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RESEARCH NOTE

Differentiation of Russian regions by life expectancy

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Abstract

The paper is devoted to the assessment of the relationship between regional life expectancy at birth (LE) with a number of economic and sociodemographic factors, in particular the gross regional product (GRP) and the share of urban population residing in large cities in the total population of the region. The analysis shows that the economic factor has a strong positive correlation with LE, especially in regions with unfavorable climatic conditions. The proportion of urban population residing in large cities in the total population of the region, influencing LE through improved health infrastructure and greater accessibility of health services to urban residents, merely complements the leading role of the economic factor.

Keywords

mortality, health, life expectancy at birth, gross regional product, correlation coefficient, modernization, urban population

JEL codes: I15, I18, J10

Population health and life expectancy at birth (hereinafter referred to as LE) are one of the main components of the population quality in the modern period. Amartya Sen, winner of the 1998 Nobel Prize in Economics, noted the fundamental importance of information on mortality, which determines LE: "mortality rates can serve as a universal measure of success or failure in any other areas of human activity" (Sen 1998). For countries with a large and diverse territory like Russia, the task of improving population health and LE is largely related to population development in the regions.

Despite the high relevance of mortality and life expectancy dynamics by region, it has been poorly researched due to the lack of necessary statistical data, especially during the period of Russia's transition to a market economy. Until the early 1990s socio-demographic studies of the Russian regions were based on information on the Union Republics, and the

RSFSR (or modern Russia) was considered mainly as a whole region, without a division into subjects.

The situation has changed drastically with the start of detailed statistical observation at the regional level: demographic statistics has been published since 1993 (*Demographic Yearbook*), socio-economic indicators for all subjects of the Russian Federation – since 1997 (*Regions of Russia* yearbook). Additional information appeared in the Human Development Reports published within the framework of the UN Development Programme. The data coming from these sources covers the period of more than 25 years and allows identifying some socio-demographic trends in the regions of Russia.

The emergence of the statistical data, conducting scientific research, accumulation of economic, demographic, and other information in our country and abroad increase the potential of the analysis on the topic. At the same time, the factors affecting health and life expectancy, the extent of their influence on mortality in various administrative and territorial entities of Russia remain understudied. Russia's transition to a market economy in the 1990s has marked the beginning of a period of significant decline in life expectancy and an increase in its territorial differences. Therefore, the cross-regional analysis of this indicator becomes extremely important.

In Russia, mortality is analyzed in the works of E.M. Andreev, E.A. Kvasha, T.L. Kharkova (2014, 2017, 2018), V.N. Arkhangelsky et al. (2016), A.E. Ivanova (2011, 2012), and others. These studies, however, pay little attention to regional economic and demographic mortality factors. This also applies to the analysis of the correlation of the LE with a number of interrelated socio-economic factors, such as gross regional product (hereinafter referred to as GRP), a generalizing indicator of economic activity of the region, and the proportion of urban population living in large cities in the total population of the region. This study focuses on these questions.

Researchers note the weak methodological component of the studies considering territorial (regional) inequality, including the lack of approaches for health studies combining indicators on population (macro) and individual (micro) levels. In addition, statistics on a number of demographic and economic indicators are not always reliable (Health... 2007:61; Determination... 2012:9).

Within this study, the analysis of the influence of the economic factor on LE was conducted at the macrolevel for federal administrative districts. The author used a paired correlation coefficient and based on statistical information covering the period from 1995 to 2016. The territorial grouping was implemented on the basis of the federal districts composition for 2016, and the list of subjects included in each of the districts was assumed to be unaltered for the entire period under review (1995-2016).

Gross regional product per capita is chosen as a general economic indicator. GRP is hypothetically accepted as the primary and only source of economic resources for each region. This approach shows the impact of GRP on life expectancy when the economic resources of the region remain at the disposal of the region itself. GRP reflects the region's ability to independently develop production and social sphere, to provide employment, wages and incomes of the population; this is a dynamic indicator reflecting the structure of the regional economy, the decline of some industries and the emergence of others, the impact of crises that reduce the financial capacity of the region to influence population health, etc.

Along with the eight federal districts existing in Russia, the author identifies the *Central District without Moscow* to reveal capital's special role as a separate entity in the economic and demographic development of Russia.

The coefficients of paired correlation between LE and GRP in 1995-2016 show that federal districts can be divided into three groups. The first group includes regions with a strong direct correlation, which are The Ural (0.96) and Central (0.76) Federal Districts. The second group consists of districts with direct average (close to strong) coefficients: Northwestern (0.59), Central without Moscow (0.58) and Siberian (0.37). The third group unites administrative territories with an inverse relation between LE and GRP: the Volga (-0,02), Far Eastern (-0.41), Southern (-0.48) and North Caucasian (-0,5) Federal Districts.

The impact of the economic factor on the health of the population of each district shows the theoretical potential of GRP to influence LE at the macro level. In a number of regions, the generated gross regional product is not fully used in the region itself. For example, rich in natural resources regions (Northwestern, Ural, Siberian, Volga, Far Eastern), as well as the Central Federal District export a large part of their GRP outside Russia or regions. Depending on the type of available internal resources, the share of exported resources varies from 60 to 90% of Russian exports. At the same time, imports (except for chemical and mechanical engineering products) do not replace exports and are many times inferior to it.

The weak relationship of GRP with LE can be explained by the greater contribution of other factors, i.e. state of the health care system, climatic conditions, behavioural factors, and others. As one of the indirect indicators of the regional health care system development, the author regards the proportion of the population of modern big cities in the region.

For economic and demographic analysis of life expectancy in regions, it is important to show the link with it of not only GRP but also the proportion of the population of large cities. Although the economic factor plays a major role in the development of large cities (increasing their share in the entire population, improving social infrastructure, including health care), this development is, however, associated with certain laws of improvement (modernization) of the territory, manifested as laws of spatial development (Zubarevich 2010:153). The laws of spatial development include accelerating the spread of innovation in the territorial context, the competition of regions and cities for investment, including those put in human capital. The innovation spreads across the territory going from the largest cities to smaller ones, from the border regions involved in globalization to the inland, and in the agglomerations, it comes from the city center to the suburbs. The role of major cities and regional centers in the territorial spread of innovation and in competition for investment is particularly great.

Investments in human capital include the cost of building health care and education infrastructure, training, i.e. conditions for the development of the quality of the population. They contribute to the modernization of values, such as attitudes towards health, family and marriage, childbirth, and mobility, especially at the macroeconomic level in large cities. At first, this occurs in small social groups, which, as their share in the population of the territory grows, manifest themselves as trendsetters at the macro level.

Social infrastructure for the provision of health care services (at the macro level) is being created faster than the population gains a more responsible attitude towards health (at the individual level). As a result, the attitude of the population to health in general is formed with some delay. Thereby, a thorough knowledge of the modernization laws influence on life expectancy enables a deeper understanding of the peculiarities of economic and demographic differentiation of the federal districts of Russia.

Not only experts in the field of economic and geographical analysis, but also demographers note the huge role of large cities for the development of regions within the modern urbanization research. For example, the famous demographer A.Y. Kvasha, considering the

demographic transition on the example of the Union Republics of the USSR, connected the low fertility and low mortality of the third and fourth stage of demographic transition with the formation of new, more developed forms of territorial organization (which are large cities and urban agglomerations) (Kvasha 1981:41, 48).

For economic and demographic analysis of regions, it is also necessary to take into account the impact of the share of the urban population residing in modern large cities (over 100,000 inhabitants) in the entire population of the region on life expectancy. Presence of modern large cities in Russian federal districts with strong or medium positive correlation between LE and economic indicators, as a rule, turns out to be also positively correlated with LE. For example, in 2016, in the Central Federal District, the correlation coefficient between LE and GRP was 0.76, and between LE and the share of the population of large cities – 0.56, in the Northwestern district these coefficients reach, respectively, 0.59 and 0.92, in the Siberian district – 0.37 and 0.39, in the Ural district – 0.96 and 0.32.

The importance of large cities for mortality indicators and population health in Russia is largely related to the quality of medical services (availability and qualification of medical personnel, presence of modern equipment, provision of medicines, territorial availability of medical care, etc.), which in turn are determined by the economic capabilities of the regions. The availability of medical services in Russia, which has the largest territory in the world, depends on the development of transport links between cities of different categories. If the average distance between cities in Western Europe is 20-30 km, in European Russia it is on average 70 km, and in Eastern Russia – more than 225 km (Report... 2001:122; Health... 2010: 38).

In Russia, the quality and volume of medical services are better in large cities, and over the observed period the share of the population residing in these cities has been increasing unevenly in different districts. In some districts it has been changing faster, for example, in the Ural district it increased from 41.5 to 49.5% over 1995-2017, in the Central district – from 50.8 to 60.8% and in the Central district excluding Moscow – from 35.3 to 43.3%. In other districts the changes were slower: in the Siberian district the share of the population of large cities increased from 43.8 to 48.5% in 1995-2017, in the Volga District – from 47.2 to 49.3%, in the Far Eastern District – from 37.6 to 42.6%.

In 2000-2016, only the Central and Northwestern districts improved their position in terms of life expectancy: the Central District advanced from third to second, the Northwestern District – from sixth to fourth in the cross-country rating. At the same time, compared to the Central district, in the Northwestern district the effect of the spatial modernization laws was seen more profoundly: since 2010, the role of the share of the population of large cities and regional centers in the territorial spread of innovation and in regional competition (in particular for investment in human capital and health) has increased. In the Central district a similar influence of the share of the population of large cities revealed itself only at the end of the period, in 2016.

In the Northwestern district, there is a strong and direct correlation of LE with the proportion of the population of large cities, which may be attributed to one of the highest values of the latter among all federal districts. In addition, the territory of the Northwestern District – about 1,700 sq km – is almost three times smaller than the territory of the Siberian and Far Eastern districts, which makes the big cities of the Northwestern district with their high-quality health care services more accessible to the population of the entire region.

In terms of the GRP volume and its connection with LE, the Ural District ranks first among all regions (in 2016 the correlation coefficient reached 0.9), but the association of LE with the

share of the population of large cities was weak. At the same time, there is a significant correlation between LE and the share of the population of cities with the number of inhabitants less than 100 thousand. Over the past years, this correlation has been positive, strong or average depending on the year: in 2010 the correlation coefficient was 0.98, in 2015 – 0.67, in 2016 – 0.4. This is determined by the peculiarity of the production structure in these areas: production of oil and gas raw materials (Tyumen oblast) and metallurgy and mechanical engineering (Sverdlovsk and Chelyabinsk oblasts). These productions are located outside large cities: in urban settlements with a population of up to 100,000 inhabitants (together with its social infrastructure) and they have strong positive influence on public health. In Russia, military-industrial enterprises arose outside big cities (Sievert et al. 2011:37); oil and gas production in the Ural and other districts is located in small settlements.

The Far Eastern district had a per capita GRP volume much higher than that for Russia as a whole over the entire period under review (up to 2016). However, the correlation of GRP with LE turn out to be negative, medium or insignificant: in 2010 the correlation coefficient was -0.45, in 2013 – -0.12 and in 2016 it was -0.41. The connection of LE with the share of the population of large cities was positive, medium or weak: in 2010 the correlation coefficient was 0.24, in 2013 – 0.56 and in 2016 – 0.11.

Over the period under review, in the Siberian Federal District we observe positive and medium correlation between LE and GRP: paired correlation coefficients were 0.41 in 2010, and 0.37 in 2016. In the same years, the share of the population of large cities showed a stronger correlation with LE (especially in 2005-2013 and 2015): in 2010, the correlation coefficient of LE and the proportion of the population of large cities was 0.62, in 2016 – 0.39. In our opinion, this might be due to the preservation of infrastructure and health care personnel in the large cities of Siberia. At the same time, a weaker correlation of LE with GRP compared to that with the share of the population of large cities reduces the possibilities of modernizing the quality of the population of the Siberian Federal District.

Conclusion

Economic and demographic analysis has shown that regions of the most health-friendly climatic zone – the North Caucasian, Southern and Central districts – were among the top three in terms of life expectancy. Regions from the zone of severe climate, unfavorable to the health of the population – Ural, Siberian and Far Eastern – ranked last. In these districts, the economic factor and regional social policies aimed at compensating the adverse effects of climate on LE of the population are of particular importance. The objectives of social policy should still continue to include the fight against alcoholization of the population, which, despite state regulations adopted in this area, remains relevant. Given all the differences between regions (climate, ethnic, information, etc.), it is necessary to take into account the leading role of the economic factor (GRP) and the laws of spatial modernization.

Along with GRP, life expectancy is influenced by the presence of large cities with relatively developed health care infrastructure. But the influence of large cities tends to only complement the leading role of the economic factor. With the growth of GRP, not only does its impact on LE increase, but so does the influence of large cities, as the region's ability to influence the quality of the population and their health increases; these opportunities are implemented only in selected districts with strong and medium positive correlation between GRP and LE. Herewith, the population density in the Ural, Siberian and Far Eastern regions

has traditionally been and will remain relatively low, but the concentration of population in large cities in these districts is not much different from the rest of the regions. In terms of the availability of health care services, the main difference in the type of settlement of "European" and "Eastern" districts is the long distances between settlements, which can be smoothed by the development of digital medicine in the near future.

The reasons why Russian regions cannot fully implement the GRP they create to improve public health include, for example, the following:

- redistribution of GRP of the region to other administrative territories: only part of it is used within the region that created the regional product;
- distribution of GRP within each district does not take into account the need to develop the social sphere of the district (housing and living conditions, health care development, transport accessibility, etc.);
- an unreasonable reduction of state and regional funds for social policy during crises;
- in a number of regions, economic resources are insufficient to compensate for the discomfort associated with the harsh climatic conditions: present improvements in quality of construction and maintenance of social infrastructure, an increase in incomes of the population, etc., are not enough.

In contemporary Russia, together with a necessity of smoothing territorial differences, there is a need of modernization of economic and demographic processes, among which preservation of the population health is a number one priority. To enable such processes, we must supplement the analysis of the regional differentiation with the knowledge of the territorial modernization laws. Currently, the modernization of the population health and, more generally – quality, is the first priority, associated with a thoughtful scientifically based social policy, for most federal districts. It is also necessary to draw academic attention to theoretical and methodological work on economic and demographic health inequalities at the population (macro) and individual (micro) levels in the regional context.

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