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Of Forecasting Changes in Demographic Processes

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Abstract: The article deals with changes in demographic processes, statistical data and methods of demographic forecasting.

Keywords: Geography, demographic processes, great geographical discoveries, population growth, birth rate, mortality rate, comparative demography.

Enter. The transition of Uzbekistan to the path of independent development necessitated the transition to a new stage in its demographic history. As a result of the formation of market relations, changes in socio-economic and political conditions in the republic, a new demographic process began: the birth rate decreased sharply, the country's Slavic peoples, Jews, Meskhetian Turks, Greeks, Ukrainians, Germans, etc. a certain part of peoples their historical lands, etc. moved to foreign countries.

The most important features of the demographic situation in Uzbekistan are the decreasing population growth rates; decrease in the rate of natural population increase; negative effects of external migration; slow growth of urban population and others. The country's urban population is extremely unevenly distributed, and the main part is in Tashkent.

In the years 2015-2020 , there was a significant disparity in the growth of the urban population in the regions of Uzbekistan. In these years, the growth rate of the population of the republic's cities is 0.9%, this indicator is 3.2% in Surkhandarya; 2.8% in Jizzakh; 0.6% in Syrdarya; 0.7% in Bukhara; It was 0.8% in Khorezm and 0.2% in Tashkent region.

Method . Demographic forecasting is a scientifically based prediction of the main parameters of the population movement and the future demographic situation, quantitative and qualitative characteristics of the population, age-sex and family composition, birth, death, marriage, divorce, and migration processes. The forecast is made on the basis of certain hypotheses regarding the future dynamics of one or another description of birth and death. Types of demographic forecasting. The following four directions can be distinguished in social forecasting:

- scientific and technical,
- socioeconomic,
- medical and biological
- military-political.

Demographic forecasts are part of the socio-economic forecasting complex. Today, two main directions of demographic forecasting have been distinguished: global and regional. **Global forecasting** makes it possible to solve global problems of demographic development on a global scale. In this type of forecasting, models describing the complex interrelationship of the population with many factors and parameters of socio-economic development are used.

Regional forecasts are directly related to planning. For example, when planning socio-economic development, specific features of population regeneration, descriptions of demographic processes are

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taken into account. Also, regional forecasts provide information on the future dynamics of the population and structure of the region, which includes education, health care, housing policy, sports, trade and household services, population with consumer goods. used for provisioning and planning in the field of production.

Also, extrapolation, age shifting, expert assessment, econometric modeling, simulation modeling, and other methods are widely used to estimate future indicators of population movement.

For example, according to the method of **expert assessment** , the future reconstruction of the population is determined by experienced demographers. In this case, in order to reach accurate estimates, it is advisable to use advanced methods of expert information analysis, i.e. conducting a survey among experts in a special way. In econometric forecasting methods, natural movement indicators of the population are seen as variables related to the levels of socio-economic factors determined by means of mathematical correlations. In particular, there has been a long-standing debate among demographers about the U-shaped relationship between fertility and average per capita income (D). Such a connection is expressed as follows:

$$b_m(t) = a_0 + a_1 x D(t) + a_2 x D^2(t) .$$

Due to the correlation of migration movement indicators with external factors, the following gravity models can be used to forecast migration movements:

$$y^{nr} = k(Z^n)^a (xr)^b / c_{nr}$$

Here: Z^n — is usually expressed by describing the density of the n — area, for example, by the number of places where labor is spent; c_{nr} is a variable representing the distance between these regions; k, a, b, are model constants. Thus, migration from region r to region n is proportional to the gravity of region n and the population of region r, and is inversely proportional to the distance (squared of the distance) between them.

In demographic studies, the future number of the population is projected according to the age-sex composition of the population, and changes in the age-sex composition of the population are relatively clearly covered. The "age shift" method is used to forecast the population by age. In this case, the prospective population is determined using the following formula:

$$L_x * P_x = L_{x+i},$$

where: L_x is the number of adults who can live up to the age of x; P_x — probability coefficient that can live to the age of x + 1; L_{x+l} is the population that can live up to the age of x + 1. Hence, the population at each age (L_x) is shifted from one age (L_x) to another age (L_{x+1}) using the probability ratio (P_x) that each age can survive .

For example, in 2020, the population aged 55 is 123557, from 55 to 56 years old, that is, the probability coefficient of the population of this group living in one year is 0.98588. Death rates per 1,000 people by major age group were used to find this ratio. Let's say the specific death rate for the 55-59 age group is 14.12%, or 14.12 deaths per 1,000 55-59-year-olds.

After that, the number of 55-year-olds - 123557 was multiplied by 0.98588, and the number of people who will turn 56 in the next year was calculated. From age to age, the survival probability coefficient also changes. This coefficient was calculated on the basis of the special coefficient of 250 deaths in the last five years by age groups of the population. In this way, the future population was projected.

Conclusion. Thus, using extrapolation, mathematical functions, age shifting and a number of other methods, prospective population figures are determined.

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