

Social factors of territorial variability of life expectancy in the Russian Federation and features of the Baikal region

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Abstract. The article deals with territorial links of the expectancy of the forthcoming life on the aggregate of regions of the Russian Federation with 57 socio-economic phenomena. Phenomena belong to the 8 thematic groups. To identify the social characteristics of the regions of the Russian Federation, the variability of which is most closely related to the variability of life expectancy, the package of programs "Stochastic modeling" was used. It has been established that the life expectancy depends to the greatest extent on the prevalence of crimes against the person, certain infectious and parasitic diseases, abortions, on the level of knowledge of schoolchildren in mathematics and the Russian language, on the level of influence of traditional confessions, on the prevalence of worldview phenomena that are a deviation from traditional religiosity. Factors determining the lowered life expectancy in the Baikal region are identified. The Baikal region is characterized by an increased level of violent crime, an increased number of abortions, a lower level of knowledge of schoolchildren in mathematics and the Russian language, and a lower influence of traditional confessions. These characteristics are reliably combined on the aggregate of regions of the Russian Federation with a reduced life expectancy.

1. Introduction

The expected life expectancy at birth is one of the main indicators characterizing the level of development of a country or a group of countries. This parameter is widely used in modern science and is for it the main statistical indicator reflecting the health and living conditions of people [1]. Theoretical and methodological base on this problem are the works of such scientists as J. Vaupel [2], S. Olshansky [3], V. Milholland [4], J. Wilmoth [5], B.T. Velichkovsky [6]. Recognition of the value of this parameter is reflected, in particular, in that it is taken into account along with indicators of per capita income and education in calculating the human development index, regularly conducted by the United Nations to assess the level of development of countries and regions of the world.

Life expectancy is related to the notion of "public health". It is believed that the first place among the risk factors for public health is lifestyle; less importance for hereditary factors and pollution of the environment and even less - the work of health authorities and institutions. In this case, the concept of "lifestyle" is difficult to determine. Yu. P. Lisitsyn [7] includes in the content of this concept such components as level, way of life, style and quality of life. A considerable amount of data on the problem of life expectancy has been accumulated. Modern research is carried out mainly in two scientific areas - biology-medical and socio-ecological [8]. The second direction, which includes our work, sometimes also has a link to the territorial natural and climatic factors of the population's living. In our study, only social factors are considered.



It is common knowledge that life expectancy varies in different countries. It differs by regions of Russia. It is important to know what causes such variability. To try to advance in understanding this problem, we will use various methods to investigate the multifactor statistical relationships between parameters that reflect the territorial variability of life expectancy and the parameters of regions on which this duration may depend. The main task of this paper is to identify the most significant factors affecting the territorial variability of life expectancy in Russia and assess their contribution to the formation of such variability. As quantitative indicators reflecting the influence of various factors on life expectancy, we will consider any of the parameters of regions considered by us in this study separately or certain combinations of these parameters.

2. Materials and methods

We conducted a study of the territorial variability of life expectancy in the regions of the Russian Federation, using the "Stochastic Modeling"[9] software package, in which social characteristics of the regions of the Russian Federation were identified, the variability of which is most closely related to the variability of life expectancy. This software package is a convenient tool for investigating statistical dependencies. It includes many different ways to solve this class of problems. The simplest and freely distributed version of it is available through the Internet to any interested person. The use of this program allows in manual or automated mode to formulate mathematically and test various hypotheses about the dependence of variables on each other. The program provides the user with the opportunity to build models of multifactor stochastic relationships between quantitative characteristics possessing different mathematical structure on the basis of real data on their values in joint implementations. It also provides an opportunity for the researcher, on the basis of his expert views on the modeled interrelationships, to set additional constraints on the structure of regression operators. In addition, the package implemented various techniques to more accurately assess the reliability of simulation results, taking into account the nature of the source data and the chosen method of solving the problem.

The initial information for the task was obtained from various sources. Part of the necessary information was taken from the directory "Regions of Russia" for 2015. Based on the above information, a table of joint implementations of a group of 57 quantitative parameters characterizing the life expectancy of people and potentially factors affecting it in 82 regions of Russia in the first half of the second decade of the 21st century was formed. According to 3 regions of the Russian Federation - the Nenets Autonomous District, the Republic of Crimea and Sevastopol, the data are not complete and were not considered in our study. Some of the characteristics used make sense of the average value or share in the total population of the region. Parameters that directly depend on this number are divided by its size.

All the characteristics of the regions present in the initial data were divided into thematic groups. When forming such groups, a certain commonality of the possible influence of the corresponding indicators on the life expectancy was taken into account. Each formed group of indicators in this case can be considered as a parametric description of some particular complex factor of this influence. In accordance with the described principles, 8 such factors were formed. The following are their names (underlined) and the names describing these factors of the initial characteristics of the regions.

1. Crimes. Intentional murder and attempted murder. Intentional serious harm to health. Rape and attempted rape. Theft. Robbery. Dead in an accident. Robbery, Crimes committed by minors. Crimes in the sphere of economy. Crimes related to drugs.

2. The economy. Gross regional product. Per capita income. Products of manufacturing industries. Power generation. Coefficient of funds. Registered unemployment.

3. Education and science. Students of universities. Candidates of Science. Patents for inventions. EGE - the average score in mathematics. EGE - the average score in the Russian language. The success of the best secondary schools. EGE mathematics - the proportion of participants who have overcome the threshold score. EGE mathematics - the ratio of excellent students. EGE Russian

language - the proportion of participants who have overcome the threshold score. EGE Russian language - the ratio of excellent students. Graduates with a certificate of basic general education.

4. Religion and worldview. Orthodox (ROC). Atheists. Believers in signs, fortune-telling, destiny. Loving Russia. Respect the law. Muslims (Islam is indefinite). Muslims (Islam of the Sunni direction). Agnostics. Christians who do not belong to any church. People who believe in an undetermined higher power.

5. Nutrition. Consumption of vegetables and food melons. Consumption of meat and meat products. Consumption of milk and dairy products.

6. Consumption of alcoholic beverages. Consumption of vodka. Consumption of wine. Consumption of beer.

7. Diseases and abortions. Some infectious and parasitic diseases. Neoplasms. Diseases of the blood. Diseases of the endocrine system, eating disorders and metabolism. Nervous diseases. Diseases of the circulatory system. Abortions for 100 deliveries.

8. Demographics. Share of urban population. The proportion of young people who have not reached working age. Fertility. Population. The coefficient of migration increase.

3. Results and discussion

As the main factors influencing the territorial variability of life expectancy, statistically more significant are external influences leading to death or a significant deterioration in the health of people, especially at a young age. Such factors are crimes against the person, infectious and parasitic diseases and abortions. This fact can be related both to the intensity of these factors and to the formula for calculating the expected life expectancy.

In regions characterized by an increased level of religiosity and the quality of school education (especially in mathematics), there is also a statistically significant deviation in the life expectancy of people towards increasing it. The economic characteristics of the regions, the characteristics of nutrition, alcohol consumption and demography are not statistically significant or very weakly identified as possible causes that form the territorial variability of life expectancy. Nevertheless, a certain tendency of the positive influence of the level of the economic state of the regions on the life expectancy can be noted. Cause-effect interpretation of established territorial links is a difficult task, given the complexity of the complex of factors affecting life expectancy.

Taking these results into account, one can look at life expectancy indicators in the Baikal region (Irkutsk region, Republic of Buryatia and Trans-Baikal region) and identify factors that determine its differences from the rest of the Russian Federation. The life expectancy of both men and women in the Baikal region is substantially lower than the all-Russian indicators. Table 1 presents data for the Russian Federation and for regions in the Baikal region.

Table 1. Socio-economic phenomena that distinguish the Baikal region from the rest of the Russian Federation

| Phenomena | Russian Federation | Irkutsk area | Buryat Republic | Trans-Baikal region |
|--|--------------------|--------------|-----------------|---------------------|
| Life expectancy of men (years) | 64,5 | 60,5 | 62,7 | 61,7 |
| Life expectancy of women (years) | 75,8 | 73,4 | 74,5 | 73,4 |
| Intentional homicide and attempted murder | 9,8 | 17,1 | 20,6 | 26,6 |
| Intentional serious harm to health. | 26,9 | 49,7 | 46,1 | 61,3 |
| Abortions, cases per 100 births. | 53,7 | 64,0 | 57,0 | 56,0 |
| EGE mathematics, average score. | 47,8 | 44,8 | 46,4 | 39,8 |
| EGE Russian language, average score. | 62,6 | 60,2 | 59,8 | 57,9 |

The Trans-Baikal Territory and the Republic of Buryatia, to a lesser extent Irkutsk Oblast, lag behind in the economic development from the average level of the regions of the Russian Federation,

but in accordance with our data on the weakness of the influence of economic factors on the territorial variability of life expectancy in Russia, it should be assumed that this gap The Baikal region. According to the results of our studies, the reduced life expectancy has territorial links with the prevalence of infectious and parasitic diseases. But, according to the statistical data on which we rely, the Baikal region as a whole does not differ for the worse from the rest of the Russian Federation in this respect.

The Baikal region is characterized by a high level of crime. In this respect, the constituent entities of the Russian Federation, which are part of the Baikal region, join into the all-Russian pattern found in our study - a high level of violent crime is associated with low life expectancy.

In the Baikal region, the number of abortions is increased, which is typical for regions of the Russian Federation with a reduced life expectancy. Perhaps this factor is significant in the Baikal region. The quality of school education is reduced, which is reflected in the results of the Unified State Exam (USE). This decrease is also typical for regions of the Russian Federation with a low life expectancy.

The regions of the Russian Federation, which are part of the Baikal region, are quite different from the average Russian indicators for a number of phenomena in the worldview sphere (table 2).

Table 2. Outlook phenomena that distinguish the Baikal region from the rest of the Russian Federation

| Phenomena | Russian Federation | Irkutsk area | Buryat Republic | Trans-Baikal region |
|---|--------------------|--------------|-----------------|---------------------|
| Orthodoxy, ROC (% of survey participants) | 39,0 | 28,0 | 27,0 | 25,0 |
| Atheism (% of survey participants) | 13,0 | 17,0 | 13,0 | 17,0 |
| Agnosticism (% of survey participants) | 5,9 | 0,0 | 6,0 | 16,0 |
| Occult direction (% of survey participants) | 13,8 | 22,0 | 11,0 | 15,0 |
| Uncertain religiosity (% of survey participants) | 25,7 | 37,0 | 25,0 | 28,0 |

Here, the influence of the traditional confessions of Russia, including Orthodoxy (ROC), has been reduced, and the prevalence of forms of outlook that can be regarded as a departure from traditional religiosity has been increased. This is atheism, agnosticism, occultism (belief in signs, fortune telling, destiny), indefinite religiosity ("I believe in God, supreme power, but I do not confess a specific religion").

Earlier, we have already identified with the help of a correlation analysis [11] that the level of influence of traditional confessions (Orthodoxy, Islam) in the region of the Russian Federation is positively related to the level with life expectancy. Islam is not widespread in the Baikal region, so we are not considering it. Buddhism spreads in the Baikal region, but it is difficult to reveal the correlation of levels of its influence on life expectancy on the aggregate of regions of the Russian Federation, due to the scarcity of regions where it is quite common.

Thus, the regions of the Russian Federation that are part of the Baikal region fit into the system of territorial links of life expectancy, identified through the "Stochastic Modeling" software package. Reduced life expectancy, an increased prevalence of crimes against the person and abortion, a reduced quality of school education, and a reduced influence of traditional denominations form one of the characteristic combinations that are found on the aggregate of regions of the Russian Federation.

4. Conclusion

The main factors influencing the territorial variability of life expectancy at the level of the aggregate of regions of the Russian Federation are crimes against the individual, infectious and parasitic diseases and abortions.

The increased level of religiosity and the quality of school education (especially in mathematics) have a positive effect on life expectancy.

The Baikal region, with its characteristic low life expectancy, high prevalence of crimes and abortions, low school performance and low religiosity, joins into the system of territorial links of social phenomena characteristic of the aggregate of regions of the Russian Federation.

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