

# DYNAMICS OF NATURAL SELECTION IN THE URBANIZED UKRAINIAN POPULATION

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Selection is the most important driving power of evolution and it occurs in all types of living organisms, and human is not an exception. In the context of genetics, selection is the differential reproduction of genotypes. It occurs at different stages of the development of the human body: at the prenatal stage it happens in the form of spontaneous abortions and ectopic pregnancies; in postnatal is in the form of infant mortality. Reproduction of genotypes is associated with the reproductive behavior of women, which depends on many factors such as age, education, cultural level, traditions, etc. The structure of indicator of total selection is changing with the development of civilization, increasing in the standards of living and the success of medicine [1]. The main tendency of these changes is moving selection to the prenatal stage of development and it is manifested in increasing of the frequency of spontaneous abortions, which are caused by genetic defects of the fetus or inability of a female body for childbearing. The practice of family size planning eliminates differences in the number of offspring in women with different reproductive potentials [2, 3].

The intensity and direction of the selection is described quantitatively by indicators called Crow's indexes. The total selection rate ( $I_{tot}$ ) includes two components: the differential mortality rate ( $I_m$ ) and the differential fertility rate ( $I_f$ ). The structure of the total index (specific weight of each component) is not the same in different populations and depends on the level of civilizational development of the community and is changing during the historical development of society [4]. Therefore, the purpose of this study was to investigate how these processes take place in Ukraine, where 70% of the population lives in cities. It was carried out on the example of Kharkiv city. The task was to assess the intensity of selection in the dynamics of three successive generations.

The information of the obstetric-gynecological history of the female residents of Kharkiv with completed reproduction was used. Material was collected in 1990 and 2017. Information was received from 1121 women who were divided into three generations according to the year of birth: the first generation (1900 – 1924), the second (1928 – 1955), and the third (1956 – 1979). According to the obstetric and gynecological history, the total selection index (Crow's index) was calculated.

It has been established that in the studied population from the older generation to the younger one the total selection index has been decreased. In the first generation this indicator is as twice as large ( $I_{tot} = 0.56$ ) than in the second ( $I_{tot} = 0.29$ ) and third ( $I_{tot} = 0.28$ ) generations. In countries with low infant mortality the proportion of the specific weight of the selection component associated with differential fertility ( $I_f$ ) is higher than the component of differential mortality ( $I_m$ ). In the population of Kharkiv the same orientation has been observed: for the first generation,  $I_m = 0.04$ , which is 7.2% of the total index, for the second generation,  $I_m = 0.02$ , which is 7.3% of  $I_{tot}$ , and for the third generation  $I_m = 0.01$ , which is 4.1 in percentage terms. The  $I_f$  component depends on the dispersion of the number of children and is equal to 0.52 in the first generation; 0.26 in the second and 0.27 in the third, which is approximately 93; 91 and 95% out of the total index in generations. The selection intensity slightly goes down mainly due to the decrease in the differential mortality component, which can be associated with an improvement of the quality of medicine and other social factors.

Comparison of the reproductive characteristics of residents of Kharkiv city among adjacent generations showed that their reproductive dynamics are, in general, on line with global trends, which is expressed in a decreasing of fertility due to its artificial regulation. The Kharkiv population is characterized by a narrowed type of reproduction. Natural selection is weakening due to development of civilization, success of medicine, and improvement of living conditions for a human. The selection rate ( $I_{tot}$ ) is decreasing due to a reduction in differential mortality and changes in the index of differential fertility. Studying of the structure of the population and the intensity of selection processes, especially in the presence of the phenomenon of its natural relaxation, increases the relevance of predicting of dynamic of the gene pool of concrete population, and popularization of medical and genetic counseling and dissemination of methods for preventing the appearance of sick children in families predisposed to genetic pathologies.

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