

Medical and social indicators of the reproductive potential of the female population of the region (on the example of the Republic of Tatarstan)

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Abstract

Aim. To analyze the dynamic changes in medical and social indicators of the reproductive potential of the female population, markers of trends in the formation of the medical and demographic process in the region.

Methods. The study was conducted on the basis of an analysis of literary sources that determine the general trend in the demographic situation in the country, as well as information from statistical collections of the Federal State Statistics Service and the Ministry of Health of Russia and Tatarstan. The analytical and statistical methods (descriptive statistics, student criterion, trend analysis) were used in the study.

Results. It was revealed that the fertility rate of women living in rural areas decreased by dynamics (between 1991 and 2017, from 79.9 to 42.3 per 1000 women aged 15–49; $p < 0.05$). Before 2014, the indicator for rural residents was higher than that for urban women. Since 2015, the trend has been reversed: among urban women it has become higher than among those living in rural areas, which correlates with the birth rate in urban and rural areas. Percentage of live births from 1991 to 2017 in women of early reproductive age (up to 20 years) decreased among urban women from 11.3 to 3.7% ($p < 0.05$), among rural women from 10.0 to 5.8% ($p < 0.05$); among urban women in the age group 20–24 years from 35.4 to 27.1% ($p < 0.05$), among rural women of the same age from 40.9 to 34.2% ($p < 0.05$). In the observed period, percentage of live births among women of the older reproductive age increased both among residents of cities and in rural areas. Percentage of births by birth order was changed: in urban areas accounted for 55.9% of the first child, in rural areas — 44.3%; for the second child — 35.1% and 34.2%, respectively; for third and more children — 9 and 21.5%.

Conclusion. The analysis of medical and social indicators of the reproductive potential of the female population and markers of trends in the formation of the medical and demographic process in the region suggests a decrease in fertility rate (fertility) with an increase in the mean age of women at childbirth.

Keywords: reproductive potential, female population, urban and rural population, demographic situation, mortality, birth rate, population, fertility (fertility) of women, medical and social indicators.

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Background. With regard to government initiatives focused on the improvement of the demographic situation in the country, which is currently based on two fundamental “platforms,” the national project “Demography” and the Presidential Address to the Federal Assembly of January 15, 2020, a detailed study of the range of medical and social

indicators characterizing the reproductive potential of the female population at the regional level seems relevant [1, 2].

It is recommended to pay special attention to the reproductive health issues of women, taking into account the main medical and demographic tendencies typical for the regions of Russia and the world,

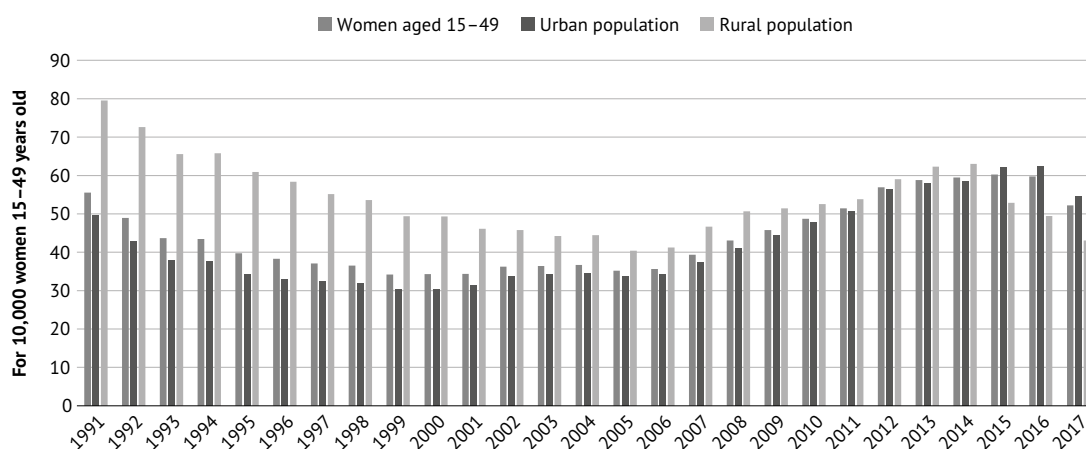


Figure 1. Changes in fertility indicators of reproductive age of women in urban and rural areas of the Republic of Tatarstan.

such as low fertility, high mortality, depopulation, and aging of the population [3–6]. Special attention must also be given to the issues concerning the assessment of the health status of the population and the impact of medical and social indicators on further improvement of the demographic situation in the region [7–10].

The article analyzes medical and social indicators that allow for a fast assessment of the changes in the demographic process, such as the fertility of women, the structure of birth by the mother's age, the structure of birth by birth order, the average age of puerperas, the mortality of women of fertile age, and so forth.

The study aims to examine the dynamic changes in the medical and social indicators of the reproductive potential of the female population and marker tendencies in the formation of the medical and demographic processes in the region.

Materials and methods. The study was conducted by analyzing literary sources that determine the general tendency in the country's demographic situation as well as data from statistical digests of the Federal State Statistics Service and the Ministry of Health of Russia and the Republic of Tatarstan (RT) for 1991–2017. Analytical and statistical methods, namely, descriptive statistics (Student's test and trend analysis), were used during the research. The topic of the research was the regularity of the natural movement of the population, and the object was a set of basic indicators characterizing the reproductive potential of the region's female population (fertility of women, the number and structure of births by the age of the mother, as well as children born alive by the order of birth and the average age of puerperas).

Results and discussion. The study found that the changes in the fertility of women of repro-

ductive age in urban and rural areas are different. Thus, this indicator among rural residents was higher than the same indicator among urban women until 2014. The trend, which correlates with the birth rate in urban and rural areas, has changed since 2015. At the end of 2017, the fertility of women of childbearing age in RT as a whole was 52.2 per 1,000 women, 54.5 per 1,000 women for the urban population, and 43 per 1,000 women for the rural population (Figure 1).

The fertility rate of women living in rural areas decreased from 1991 to 2017 (from 79.9 to 42.3 per 1,000 women aged 15–49 years; $p < .05$). The minimum values of this indicator for the 1991–2017 period were determined in 2005 and 2006, and the maximum values were determined in 1991 and 1992.

It is worth noting that the structure of births by age of mothers in RT has also changed. The proportion of children being born alive among urban women under the age of 20 decreased significantly compared with 1991 (from 11.2% in the total number of born children to 1.8% in 2017); this indicator decreased from 10% to 4.1% in rural areas ($p < .05$).

The highest proportion was accounted for women aging 20–24 years among children being born until 2007, which was on average 37.5% for the urban population and 38.1% for the rural population. This age group of women in rural areas has managed to hold the highest indicators in terms of the number of births since 2008; however, in urban areas, the age-specific birth rates have increased, and the 25–29 age group is becoming dominant, with an average proportion accounting for 37.9% among live births from 2008 to 2017. This age threshold (25–29 years) for women in rural areas was surpassed in 2013 when the 25–29 age group accounted for the highest number of live births, which was 35.9% on average from 2013 to 2017.

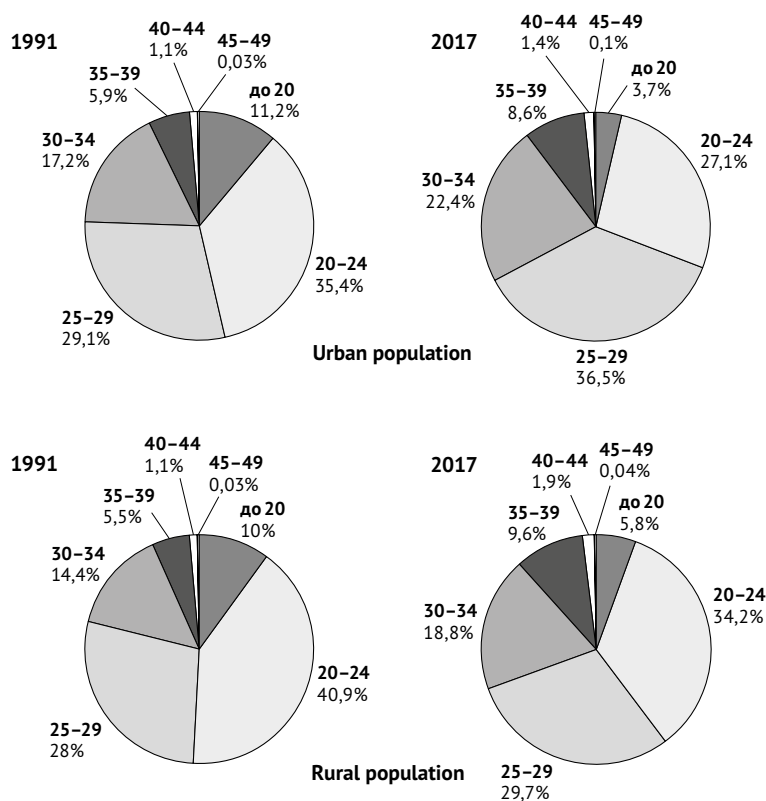


Figure 2. A pie graph showing the number of women who gave live births with the total number of puerperas in the Republic of Tatarstan, by the mother's age, in percentage points.

The proportion of early reproductive age puerperas (up to 20 years) who had live births decreased from 1991 to 2017: from 11.3% to 3.7% for urban women ($p < .05$) and 10.0% to 5.8% ($p < .05$) for rural women and from 35.4% to 27.1% ($p < .05$) for urban women in the 20–24 age group and 40.9% to 34.2% ($p < .05$) for rural women. The proportion of live births among older women (over 35 years) of reproductive age increased in both urban and rural residents from 1991 to 2017 (Figure 2).

The study found that the structure of children born by birth order changed as follows. Around 55.9% of first-born children were registered in urban areas in 1991, and 44.3% were born in rural areas; around 35.1% and 34.2% of the second child were registered in urban and rural areas, respectively; and 9% and 21.5% accounted for the third and more children. It was also found that with a decrease in the proportion of the first child in the structure of live births in 2017, the proportion of the second and third and more newborns increased; and this trend was more pronounced for the urban population than for the rural population. For the structure of live births in urban areas in 2017, 40.8% accounted for the first child, 42.9% for the second, and 16.2% for the third and more children;

whereas for rural areas, these indices were 36.6%, 37.5%, and 25.9%, respectively (Table 1).

In the RT, as well as in the Russian Federation as a whole, the average age of both the male and female population increased since 1991, affecting the possibilities of giving birth to a potentially healthy population. The average age of the population from 1991–2018 in RT had a steady upward trend, with the average age of women in both urban and rural areas exceeding the average age of men. The age difference between women and men in urban areas was 4.4 years in 1991, but by 2018, it was 5.1 years; in rural areas, on the contrary, the age difference decreased from 8.1 years in 1991 to 5.1 years by 2018. From 1991–2018, the age difference between men and women living in urban settings amounted to 4.4 years on average, whereas in rural areas, it was 6.2 years (Figure 3a,b).

Figure 3 shows that the average age of men and women increases in both urban and rural areas, which can be associated with an aging population.

The average age of puerperas during the period studied (1991 to 2017) in RT was also slightly higher than the average for the Russian Federation. Thus, the average age of puerperas in the urban population of RT was 25.6 years (25.1 years

Table 1. Live births by birth order in the Republic of Tatarstan (total percentage).

Years		1991	2000	2010	2014	2015	2016	2017
First child	Urban population	55.9	62.3	51.4	45.0	42.6	40.6	40.8
	Rural population	44.3	45.1	43.7	42.5	38.1	36.8	36.6
Second child	Urban population	35.1	30.4	39.2	42.1	44.3	45.5	42.9
	Rural population	34.2	37.1	35.3	37.3	39.0	39.3	37.5
Third child and more	Urban population	9.0	7.3	9.4	12.9	13.1	13.9	16.2
	Rural population	21.5	17.8	21.0	20.2	22.9	23.9	25.9

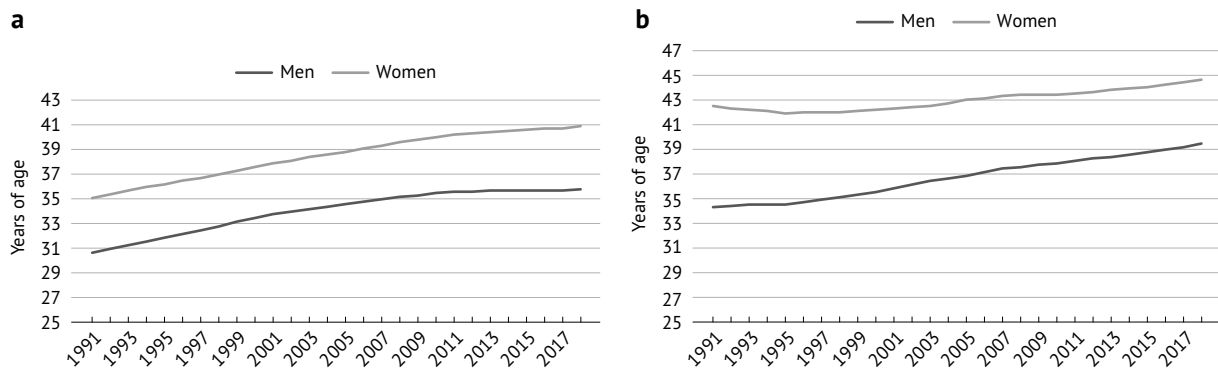


Figure 3. The average age of the population of the Republic of Tatarstan on January 1: (a) urban population; (b) rural population.

in the Russian Federation) in 1991 and that of the rural population was 25.5 years (24.8 years in the Russian Federation). In addition, the average age of puerperas in the urban population of the RT was 29 years (28.9 years in the Russian Federation in 2016) and that of the rural population was 28.4 years (27.3 years in the Russian Federation in 2016). The average age of puerperas in urban areas exceeded the average age of puerperas in rural areas by an average of 0.4 years in the RT from 1991 to 2017 (the exception was from 1994 to 1997 when the average age of puerperas in rural areas was higher than that of urban areas by 0.175 years; Figure 4).

The mortality rate of women of reproductive age is one of the key factors influencing the indicators of population reproduction. The age-specific mortality rates of women of reproductive age in RT in 2017 did not change significantly compared with 1991. The maximum number of deaths on average per year per 1,000 people of the urban and rural population of the corresponding gender and age was recorded for the 45–49 age group, followed by the 40–44 and 35–39 age groups. In urban areas, the age-specific mortality rate for women of reproductive age increased from 8.3 per 1,000 female inhabitants in 1991 to 9.3 per 1,000 people in 2017; and in rural areas, it increased from 14.1 to 14.5, respectively. It should be noted that the age-specific mortality rate of women in the 20–24 age

group decreased from 1.4 to 0.4 in rural areas, although there was a significant increase in the age-specific mortality rate of women in the 35–39 age group, which rose from 1.8 to 2.5. The changes in time for the rest of the age groups for both the urban and rural population remained within the permissible error (Table 2).

Data on changes in the number of people is an important “marker” indicator for the formation of demographic policy, carrying the potential for the birth of the next generation in the country. It was found that from January 1, 1991 to January 1, 2000, the number of adolescent women aged 10–14 years in the overall population exceeded the number of adolescent women aged 15–19 years by an average of 0.5 percentage points in urban areas in RT. Then the situation changed from January 1, 2001; but as of January 1, 2015, owing to the rise of the proportion of adolescent women in the overall number of women in the urban population, their number exceeded the relative number of adolescent women in the older age group (Figure 5).

From January 1, 1991 to January 1, 2000, The proportion of rural adolescent women aged 10–14 years in the overall number of rural women exceeded the number of adolescent women aged 15–19 years by an average of 1.4 percentage points; however, the situation has changed after this period and the proportion of adolescent women aged 15–19 was higher than the number of adolescent



Figure 4. The average age of puerperas in a given year: (a) in Russia; (b) in the Republic of Tatarstan.

Table 2. Changes in the age-specific mortality rates for women of fertile age in the Republic of Tatarstan (the number of deaths on average per year per 1,000 resident population of the corresponding gender and age).

Age, years	1991	2000	2005	2010	2014	2015	2016	2017
Urban population								
Total	8.3	10.2	10.2	10.4	9.8	9.6	9.4	9.3
15–19	0.4	0.6	0.4	0.2	0.3	0.2	0.2	0.2
20–24	0.6	0.9	0.9	0.6	0.4	0.3	0.3	0.5
25–29	0.8	0.9	1.1	1.0	0.6	0.6	0.4	0.5
30–34	1.0	1.3	1.5	1.4	1.3	1.3	0.9	0.8
35–39	1.4	2.0	2.1	2.0	2.2	1.7	1.8	1.6
40–44	2.1	2.4	2.9	2.3	2.3	2.4	2.2	2.2
45–49	3.3	3.7	4.0	3.3	3.2	3.1	2.8	2.8
Rural population								
Total	14.1	16.3	16.4	15.7	15.1	15.1	14.7	14.5
15–19	0.8	0.7	0.3	0.9	0.7	0.6	0.4	0.5
20–24	1.4	1.2	1.1	0.8	0.7	0.6	0.5	0.4
25–29	0.8	0.8	1.4	1.0	0.8	0.9	1.1	0.8
30–34	1.4	1.5	1.3	1.5	1.5	1.4	1.8	1.7
35–39	1.8	2.0	2.0	1.9	2.4	2.0	1.8	2.5
40–44	2.9	2.9	3.1	2.4	2.4	2.9	2.1	2.7
45–49	3.5	3.9	3.7	3.2	3.3	3.0	3.2	2.3

women aged 10–14 by 0.6 percentage points on average among rural women (Figure 6).

The following results were obtained from the research on the analysis of medical and social indicators of the reproductive potential of the female population of the region (RT):

1. The fertility rate of women living in rural areas decreased from 1991–2017 (from 79.9 to 42.3 per 1,000 women aged 15–49, $p < .05$). The indicator among those living in rural areas was higher than that among urban women until 2015. The trend has been reversed since 2015, and the fertility rate of urban women has become higher than that of women living in rural areas.

2. The proportion of live births to women of early reproductive age (under 20) from 1991–

2017 decreased from 11.3% to 3.7% among urban women ($p < .05$), from 10.0% to 5.8% among rural women ($p < .05$) and from 35.4% to 27.1% among urban women in the 20–24 age group ($p < .05$) and from 40.9% to 34.2% among rural women ($p < .05$). On the other hand, the proportion of live births to women of the older reproductive age group (over 35 years old) increased both among residents of urban and rural areas. The average age of urban puerperas of RT was 25.6 years in 1991 and the age of women in the rural population was 25.5 years; and in 2017, it was 29 and 28.4 years, respectively. On the one hand, the trends that were revealed suggest a decrease in the proportion of early and middle reproductive age mothers because of the decrease in the number of young people owing to the

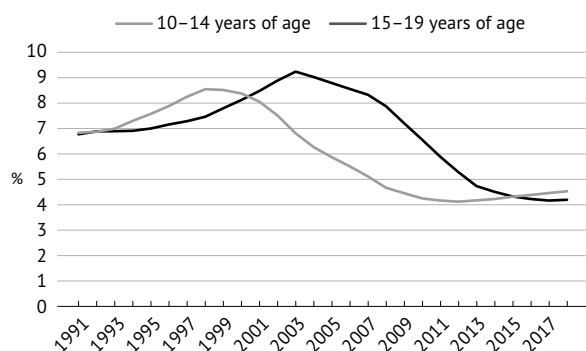


Figure 5. The proportion of age groups of adolescent women aged 10–14 and 15–19 years among urban women of the Republic of Tatarstan (percentage of the overall number of women in the urban population as of January 1).

“reproductive gap” in the demographic process of our country at the turn of the Millennium; and on the other hand, a global trend toward an increase in the proportion of mothers of older age groups at childbirth.

3. A change was observed in the structure of children born in the order of birth. Around 55.9% accounted for the first child among children born in urban areas in 1991, whereas in rural areas, this index was 44.3%; the share of the second child was 35.1% and 34.2%, respectively; and the share of the third and more children was 9% and 21.5%. About 40.8% also accounted for the first child in the structure of live births, 42.9% accounted for the second child, and 16.2% for the third and more children in urban areas in 2017; whereas in rural areas, these indices were 36.6%; 37.5%, and 25.9%, respectively. These indicators allow for the identification of a tendency to an increase in the number of second and subsequent children in the family, indicating the beginning of a positive demographic trend for large families (three or more children in the family).

4. The average age of the population had a steady upward trend from 1991 to 2018, with the average age of women in both urban and rural areas exceeding the average age of men. The age difference between men and women was 4.4 years in urban areas and 6.2 years in rural areas on average from 1991–2018.

5. The age-specific mortality rates of women of reproductive age in 2017 did not change significantly compared with 1991. The largest number of deceased women on average over the year per 1,000 people of the urban and rural population by age groups accounted for the 45–49 age group, followed by the 40–44 and 35–39 age groups.

CONCLUSIONS

1. The analysis of the medical and social indicators of the reproductive potential of the female po-

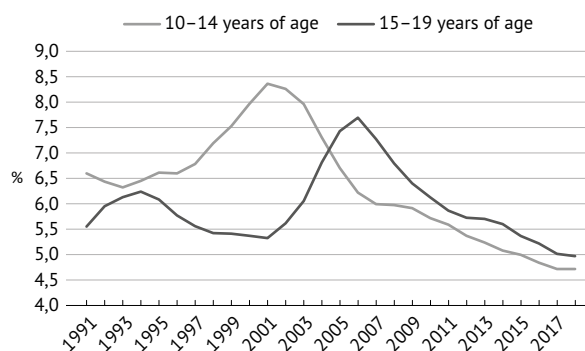


Figure 6. The proportion of age groups of adolescent women aged 10–14 and 15–19 years among rural women of the Republic of Tatarstan (percentage of the overall number of rural women as of January 1).

pulation and markers of trends in the formation of the medical and demographic process in the region suggests a decrease in the level of fertility in women with an increase in the average age of puerperas. At the same time, in the long-term dynamics, The age-specific mortality rate of women of reproductive age also increases in the long-term dynamics, where the over 35 age group is most vulnerable.

2. The medical and social indicators were analyzed in this study to characterize the reproductive potential of the female population of the region of the RT. This analysis can be used as a model for the development of regional and federal programs for optimizing demographic policy and protecting the health of the female population.

Author contributions. R.U.H. exercised management; E.N.M. and T.N.Sh. conducted the study and analyzed the results; R.N.S. collected the materials.

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Conflict of interest. The authors declare no conflict of interest.

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