

Trends in life expectancy as an element of economic security of the Volgograd area

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Abstract — Currently, Volgograd region is faced with the problem of population decline. This problem can have a negative impact on the economic security of the area.

The article substantiates the author's position that life expectancy isn't only a social indicator of the quality of life, but also an economic indicator – the quality of labor. The mortality rate of the working-age population – an indicator of the share of the working personnel, which, carrying out labor activity, has actually not had the physical ability to work.

According to Rosstat, life expectancy in the Russian Federation is increasing. At the same time, information on increases in life expectancy is a projected achievement that demographers hope to see in the future. Unofficial sources point to the fact that today the real life expectancy of Russians is significantly lower than the official forecast.

The author proposes a method of studying trends in life expectancy and quality of labor, based on the study of the structure of the sex-age composition of the deceased in certain periods of time. The paper provides an example of such a study based on random sample data.

The value of this work is that the used method allows not only to trace the trends in life expectancy, but also assess the changes in the age composition of the deceased in certain periods of time.

Keywords — *economic security, human capital, life expectancy, demographic situation, quality of life, employable population*

I. INTRODUCTION

The relevance of the research is determined by the need to develop real ways to assess the quality of life in order to effectively manage the human capital of Volgograd and Volgograd area.

The aim of the work is to develop methods for assessing trends in life expectancy of residents of Volgograd area.

The value of this work is that a new approach to life expectancy has been developed.

The economic security of the region depends on many factors. One of the factors that significantly affect the economic security of the region is the availability of human resources (human capital). The quality of human capital is defined as the main term characterizing the welfare of society. For this reason, ways to improve the quality of human capital by improving the demographic situation of the country are of particular interest. [1].

According to statistics, Volgograd region in 2018 lost about 13 thousand residents. The reasons for the population decline are the following: high mortality and a large number of people leaving the region [2].

The quality of human capital - a socio-economic category, which reflects not only the structure of human needs and possible ways to meet them, but also a systemic concept, which is defined as a set of components of the quality of human capital: human, as a biological and spiritual beings and the quality of its living conditions [1]. In the strategy of economic security of Russia until 2030, one of the threats is the lack of labor resources. The list of the main objectives of the state policy indicates the improvement of the quality of life of the population [3].

II. MATERIALS AND METHODS (MODEL)

The quality of life of the population is characterized primarily by its duration. According to some data, the mortality of the employable population from all causes in Volgograd region is consistently below the average Russian level. At the same time, in Volgograd region, the lowest value

for the last 7 years was recorded in 2016 – 486 (per 100 thousand people of working age). At the same time, according to studies in 2013, only 57% of men and 80% of women in the Russian Federation live to 65 years [4].

If we approach life expectancy as an economic indicator, the decline in life expectancy indicates that the quality of life is poor, while the approach of life expectancy to retirement age indicates the fact that in the pre-retirement period the efficiency of work is significantly reduced due to identified or undiagnosed diseases. The increase in life expectancy, on the contrary, indicates a favorable social climate, a high level of medicine. The long period of "pension" life is not only the spent funds of the pension Fund, it is also an indicator that upon retirement the person was physically healthy, and, therefore, had the opportunity to fully and efficiently perform their duties until retirement. Thus, we can say that the life expectancy of the population is a significant indicator not only of the quality of life of the population, but also of the quality of labor resources.

Average life expectancy (ALE) in the Russian Federation is calculated by the method covering the age groups from infants to people of 110 years old. The indicator is an arithmetic mean of the number of years lived by a certain part of the population. In terms of demographics, life expectancy is rarely used. Because one must wait until all members of the group will die. For this reason, the term "life expectancy" is used: it does not define the actual life expectancy, but the estimated life expectancy. This is the life expectancy of the newly born. In fact, the information about the increase of life expectancy are forward-looking achievements that demographers hope to get in future. According to the data of Rosstat at the end of 2018, life expectancy increased to an average of 72.7 years. At the same time, it was 67.5 years for men and 77.64 years for women [5].

Unofficial sources point to the fact that today the real life expectancy of Russians is significantly lower than the official forecast. So, Alexey Kovalenko conducted a study on the example of the Perepechinsky cemetery in the Moscow area determines the average life expectancy of 66.25 years, in men 63 years, in women 68.75 years [6]. It should be noted that the Moscow area is considered quite a favorable place to live for quality of life. According to Rosstat in the ranking of the welfare of Russian families in 2017 Moscow region takes the 11th place and Volgograd area 46 place [7].

Significant deviations of the official forecast data from the unofficial real ones make us think about the issue of life expectancy in our region. At the same time, we see our main goal not in determining life expectancy per se, but in studying trends in life expectancy over the past decades.

The application of the methodology used in this study was based on the assumption that the trends in life expectancy in different areas of Volgograd and Volgograd area do not differ essentially. Having agreed with this assumption, it is not necessary to use the full body of information in the study to study these trends. It becomes permissible to study not the entire study population, but only part of it (sample).

The full set of information in this study is information about all deaths in a limited area in a certain period of time. Consequently, a single element of the population is a specific case of death. For the purposes of the study, a random sample of single elements from the complete set of information was used.

Achieving the reliability of the conclusions, when using only part of the population in the study, is possible only with a sufficiently large sample size. The sufficiency criterion for the sample size can be considered as the sample size that will allow to obtain identical or similar trends in life expectancy, identified in different populations in the same territory for the same period of time.

In order to systematize the information received, a table has been developed to record each selected element of the population. We present a fragment of the developed table with examples of data of individual elements of the considered population. (Таблица 1).

TABLE I. THE FRAGMENT OF THE TABLE USED TO SYSTEMATIZE THE INFORMATION RECEIVED

Years of death	Years of birth									
	1931		1932		1933		1934		1935	
	М	Ж	М	Ж	М	Ж	М	Ж	М	Ж
2008							2886			
2007										
2006										
2005		2930								
2004										
2003		2833								
2002	2882								2864 ¹	

^a. The designation of the code element of the sample in the studied population

The most illustrative would be a study in which the studied populations would be deaths in each year under review, however, such a study requires too large a sample. A relatively small sample has now been conducted. The first was held in Volgograd (a little more than 100 elements). The second – in Volgograd region (about 150 elements). The result was a graph of life expectancy (рисунок 1).

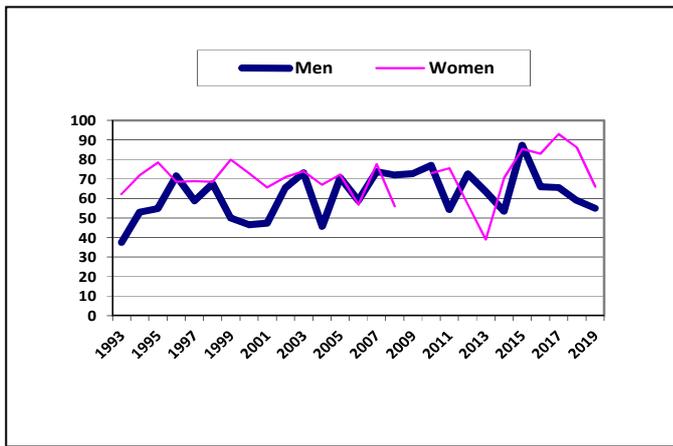


Fig. 1. Average life expectancy in Volgograd (based on the results of the sample)

Due to the small sample size, the curves of changes in the mean age over the years were not smooth and discontinuous. Nowadays, actions are being taken to increase the volume of initial information and to obtain more accurate results (the elements under study).

III. RESULTS AND DISCUSSION

In order to obtain intermediate results, the total population was divided into decades rather than years. Synthesis of the elements was made according to the age group of the deceased.

According to the results of grouping elements by decades based on the date of death and at the same time by age groups, a table of life expectancy was developed (table 2).

TABLE II. A FRAGMENT OF THE TABLE OF LIFE EXPECTANCY

Years of death	Years of birth based on life expectancy (by decades)									
	0- 10	11- 20	21- 30	31- 40	41- 50	51- 60	61- 70	71- 80	81- 90	91- 100
2019	2010	2000	1990	1980	1970	1960	1950	1940	1930	1920
	2019	2009	1999	1989	1979	1969	1959	1949	1939	1929
2018	2009	1999	1989	1979	1969	1959	1949	1939	1929	1919
	2018	2008	1998	1988	1978	1968	1958	1948	1938	1928
2017	2008	1998	1988	1978	1968	1958	1948	1938	1928	1918
	2017	2007	1997	1987	1977	1967	1957	1947	1937	1927
2016	2007	1997	1987	1977	1967	1957	1947	1937	1927	1917
	2016	2006	1996	1986	1976	1966	1956	1946	1936	1926
2015	2006	1996	1986	1976	1966	1956	1946	1936	1926	1916
	2015	2005	1995	1985	1975	1965	1955	1945	1935	1925

The life expectancy table includes 10 age groups from 0 to 100 years. The original table contains the periods of birth of all age groups for persons who died between 1981 and 2019.

Here is a fragment of the original table for persons who died in 2015 – 2019.

IV. CONCLUSION

In order to study the trends in the life expectancy of residents of Volgograd and the Volgograd region, it is important not only the average age, but also the age composition of the deceased. The results of the study were combined by age groups and decades. The calculation results are presented in table3.

TABLE III. A FRAGMENT OF THE TABLE OF LIFE EXPECTANCY

Years of death	Composition of the deceased by age group (%)									
	0- 10	11- 20	21- 30	31- 40	41- 50	51- 60	61- 70	71- 80	81- 90	91- 100
2011- 2019	4	4	2	6	4	4	16	25	25	10
2001- 2010	4	0	4	4	0	17	17	33	17	4
1991- 2000	0	3	3	3	11	25	13	17	22	3
1981- 1990	2	2	2	12	6	4	15	29	22	6

The results of the study of the materials collected in the course of the study allow us to draw some conclusions about the trends in life expectancy in Volgograd and Volgograd region. In General, life expectancy in the period under consideration does not change significantly. The positive trend is an increase in the proportion of people who died in the age group from 90 to 100 years. However, at the same time, the proportion of child and adolescent mortality is increasing. It is necessary to emphasize once again that this study is in fact an attempt to assess the possibilities of managing the quality of labor resources by analyzing life expectancy in Volgograd and the Volgograd region.

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