million people. It is predicted that the population of elderly people may reach 1603 million people in 2050. According to various scientific sources, in 2050 there will be more elderly people than children in the world [1].

The issue of population aging in Russia is urgent, and addressing the issue is one of the priorities in the state policy. This is confirmed by the document developed, the "Demographic Policy of the Russian Federation for the Period up to 2025" (of 9 October 2007) [2]. The document is focused on ensuring growth of the population and birth rate, reducing mortality, and increasing life expectancy through preserving and improving health and improving the quality of life. The concept described provided the basis for development of the program "Concept

of Demographic Policy in the Voronezh Region for the Period up to 2025" in the Voronezh region. The program is aimed at maintaining the population of 2.11 million people, increasing life expectancy up to 75.1 years and birth rate by 15.1%. Migration gain should be 7.51 thousand people.

Government of the Voronezh region plans to achieve such results through developing perinatal technologies and improving the quality of conditions that promote the increase in birth rate.

The study was aimed to assess ageing in terms of demography and analyze the demographic policy in the Voronezh region.

## METHODS

The study involved systematizing and reporting statistical data (data reduction, pooling, and reporting). The official statistical data taken from the accounting documents of the territorial

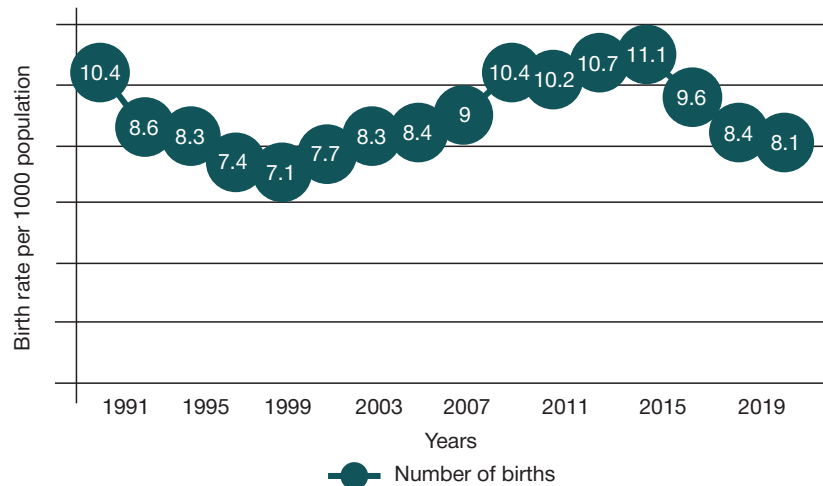


Fig. 1. Trends in birth rate observed in 1991–2021

agency of the Federal State Statistics Service in the Voronezh region (Voronezhstat) were used for analysis [3]. The interval between 1991 and 2021 was selected for the study.

Assessment of the population of the Voronezh region, birth rate, mortality, and life expectancy was performed by analyzing both trends in these indicators over time and the structure of the body of knowledge. Statistical data processing was performed using the Excel 2013 spreadsheet (Microsoft; USA).

## RESULTS

In the Voronezh region, population aging is the most rapid, and the demographic indicators show negative trends.

The increase in the share of elderly people along with the decrease in the number of children are referred to as demographic aging. Both processes result from the decrease in birth rate and mortality (see Fig. 1, 2) [4].

The graph shows that the highest birth rate was observed in early 1990s and between 2009 and 2015 (Fig.1). The number of births has been decreasing over the last 5 years.

Analysis of the data on mortality of the population in 1991–2021 showed that mortality increased in the 1990s and 2021 during the pandemic of coronavirus infection (Fig. 2).

Analysis of the population in the Voronezh region showed that it decreased by more than 163,000 people between 1991 and 2021 (Fig. 3).

Life expectancy in the Voronezh region appears to be unstable. In early 1990s life expectancy was 70.4 years, while in 2000

it was 66.54. This parameter increased by 4.3 years between 2000 and 2019. Life expectancy dropped to 69.5 years by 2021 (Fig. 4).

## DISCUSSION

The data provided by Voronezhstat show that birth rate has been decreasing since late 1980s. The lowest birth rate was reported in 1999.

The increase in birth rate has been reported since 2007. Thus, this parameter increased from 20,670 births to 25,290 births by 2014. Birth rate decreased in 2021: a total of 18,593 children were born.

Perhaps, such values result from the amendments to the legislation regarding the increase in birth rate together with motherhood and childhood protection in both Russia as a whole and the Voronezh region (since early 2007). Slowdown of the increase in birth rate by 2021 may be due to the effects of the COVID-19 pandemic and global instability [5].

The negative birth rate trend in the region results from the small number of children per family (1–2 children), the increase in the number of primiparous women of advanced maternal age, and the increase in extramarital births [6]. The listed above factors are obstacles to the solution of the problems stipulated in the program “Concept of Demographic Policy in the Voronezh Region for the Period up to 2025”.

The analysis of mortality over the studied period showed that this parameter increased in the 1990s and in 2021, which could be the result of the COVID-19 pandemic.

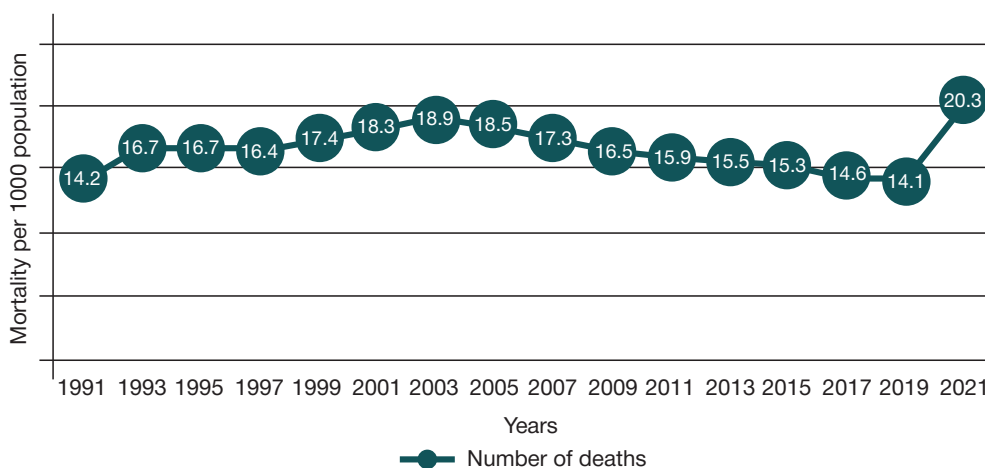


Fig. 2. Trends in mortality observed in 1991–2021

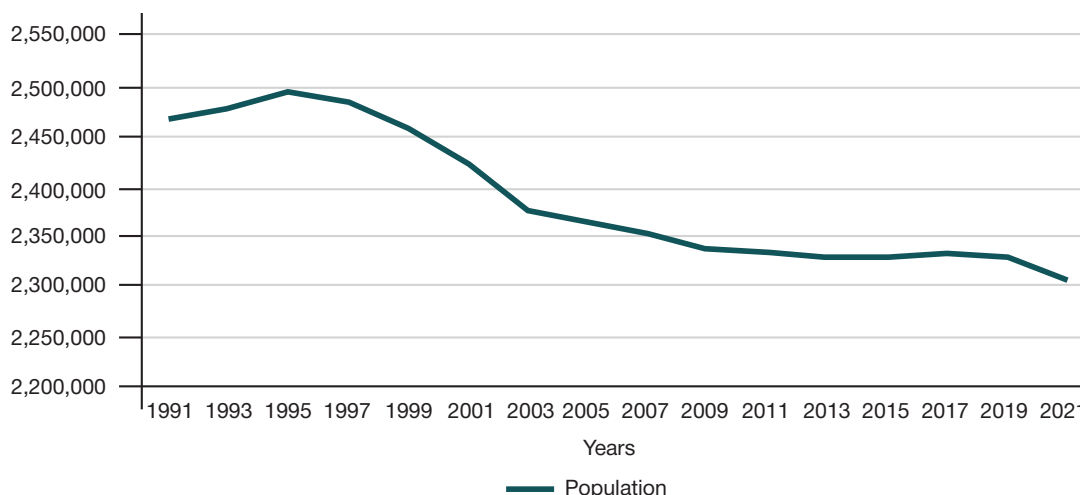


Fig. 3. Population in 1991–2021

Analysis of the population in the Voronezh region showed that in 1990s the values were higher than during the period between 2003 and 2021, despite the negative trends in birth rate and mortality observed in the 1990s. This can be explained by the increase in other parameters: migration rate and life expectancy [6].

Life expectancy in the Voronezh region undulates: it was 70.4 years in 1990s, 66.5 years in 2000, 70.8 years in 2019, and 69.5 years in 2021. Furthermore, one of the stated goals of the demographic policy in the Voronezh region is to increase life expectancy to 75 years. According to the research, life expectancy is directly related to the level of development of medicine [7].

## CONCLUSIONS

Analysis of demographic indicators in the Voronezh region shows that the program “Concept of Demographic Policy in the Voronezh Region for the Period up to 2025” demonstrates

no positive trends: birth rate has decreased, mortality has increased, and life expectancy has decreased by 4.1 years compared to the year 2019. Comparison with the 1990s and 2000s shows that the values of the main demographic parameters are negative. This could be due to the COVID-19 pandemic. Aging is an irresistible but inhibited process. This very fact is taken into account when developing state programs on demography. The risk factors of aging are as follows: healthcare development level, external and internal environment, standard of living. There are two interrelated processes: the increase in the number of elderly people, that results in slower growth of the population, involves increasing mortality and decreasing birth rate, and vice versa, the decrease in birth rate and the increase in mortality and life expectancy result in the larger share of people of retirement age. These facts confirm the correlation between aging process and the demographic effects. The fact that aging is irreversible has to be taken into account when developing state programs on demography.

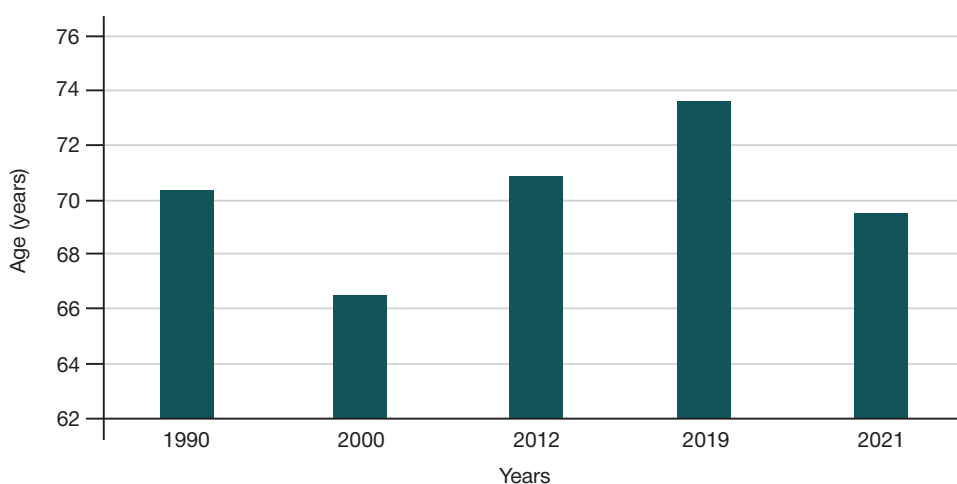


Fig. 4. Live expectancy over the years

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