The demographic potential of the regions in the steppe zone as a basis for spatial development under the current challenges

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Abstract. The population structure, the potential of its reproduction and replacement in the territory are significant components of spatial socio-economic development. Under conditions of the current challenges, it is necessary to detect economic and geospatial factors and hazards of demographic growth in the country, especially in adjacent border territories to which the RF steppe belongs. Based on the statistical analysis methods, we identified the interconnection of the population dynamics, welfare indicators, workforce resources quality, and depth of differentiation of the steppe regions taking into account the total spatial organization in conditions of stable development challenges. The most critical situation formed in Kurganskaya region, where the reduction of personal income exacerbated health status, promoted heavy mortality and reinforced the outflow of labor supply. The southern (Krasnodarskiy and Stavropolskiy Krays and Rostovskaya region) and central regions (Belgorodskaya and Voronezhskaya regions) have a high demographic potential provided by favorable natural conditions, official places, a relatively high rate of income. It promotes to identify points of prospect development in these areas under the transfer to stable nature management.

1. Introduction
The quantitative and qualitative state of the population has the most significant meaning to form concepts and maintain spatial development of the territories. Detection of principal directions of demographic processes has an important strategic sense for the region's following functioning as a united socio-economic and natural system. Simultaneously, All-Russian methods of demographic potential's influence on the socio-economic development are studied, but regional specific has been researched not enough. The territory of the study is Russian regions located in the natural steppe zone. Areas of the steppe zone have opportunities to place vast industries but are situated near the state border. These aspects determine an increased necessity to study these areas, especially considering the current challenges of population decrease in one country and its growth in another state, a long harmful natural loss in Russia, and problems of migration flows' redistribution.

2. Target setting
A basis of the regions' spatial development is the placement of population, its quality, and functioning. Demographic politics must be directed to increase population and rate of well-being and promote conditions for growth. The current challenges in controlling poverty and social exfoliation form a necessity to activate modernization and potential human multiplication.
The study of the depopulation problem and consequences as asymmetry of territorial development, risk of a labor force deficit, and reduction of the total welfare in the regional scale is necessary to examine these processes and separate complete problems of these phenomena. We should take into account global and all-country tendencies and private regional peculiarities to design administrative decisions.

3. Material and Methods
The base of statistical indicators within the steppe zone regions and the country was worked out by the authors based on the Federal Service State Statistic data to conduct the study. Methods of mathematical and statistical analyses, comparative geographical method, and expert evaluation method were used in our research. The study of geographical processes and their influences on spatial development was conducted based on data of 2015 to evaluate a state of the current geodemographic situation and actualize current challenges.

The study's principal aim is to identify modern peculiarities and the following trends of demographic processes' effect on spatial development of the regions in the steppe zone. Improvement of population welfare is a meaningful precondition for mortality reduction [1] and response to the challenge of depopulation in the Russian regions. Most developed states of the world have already met the problem of birth-rate decrease and amount of children in families that led to population "aging." Analyzing the global situation formed in developed countries due to depopulation, researchers identified that depopulation would not lead to processes of "extinction" in countries with a developed economy, high level of medicine, and general technical progress [2].

Scientists consider that an essential demographic indicator of population welfare in the country and regions is life expectancy at birth (LEB). This indicator represents the state of health and the mortality rate [3]. Also, LEB indirectly integrates income inequality according to groups that lead to the imbalance of life duration in the groups [4]. It identifies a demographic indicator of LE as a significant index for objective analysis of the region's socio-economic state. The maintenance of health is realized not only by developed medicine but a high level of social responsibility (level of education, conditions of labor, and the well-being of living conditions [5].

4. Results and Discussion
Regions of the steppe zone are characterized by depopulation [6]. A slight increase in natality was noticed during 2012-2016. The birth rate exceeded the lethal level in Krasnodarskiy and Stavropol'skiy Krays, the Republic of Bashkortostan, Orenburgskaya, Chelyabinskaya, Novosibirskaya, and Omskaya regions.

Simultaneously, economic and socio-demographic development processes have occurred irregularly, with a different intensity reflected by indexes of population replacement. The coefficient of depopulation (a ratio of mortality to birth rate) varies from 0.91 (the Kalmyk Republic) to 1.68 (Voronezhskaya region) under the average value of Russia 1.22. In 12 examined regions of 17, this indicator was higher than the Russian level (figure 1). A marker of success response at the challenge of depopulation is the reduction of mortality, i.e., preservation of already-born people, support of the existing population, and prevention of premature mortality [7]. Mortality reduction has different speeds in the regions of the steppe zone. The Republic of Bashkortostan is the most successful; mortality decreased from 13.3 to 12.1 persons per 1000.

Besides natural movement, migration characterizes a state of the system of human population in the Russian regions. Due to the huge expansion of the territory, a zone of settlement in Russia has latitudinal spread along the border where the steppe zone is located. Migration processes connect with economic attractiveness and geographical position in equal measure. Active migration has happened to southern areas (Krasnodarskiy Kray, Adygei, and Rostovskaya region), the "center" of Siberia (Novosibirskaya region), territories close to the capital (Voronezhskaya region), and having high productive economy (Belgorodskaya region) (figure 2).
Figure 1. The depopulation index in the regions of the steppe zone.

Figure 2. The migration growth rate, persons per 10 000 of population.
One of Russia and its regions' challenges is demographic problems (depopulation under falling birth rates and high mortality). Besides the polarization of the settlement system, the principal danger is the decrease of the total number of economically active populations, leading to a decrease in the labor force's capacity.

A tendency of reduction of the working-age population is seen in any region of the steppe zone. A situation in the steppe zone is similar in All-Russia. Rates of annual decrease have been 98.7% for 2015-2017. The highest part of the working-age population is in Stavropolskiy Kray (57.2%), the least – in Kurganskaya region (51.8%). Also, Kurganskaya region and the Kalmyk Republic are characterized by the highest decline rates of this indicator that reflects a tense demographic situation (figure 3).

Figure 3. A part of the working-age population and life expectation at birth in the regions of the steppe zone in 2019.

According to the global life expectancy at birth (LEB), Russia lies in 109th place globally (72.9 years), being in the rating on the level of developing countries. One reason for such a low indicator is a considerable difference between men's LEB and women's LEB. Excess is about ten years. The disproportion reflects men's social vulnerability and vitality, the propensity to destructive health behavior, and an unhealthy lifestyle. The difference in mortality from suicides, injuries in traffic accidents, egregious crimes is especially considerable. This difference reflects, indirectly, the "well-being" of the region. Simultaneously, LEB is stably increasing as in the country as in the steppe regions. The increase's annual rates vary from 100.4% (Belgorodskaya region) to 100.7% (Samarskaya region). It reflects a good prospect for further improving the demographic situation in regions of the steppe zone. The LEB level difference between regions is 3.1 years – from 73.8 in the Kalmyk Republic to 70.7 in Kurganskaya region. Estimating the difference of LEB between men and women, it was ascertained that the most considerable disproportion was in Kurganskaya region (11.8 years), the least – in Rostovskaya region and Stavropolskiy Kray (8.8 years).
The main demographic danger is the reduction of the labor force, an increase of the load on social infrastructure. As a result, there is the growth of necessity to preserve the existing population and increase the quality of life that forms a new territorial development strategy. Besides improving the quality of life inside regions, it is necessary to raise migration attractiveness for labor migration to compensate for the deficit in places [8].

The employment level indicator as detection of actual market capacity is used to identify necessity in the labor force. At the regional level, the value of jobs defines a condition of the economy in working places under existing demographic situation and age structure.

The higher this indicator, the more working-age people are involved in the economy. The most acceptable indicator of the employment level is about 70%—the reduction witnesses about recession and the following fall of income level (figure 4). In dynamics within the steppe zone for 2015-2019, the level of employment has slightly changed. Chelabinskaya and Belgorodskaya regions, at the most degree, engage labor force in the economy – 68%, in Adygei and Kurganskaya region, a part of the employed is the least of the studied regions – 54%. In Adygei and Kalmykia, the highest amount of leaving for seasonal work. But in most areas, the indicator does not exceed 2% of the total employed number.

![Figure 4](image-url)  
*Figure 4.* The employment rate and a part of the employees working outside the region of the total number of the labor force in 2019.

In the condition of the current globalism and technical progress in the economy, there is a necessity for highly skilled resources to reduce the vast involvement of unqualified labor power in the economy. The high level of education characterizes Russia and the regions, but problems in labor power mobility and single-subject specialization have arisen. The non-production sector rapidly develops that reinforces competition on the labor market, making the population be involved in the constant improvement of skills learned before and qualifications or changing the scope of activity.
To level consequences of population aging and outflow leading to a deficit of labor power, technological reform of the labor-intensive sector of the economy is required. Also, the increase of the income in the region, active investment in education, improvement of the level of proficiency or reeducation of people, and favorable conditions to develop local private entrepreneurship are necessary [9]. Also, the progress of qualification of the labor force leads to the growth of productivity and profitability. Under the reduction of labor power provision due to the working-age population decrease, the economy involves labor migrants. This process is often exacerbated by the low level of income for employees and insufficient qualification for employers [10].

Issues of reducing life quality of employees and, consequently, the country's population on the whole, and measuring poverty in conditions of modern socio-economic instability have a special significance. Inequality and disproportion of revenue distribution are the leading factors of asymmetry of the regional development. Poverty intensifies demographic problems connected with increased sickness rate, mortality, and out-migration to other regions.

There are a significant number of methodologies to identify poverty. One of the descriptions of the comparable stage of poverty is the structure of consumer spending. In the current level of the economy directed to high consumption by separate households, an assessment of fraction of income rest after satisfaction of the needs is the determinative feature in the population's ability to stimulate the economy [11]. A share of expenses more than 33% for food witnesses about the subjects' poverty: all regions of the steppe zone have exceeded this indicator as in 2019 as the last years. The most complicated situation has been in Satarovskaya region (45.6%) and Novosibirskaya region (43.9%), residents of Samarskaya region have spent for food the least (32.5%). A more detailed poverty distribution pattern on regions is represented in the assessment of consumer purchasing power per capita (figure 5). Residents of Kalmykia, Kurganskaya, and Saratovskaya regions are the least well-to-do.

![Purchasing power of population](image_url)

**Figure 5.** Purchasing power of population under per capita income in 2019.
Depopulation and low-income level provoke the reduction of domestic consumption that decreases investment attractiveness and the rate of economic growth of the territory.

In the totality of factors listed above, under the lack of high technological economy and development of the tertiary sector, depopulation causes destabilization, fall of income level, and further decreased population in this area due to increased migration and mortality rate.

5. Conclusion
In the context of the study of the territories' spatial development, the problem of population number and its distribution is significant. The demographic state of the area defines a level of economic growth and quality of life. We marked the regions in the steppe zone, where the demographic status has reflected the general depression of the territory. Ongoing depopulation (including economically active labor force) in the steppe regions brings severe aftermaths for these areas' socio-economical development. The most critical situation has formed in Kurganskaya region, where a decrease of income promoted worsening of health status, high mortality, and reinforcement of outflow of the labor force. Southern (Krasnodarskiy and Stavropol'skiy Krays, Rostovskaya region) and central (Belgorodskaya and Voronezhskaya regions) regions have a high demographic potential supported by favorable natural conditions, provision of working places, relatively high rate of income. Areas of the steppe zone placing along the state border are geostrategic territories and have prospects to be economic development centers. The study of aspects of the regions' spatial development is required to work out a strategy of effective management. An assessment of the demographic potential identifies competitive advantages for each part in the steppe zone.

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