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**Demographic trends of Kazakhstan: regional features of fertility and** **mortality**

In the early 21st century the strategic course of development of the Republic of Kazakhstan turns to rapid modernization which aims at placing Kazakhstan amongst 30 more developed countries of the world. The industrial and innovative development, social modernization, active urbanization and gender based undertakings become indisputable and currently important determining factors of the state.

Demographically Kazakhstan is distinguished by the fact that rapid modernization resulted in the interaction and combination of different, sometimes completely opposite, trends which were formed under the influence of different options of reproductive behavior of population in regions. In order to identify these differences the article, based on demographic zoning, highlights regions (clusters) by their birth and mortality rates. General characteristics is provided as well. The article specifies the most important factors which influenced the regional differences in birth and mortality rates (including infant mortality rate).

Reproduction of the population was studied as a set and a result of interaction of two components of its processes - birth and mortality. At the same time the focus was put on the opposite relation: birth and mortality rates are exposed to a certain influence from this result and can change in response to modified general indicators of reproduction of the population.

**Key words:** Kazakhstan, demographic trends, regional features, fertility, mortality, natural increase, ethnic and demographic area, reproduction of the population, cluster analysis, demographic zoning

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**Демографические тренды в Казахстане: региональные особенности рождаемости и смертности**

В начале ХХI века стратегическим курсом развития Республики Казахстан становится ускоренная модернизация, целью которого является вхождение Казахстана в число 30 наиболее развитых стран мира. Индустриально-инновационное развитие, социальная модернизация, активный процесс урбанизации, гендерного строительства становятся бесспорными актуальными детерминантами государства.

Демографическим своеобразием Казахстана является то, что следствием ускоренной модернизации явилось взаимодействие, сочетание разных, порою прямо противоположных тенденций, сложившихся под влиянием различных вариантов репродуктивного поведения населения в регионах. С целью выявления данных различий в статье на основе демографического районирования выделены регионы (кластеры) по уровню рождаемости и смертности населения. Дана им обобщенная характеристика. Обозначены наиболее важные факторы, которые оказали влияние на региональные различия уровня рождаемости и смертности (в том числе младенческой).

Воспроизводство населения исследовано как совокупность и итог взаимодействия двух составляющих его процессов – рождаемости и смертности. В то же время обращено внимание на обратную зависимость: рождаемость и смертность испытывают определенное влияние со стороны этого итога и могут изменяться в ответ на изменение обобщенных показателей воспроизводства населения.

**Ключевые слова:** Казахстан, демографические тренды, региональные особенности, рождаемость, смертность, естественный прирост, этнодемографическая зона, воспроизводство населения, кластерный анализ, демографическое районирование

**Қазақстандағы демографиялық үрдістер: туу мен өлімнің аймақтық ерекшеліктері**

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Мақсаты ХХІ ғасырдың басында әлемнің ең дамыған 30 елінің біріне айналу болып табылатын Қазақстан дамуының стратегиялық бағыты жедел жаңғырту болып табылады. Индустриялдық- инновациялық даму, әлеуметтік модернизация, урбандалудың белсенді үрдісі, гендерлік құрылыс мемлекеттің сөзсіз өзекті белгілері болып табылады.

Жеделтете жүргізілген жаңғыртудың салдарынан әртүрлі, тіпті аймақтағы тұрғындардың қарама-қарсы репродуктивті мінез-құлық үрдістері Қазақстанның демографиялық ерекшелігі болып табылады. Осы айырмашылықтарды анықтау үшін мақалада демографиялық аймақтану негізінде аймақтардағы тұрғындардың туу және өлім деңгейі жан-жақты көрсетілді. Оларға жан-жақты сипаттама берілді. Туу мен өлімнің (оның ішінде, бала өлімі) аймақтар бойынша айырмашылығына әсер ететін ең маңызды факторлар анықталды.

Тұрғындардың көбеюі - туу мен өлімнің өзара біріктірілген жиынтығы ретінде зерттелген. Сонымен қатар, келесі кері қарым-қатынасқа да көңіл аударылды: туу мен өлім осының әсерінен өзгереді және көбею жалпылама көрсеткіштердің өзгеруіне байланысты болуы мүмкін.

**Түйін сөздер:** Қазақстан, демографиялық трендтер, аймақтақтық ерекшеліктері, туу, өлім, табиғи өсім, этнодемографиялық аймақ, тұрғындарды қөбейту, кластерлік талдау, демографиялық аудандастыру

In the early 21st century the strategic course of development of the Republic of Kazakhstan turns to rapid modernization which aims at placing Kazakhstan amongst 30 more developed countries of the world [1]. The industrial and innovative development, social modernization, active urbanization and gender based undertakings become indisputable and currently important determining factors of the state.

Demographically Kazakhstan is distinguished by the fact that rapid modernization resulted in the interaction and combination of different, sometimes completely opposite, trends which were formed under the influence of different options of reproductive behavior of population in regions.

Demographically, fertility is an important sign of differentiation. Separation of the regions in terms of birth rates will reveal differences in the processes of human reproduction, especially to determine the overall development of demographic processes.

We can distinguish two periods if we consider the preceding decade 2009 under study:

*Stage I:*1989-1999 the period of intense fertility decline, the rate of decline increased. So, if in 1989 the total fertility rate was 23.0‰, then in 1994 it lowered to 18.6‰ (i.e., five- year drop in the total fertility rate of 19.1%), and in 1999 it was 14.2‰ (compared to 1989 it decreased by 1.6 times), which describes the low birth rate on Urlanis and Borisov scale. As for the total fertility rate, in 1989 it was - 2.803, and in 1999 - 1.79.

The level of total fertility rate of 2.15 required for the replacement of generations Kazakhstan surmounted in 1996. In fact, at that time formed a restricted type of population reproduction was formed. In 1999 the net reproduction rate in the country amounted to - 0.8 which corresponded to a narrowed the type of population reproduction. Increased mortality became a steady demographic phenomenon since1991. That period is characterized by the most intensive decrease in the rate of natural increase of Kazakhstani population. As we can see, if in the previous decade the overall rate of natural increase dropped to 5.5%. In 1989-1999 by 3,5 times. (Table 1)

Table 1 - Crude birthrate, mortality, natural increase and infant mortality in Kazakhstan (1989-2015) [2]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Years | Number of births ‰ | Number of deaths ‰ | Natural increase‰ | number of children died before the age of 1 year per 1,000 of live births, ‰ |
| 1989 | 23,0 | 7,6 | 15,4 | 25,3 |
| 1999 | 14,2 | 9,8 | 4,4 | 20,7 |
| 2009 | 22,5 | 9,0 | 13,5 | 18,4 |
| 2015 | 23,1 | 7,6 | 15,5 | 14,0 |

So, from 1989 to 1999 There was a fall of the total fertility rate of up to 23.0 % 14.2 % per year (by 1.6 times), the total fertility rat has increased from 2.8 to 1.8 (by 1,5 times). This substantial decline in fertility will be a long-term impact on all demographic characteristics of the population of Kazakhstan.

As we consider the causes of fertility decline in this period lie primarily in the changing age structure of the population. There was a significant reduction in the number of women of childbearing age. In addition, marriage structure of the population influenced negatively in that period. Intensive emigration also had a significant impact on the process of reproduction. As a rule, the working-age population migrated e.g. a childbearing one. And, of course, the major changes occurred in the socio-economic situation in the republic affected the state of fertility.

In 1999 the total fertility rate was 1.79. The existing level of fertility provided the reproduction of the population only 83.3%. Over 20 years (1979-1999) the rate of reproduction of the population decreased by 1.7 times. Let’s come to stage 2. (Table 2)

Table 2 - The dynamics of total fertility rat in Kazakhstan (1989-2015) [3]

|  |  |  |  |
| --- | --- | --- | --- |
| Years | Number of births (thousands) | Total fertility rate(‰) | Cumulative rate of birth |
| 1989 | 382,3 | 23,0 | 2,8 |
| 1999 | 211,8 | 14,2 | 1,8 |
| 2009 | 358,8 | 22,5 | 2,7 |
| 2015 | 397,6 | 23,1 | 2,8 |

*Stage II:* 1999-2009 were the years of substantial increase in fertility. So, if in 1999 the total fertility rate was 14.2‰, in 2005 – 18.4‰, in 2009 it was already 22.5‰. Over the past 10 years the index increased by 37%, which is according to an Urlanis and Borisov scale corresponds to the average level of fertility. As for the total fertility rate, in 1999 it was 1.8, and by 2009 it reached a level of 2.7. By 2005 the level surpassed - 2.15 required for the replacement of generations. This total fertility rate ensures the reproduction of the population by 124%; we can celebrate the replacement of the restricted type of reproduction by the simple type of generation replacement. Accordingly, natural population growth rate increased from 4.4‰ per year to 13.5‰ (by 3,0 times).

*Stage III*: 2009-2015 On the whole, the total childbirth rate in the country was 22.5 per 1000 people in 2009; in 2015, it was 23.1. The total childbirth rate rose slightly from 2.7 in 2009 to 2.8 in 2015, restoring the level of 1989. From 1999, during the 15-year period, it has grown by 1.5 times. The main reasons for the birth rate increase are the evolution of the ethnic composition of the population in Kazakhstan, a growing proportion of the Kazakh, Uzbek, and Uighur population that has retained a high reproductive system.

Regional zoning singled out the regions in the territory of Kazakhstan, which were ranked by the level of fertility in the following way [4].

*Cluster 1 (West ethnic and demographic area)* included only Mangystau, with the total fertility rate of - 2.1 (a sign of clustering made total fertility rate, consider the value of fields to determine the level of security replacement rate by region). Consequently, West ethnic and demographic area had the highest reproduction rate in the country - 126%. However, this level of fertility provided only a simple replacement of generations. By 2009 the situation has substantially improved. And it is Mangistau region that can be noted for the highest total fertility rate - 3.8.It increased by 1.8 times for 10 years, which confirms that ranking is correct and Mangistau region has its own specific demographic development way differing from other regions and from average values.

*Cluster 2 (Northeast ethnic and demographic area)* combined Akmola (1.7), East-Kazakhstan (1.4), Kostanay (1.4) and the North-Kazakhstan regions (1.4). This year, the Akmola population reproduces itself by 79% in the remaining three areas – only by 65%. The average total fertility rate for the class is 1.48, which means that in the Northeast ethnic and demographic area had a​​ steady birth rate in the January 1, 2000 and provided the reproduction of the entire population by 67%, which is actually 2 times smaller than in the Western zone. By 2009 this index rose in all areas to 2.19, 2.07, 1.70, and 1.72 respectively. In general these are the lowest birth rates in the republic both in 1999 and in 2009. Average class fertility rate was 1.92, which ensures the reproduction of the population by 89% and provides a restricted type.

*Cluster 3 (South-West ethnic and demographic area)* has the middle fertility rate. Aktobe oblast this indicator had 1.7 (ensuring the reproduction of 79%), while Almaty had 1.9 (ensuring reproduction of the population by 88%), in Zhambyl - 2.0 (93%) and West Kazakhstan - 1.6 (74%). The average value of the total fertility rate for this class is 1.8. Consequently, in the South-West ethno-demographic area provided birth rate of its population reproduction by 84%. However, by 2009 the birth rate and the improved birth resulted in a primitive reproduction type. The total fertility rate Aktobe had 2.70, Almaty - 2.65, Zhambyl - 3.20 and Western Kazakhstan - 2.29. The average class rate comprised 2.71, which ensures the reproduction of the population of 126 % and corresponds to the simple replacement of generations.

*Cluster 4 (Central ethnic and demographic area)* has an extremely unfavorable situation because it has the lowest birth rate in the republic, thus Pavlodar has 1.3 (the lowest figure the total fertility rate in this area given, respectively, with the lowest level of reproduction for the country - 61%), Karaganda has 1.4 (65%). The average value of the class was 1.35, which means that the Central zone ethnic and demographic formed birth rate of reproduction of the population by 63%. By 2009 this figure increased slightly, as in the whole country and was in the Karaganda region - 2.04, in Pavlodar - 1.98. In general, the class average is at 2.01, allowing the reproduction of the population by 94% and remains at the narrowed type, but it is closer to the simple replacement of generations now.

*Cluster 5 (South ethnic and demographic area)* is characterized by high levels of fertility. In any case, the total fertility rate in the area provided a higher level required for the replacement of generations. Atyrau region had 2.3 and provided a reproduction of the population by 107%, Kyzylorda - 2.7 (126%), South Kazakhstan - 2.9 (135%) which was the highest rate in the republic. The average class index was 2.63. Accordingly, in the southern ethnic and demographic area ​​the steady birth rate provided a reproduction of the population by 122%. In1999-2009 there was a significant increase of the fertility rate and in 2009 Atyrau had 3.29, Kyzylorda - 3.42, South-Kazakhstan - 3.71. The average total fertility rate for this cluster was - 3.47 and provided a reproduction of the population by 161%. This zone occupies the 2nd place in the republic at the level of fertility.

A wide range of factors influenced the regional differences in birth rates. We denote the most basic:

- intermediate determinants of this process such as nuptiality, lactational infertility, abortion and contraception which directly determined the patterns of fertility and had a different character and intensity in the regions;

- the traditional socio-economic factors such as the level of urbanization in the regions, the standard of living, education, women's employment;

- migration influenced greatly on the processes of reproduction and fertility. The rate of migration mobility is different in the regions;

- in general Age structure of the population and the contingent of childbearing women in the region is also differentiated;

- differentiation of the ethnic structure of the population is of great importance;

- the influence of ethnic and cultural contacts also played an important role;

- regional differences in the reproductive behavior of the population;

- historical differences in the level of fertility and reproduction mode.

Mortality rate per 1,000 people dropped from 9.8 ‰ in 1999 to 9.0 ‰ in 2009; by 2015, this figure had amounted to 7.6 ‰ (Table 1). The aging of the population (an increase in the population of elderly people, among whom mortality is always higher) is equally important in this process.

The high mortality rate leads to the fact that a significant part of both men and women die at a young or middle age. According to Yu.K.Shokamanov’s calculations, out of 25-year-old men almost every fifth one does not live up to 50 years, almost one out of five does not live up to the retirement age (63 years) - 45%, every second male does not live up to 65 years. Out of 25-year-old women each fifteenth one does not live up to 50 years, one out of eight does not live up to 58 years, every fourth female does not live up to 65 years. High mortality of men at a young age leads to the fact that their number at the age of 26 becomes less than the number of women, that leads to the fact that at the time of marriage there is a lack of men. As a result, a significant portion of the population over the age of 30 is still single. So, according to the 1999 census, 14.1% of the population aged 30-34 years had never been married. High mortality of men leads to the fact that almost every fifth 30-year-old male does not live up to 50 years. As a result, the number of widows and children left without fathers is increasing. In turn, this leads to a lack of funds in the family, the declining educational opportunities; the risk of being unemployed is increasing. Ultimately, opportunities for the development of spouse and children’s human potential in other areas e.g. health, living conditions, etc. are decreasing [5, с.143].

At the end of XX century there were negative changes in the dynamics of mortality in Kazakhstan in all regions. In 1999 the East Kazakhstan region had the overall mortality rate of 12.1‰ (the highest figure in the Republic in 1999), in 2009-12,67‰. In North Kazakhstan it reached 12.0‰, in 2009- 13.35‰( the highest figure in the Republic in 2009), Akmola and Kostanay areas had 11.4‰, in 2009-12.35‰ and 12.89‰ respectively. The worst figures were in the North-Eastern ethnic and demographic area. In1999 it had the most negative character in the Central Zone, and this process ,in Karaganda the overall mortality rate was 11.6‰, in 2009 – 12.67‰, in Pavlodar – 10.5‰, in 2009-11.31‰). The relatively low mortality rate has remained in the South Kazakhstan region (1999 – 6.8‰, 2009-7.01‰) and in Kyzylorda region (in 1999 – 7.4‰, in 2009 -7.22‰), South ethno-demographic area. The lowest total mortality rate was in Mangistau region in 2009 (6.96‰) as compared with other areas, Western ethno-demographic area.

The main causes of mortality in Kazakhstan were formed earlier last decade of XX century, and the socio-economic crisis accelerated their dynamics greatly. The fall in living standards and lack of adequate compensation has led to an increase of chronic patients, and people with poor health in general. The health decline of the population will lead to a further reduction in life expectancy in future. The state of fertility and mortality mirrors the processes taking place in society, the standard of living of its people, and their psychological well-being.

The basis of regional differences in mortality rates was also a range of factors that influenced the differentiation process. They are as follows:

- differences in population age structure (the ratio of elderly and old people to young);

- differences in the objective socio-economic conditions and living standards of people, environmental conditions;

- differences in the number of immigrants, primarily of reproductive age;

- differences in the level of urbanization of the population;

- differentiation in the regions ethnic composition;

- differences in the historical conditions a particular type of reproduction;

- differences in behavioral and environmental variables that determine the structure of this process in the region.

One of the important indicators of the nation's health is its infant mortality. The infant mortality rate is a part of human developmental quotient.

In 1999 the infant mortality rate remained high for the Mangistau region, 33.2‰ (exceeding the average national rate by 38% or 1.6 times), Pavlodar region – 25.7‰ (19.5%). Over the past decade between the censuses (1989-1999) a significant reduction in the number of deaths of children under 1 year occurred in South-Kazakhstan oblast (by 35%) and reached a level of 19.9‰; in Atyrau region by 31% and established at 21.2‰. In addition, Kyzylorda (26.2%), Aktobe (25.4%) and Almaty region (33%) can be noted. Infant mortality rate has increased over the period in North Kazakhstan (12%), Zhambyl (20.8%) and Pavlodar (9.3%) regions [6].

In 2009 the highest infant mortality rate was noted in South ethnodemographic zone (South-Kazakhstan oblast – 25.56‰, Atyrau -21.27‰ and Kyzylorda – 23.89‰). The average class rate was 23.57. The Western cluster took the 2 place in the rate of infant mortality. In 2009, this ratio is was 21.20‰ in Mangistau region. The 3rd place took the Central Zone. The average cluster level was in that year 20.15‰ per year; South West Area had 18.74‰ and the lowest infant mortality rate was recorded in the North-East zone (18.67‰) which was lower than the Republican rate of 20.76‰. Traditionally, infant mortality is high in the regions with high birth rate.

Let us consider the reasons for baby mortality. Therefore, in 1999, half of babies died due to causes related to conditions originating in the perinatal period (from 28 weeks of pregnancy, including childbirth and the first 7 days of life) and congenital anomalies (the infant mortality rate due to these causes was 10.5 ‰ out of 20.0). Other diseases, which caused children death under 1 year, were infectious, parasitic and respiratory diseases (1.8 and 5.8 ‰). From 1989 to 1999 the number of deaths of children under 1 year by birth defects increased by 16%. A significant reduction of other causes of infant mortality can be observed during 10 years (1989-1999): deaths caused by infectious diseases by 50%; by respiratory diseases by 35.1%; deaths in the perinatal period by 10.4% [7] .These causes remain relevant for medicine in Kazakhstan at the beginning of the 21st century.

Until 2008, Health-care and Statistics Agencies had registered data on live births and infant mortality, following the criteria established in the Soviet Union. They are different from the criteria recommended by the World Health Organization (WHO), according to which a pregnancy that ended in a term of less than 28 weeks, was classified as a late miscarriage (even if there were signs of life in the time of parturition). Only when a prematurely born child survived for 7 days, he/she was considered as a live newborn. The outcome of pregnancy, which ended in 28 weeks or more, was classified as a live birth in the presence of breathing and stillbirth - in the absence of breath. In its turn, The World Health Organization classified parturition, culminating in a live birth, in the presence of any signs of life (breathing, heartbeat, or voluntary contraction of muscles) as a live birth, irrespective of gestational age at the time of termination of pregnancy. This also applies to pregnancies ended at term of 28 weeks or more. In 2008, after the transition of the republic to the WHO criteria, infant mortality increased by 1.5 or more times. According to a new UN report, baby ratio was 14.6 ‰ in 2014.

The infant mortality rate depends on the quality and timely measures of care and organization of epidemic control measures. Disadvantage in infant mortality in the country is closely connected with poor health status of women. There was an increase of pathologies of pregnancies and births, deteriorating health of newborns. One of the criteria the women's health state and quality of care provided to them is the maternal mortality rate, which decreased by 11% in Kazakhstan during the period from 1990 to 1999, but it remains still high compared to developed countries. In 1999 in the CIS countries, Kazakhstan ranked second after Russia in terms of maternal mortality. The maternal mortality rate in the country amounted to 49.6 per 100 thousand people in Russia - 58.2, compared to Belarus - 20.4. In 2009 - 51(in Russia – 34).

Considering the dynamics of this ratio in 1984-1985 net reproduction rate was 1.400 (for the urban population - 1.090; for rural one - 2.004), in 1989-1990- 1.286 (1.044 and 1.681 respectively). Unfortunately, the statistics of the factor was not published since 1990. However, in 1989-1990 the net reproduction rate of the urban population equaled to 1. Given that state of fertility in that period deteriorated from year to year, we can assume that the net reproduction rate was even less than 1.

The total reproduction rate (gross rate) shows the average number of girls born by a woman throughout her life. In 1984-1985 this ratio was 1.479 (for the urban population - 1.139, and for the rural population – 2.149). For five years it reduced to 1.344 (urban - 1.086, rural- 1.769) [8].

The reproduction of the population reflects the interaction between two components of its processes – fertility and mortality forming the general course and direction of reproduction. At the same time, there is an inverse relationship: fertility and mortality are experiencing some impact from this outcome and may vary in response to changes in summary measures of population reproduction. Reproduction of the population is a key component of forming the population, while migratory activity of the population is of great importance.

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