

## Spatial Aspects of Rural Demographic Ageing in Russia

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### Abstract

*The authors analyze the spatial differences in the demographic ageing of the Russian population. It is shown that under the influence of changes in the economic and social life of the Russian society the type of reproduction of the population also changes and its age structure transforms towards senior ages. Quantitative assessment of these changes in the population age structure for Russian regions is made by using a system of special coefficients. A conclusion is made that the transition to the new age structure model by the population of RF has its regional features that have to be taken into account when pursuing the social policy.*

**Key words:** Russia, age structure, rural population, regional differences, demographic ageing

**JEL Classification:** J10, J11

### 1 Introduction

Studies of global regularities of demographic development accomplished by both Western and Russian scholars show that there is a transition to a new model of the population age structure featured by a high number of elderly and old people, which affects the economic and social life of the society. The age structure of population is its most important demographic characteristics, on which many other parameters depend to a large degree. It influences birth and death rates, natural gains and proportions of economically active population. Transformations in the population age structure predetermine changes in proportions of young people on the regional labor markets, labor productivity levels and sensitivity of the regions to innovations, professional, qualification and social mobility.

The global trend of ageing of the population age structure is explained by some specific features of the demographic transition that is accompanied by mass intra-family procreation regulation and expansion of the society's control over the factors causing untimely death. In Russia the transition started later than in economically developed countries and has its regional features. At the same time, the comparative inter-regional analysis of the age structure dynamics carried out for the population of federal okrugs, oblasts and republics proves the existence of a common tendency manifesting itself in both the decrease in the proportion of the population belonging to young cohorts and the increase in the proportion of those considered among older ages, which is a token of obvious transformations in the age structure. In the demographic sense, the population ageing reflects changes in the numbers of representatives of the age groups in favor of older cohorts. Influenced by alterations in the economic and social life of the Russian society, the type of population reproduction is also on

the change, the age structure tending to become older. There exist certain spatial features of the ageing of the rural population of Russian regions. The Concept of Demographic Development of the Russian Federation for the Period Ending 2025 [1] points that among other the Russian demographic policy should be rested on the principle of taking into account the regional features of demographic development and apply a differentiated approach to developing and implementing regional demographic programs. The main purpose of the study is to make a spatial and gender analysis of the process of ageing of the age structure of the rural population of the Russian Federation.

## 2 Methods

For the purpose of making a statistical analysis of the process of demographic ageing along with a quantitative assessment of the population age structure, calculation methods and a system of coefficients described in the literature [2, 3] were applied. First of all, calculations were made for coordination coefficients reflecting specific weights of the neighboring age groups that capture their variation and are calculated by using the following formula:

$$K_j = \frac{d_{i+1}}{d_i} \times 100 \quad ,$$

where:  $i$  – number of the population age group;  $d_{i+1}$  – proportion of  $i+1$  age group in the total population;  $d_i$  – proportion of  $i$  age group in the total population. The average coefficient of coordination for specific weights of the neighboring age groups is calculated according to the formula of geometric mean:

$$\bar{K} = \sqrt[m-1]{\prod_{j=1}^{m-1} K_j} * 100 .$$

Rates of increase (decrease) in coordination coefficients reflecting specific weights of the neighboring age groups are determined by using the formula:

$$T_j = \frac{K_j^o}{K_j^b} * 100 \quad ,$$

where:  $K_j^o$  –  $j$  coordination coefficient for specific weights of the neighboring age groups in the reported year;  $K_j^b$  –  $j$  coordination coefficient for specific weights of the neighboring age groups in the base year.

The average rate of increase (decrease) in coordination coefficients reflecting specific weights of the neighboring age groups is calculated as follows:

$$\bar{T} = \sqrt[m-1]{\prod_{j=1}^{m-1} T_j} * 100 .$$

Values of the rates of increase (decrease) in coordination coefficients reflecting specific weights of the neighboring age groups characterize changes in the proportions of subsequent age groups in the reported year as against the base year or a year taken as the benchmark.

## 3 Results of Research

According to the international criteria (the UNO scale of demographic ageing), a population is considered old when the proportion of the people aged 65 or over exceeds 7%. In Russia 14% of the population of the country (almost every seventh) is of the above age, more than two thirds (67.9%) of them being women [4]. One of the criteria of attributing the society to this or that old-age group is “the proportion of the people aged 60 or over”. As the J.Boget-Garnier and E.Rosset scale of demographic ageing puts it, the demographic ageing occurs when the proportion of the people aged 60 or over tops 12%. Several stages of demographic ageing and population age levels are distinguished between: the initial one, when the proportion of the people aged 60 or over reaches 12-14%, moderate (14-16%), high (16-18%) and very high (18% or more). The age structure of the urban population is featured by a high rate of demographic ageing (the proportion of the population of 60 years of age or older constitutes 16.60%), while that of the rural population has crossed the line where the demographic ageing level is very high (18.39% of the population aged 60 or over).

**Table 1: Basic Ageing Parameters for the Russian Population**

Parameters	Total population	Urban population	Rural population
Proportion of the people aged 60 or over			
1959	8,98	7,56	10,55
1989	15,31	14,20	18,40
2002	18,46	17,58	20,86
2007	17,08	16,59	18,39
Ageing index (number of old people per 100 children)			
1959	39	37	41
1989	76	72	84
2002	113	117	105
2007	129	136	115

The main cause of the ageing of the Russian population is the decreasing birth rate. Today the number of children and adolescents (0-15 years of age) is by 6.6 million people or 22.6% smaller than that of the people older than the able-bodied age [1].

The proportion of old people among the rural population used to be traditionally greater than that among the urban one. However, the proportion of the people older than 60 years of age in rural regions surpassing that in urban regions by 40% 50 years ago, by 2007 the excess reduced to some 10%. At the same time, the proportion of old people among the rural population dropped by 2.5% in the latter year.

The ageing index for the urban population depicting the intensity of the ageing process is but higher than that for the rural population. This index, calculated as the number of old people per 100 children, proves that the ageing of the rural population is going on, although at a smaller pace than that of the urban population.

One should also take into account the gender asymmetry of the population ageing process that is much more sizeable in Russia than in developed European countries. In 2007 the number of men per 1000 rural women aged 60 or over counted 519, compared to 457 in 1989 (see Table 2). There are many lonely old women in rural areas those life problems deserve special attention.

The proportion of men aged 60 or over in the total male population grew from 6.2% in 1959 to 12.4% in 2007, while that of women aged 60 or over made 21.1% in 2007. All in all,

the “60 years or over” age group that year comprised 33.7% of men and 66.3% of women, for the rural population the respective figures being 34.1% and 65.9%.

**Table 2: Breakdown of the Population Aged 60 or over by Sex**

Description		1959	1989	2002	2007
Proportions of men and women aged 60 or over					
Total population	Men	30,71	30,85	34,63	33,68
	Women	69,29	69,15	65,37	66,32
Urban population	Men	29,89	31,53	34,42	33,49
	Women	70,11	68,47	65,58	66,51
Rural population	Men	31,36	29,39	35,13	34,14
	Women	68,64	70,61	64,87	65,86

**Table 3: Breakdown of the Rural Population by Sex and Age**

Subjects of RF	Years	Proportions of individual population groups					
		Men			Women		
		Below the able-bodied age	Able-bodied age	Beyond the able-bodied age	Below the able-bodied age	Able-bodied age	Beyond the able-bodied age
RF	1959	37,8	54,7	7,5	29,0	52,7	18,3
	1989	28,5	60,0	11,5	24,5	44,0	31,5
	2002	23,0	61,6	15,4	20,0	54,1	25,9
	2007	20,0	66,8	13,2	17,4	53,8	28,8
Central FO	1989	22,7	61,4	15,9	23,2	39,5	42,5
	2002	18,8	61,3	19,9	15,3	50,3	34,4
	2007	16,4	66,7	16,9	13,3	49,8	36,9
North-west FO	1989	26,2	62,9	10,9	23,2	43,1	33,7
	2002	19,4	64,8	15,8	17,0	54,1	28,9
	2007	16,8	69,8	13,4	14,6	53,3	32,1
South FO	1989	31,1	57,9	11,0	26,8	47,4	25,8
	2002	26,2	60,1	13,8	23,1	55,9	20,9
	2007	23,1	64,9	12,0	20,4	55,6	24,0
Volga FO	1989	28,1	60,2	11,7	23,7	42,2	34,1
	2002	22,7	61,0	16,2	19,7	52,0	28,3
	2007	19,4	66,7	13,9	16,8	52,6	30,6
Ural FO	1989	30,1	60,5	9,3	27,4	45,9	26,7
	2002	23,3	63,2	13,5	20,6	56,4	23,0
	2007	20,0	68,2	11,8	17,4	55,8	26,8
Siberian FO	1989	32,1	58,7	9,2	29,7	45,8	24,5
	2002	24,4	62,2	13,4	21,7	57,0	21,3
	2007	21,2	67,3	11,5	18,8	56,3	24,9
Far-Eastern FO	1989	32,1	62,0	5,9	32,5	53,0	14,5
	2002	24,4	65,8	9,7	23,8	60,4	15,8
	2007	21,2	69,7	9,1	20,4	58,0	21,6

As seen from Table 3, the proportion of the people older than the able-bodied age in the age structure of the rural female population grew from 18.3% in 1959 to 28.8% in 2007. That in the rural male population respectively increased from 7.5% to 13.2% in the same period.

On average, the proportion of women older than the able-bodied age is twice as big as that of men.

Worth mentioning is the spatial heterogeneity of the population ageing process. While in the Central and Volga Federal Okrugs the proportion of the people below and beyond the able-bodied age varies by individual oblasts insignificantly, in the South Federal Okrug the difference reaches 14.5% and in the eastern Federal Okrugs – Ural, Siberian and Far-Eastern it makes 12.1%, 14.7% and 11.7%, respectively.

By Federal Okrugs of Russia today the proportion of men beyond the able-bodied age varies from 9.0% in the Far-Eastern FO to 16.9% in the Central FO, the proportion of women belonging to the same age group ranges from 21.6% in the Far-Eastern FO to 37.0% in the Northwest FO. In the very beginning of the 21<sup>st</sup> century a slight decrease in the proportion of senior female age groups was observed, but by 2007 its previously high positions were re-established. It should be noted that during the last 5 years the proportion of women of the able-bodied age remained almost unchanged in all Federal Okrugs. At the same time, the proportion of men of the able-bodied age showed an average increase of 5% resulting from the decrease in the proportion of the people below and beyond the able-bodied age.

Analyzing the coordination coefficients for 10-year age groups of the rural population of RF we see that the average specific weight of each subsequent age group constitutes from 70.2% in 1959 to 85.0% in 2007 (see Table 4), which means that the proportions of the subsequent age groups are on the continuous increase, which in turn is characteristic of the reproduction type forming a regressive age structure with low birth rates and manifests that the demographic ageing process is in progress.

**Table 4: Dynamics of the Age Structure of the Rural Population of RF**

Age groups	Coordination coefficients, %				Rates of increase (decrease) in coordination coefficients reflecting specific weights of the neighboring age groups			
	1959	1989	2002	2007	1989 vs 1959	2002 vs 1959	2007 vs 1959	2007 vs 2002
10-19	60,00	76,47	154,55	136,36	127,45	257,58	227,27	88,24
20-29	113,33	107,69	76,47	93,33	95,02	67,47	82,35	122,05
30-39	113,33	100,00	100,00	92,86	88,24	88,24	81,93	92,86
40-49	84,62	64,29	123,08	123,08	75,97	145,45	145,45	100,00
50-59	81,82	144,44	56,25	81,25	176,54	68,75	99,31	144,44
60-69	66,67	76,92	122,22	61,54	115,38	183,33	92,31	50,35
70-79	66,67	60,00	72,73	100,00	90,00	109,09	150,00	137,50
80 or over	25,00	33,33	25,00	37,50	133,33	100,00	150,00	150,00
Average	70,24	76,53	80,81	85,01	108,94	115,04	121,02	105,20

The proportions of the “70-79” and “80 or over” age groups in the total rural population demonstrated an obvious growth, the coordination coefficients having respectively increased by 33.3% and 12.5% in the last five years to make 100% and 37.5%. In addition to that, the coordination coefficient value for the “40-49” age group increased one and a half times to reach 123.1% in 2007.

The average rates of increase in coordination coefficients reflecting specific weights of the neighboring age groups (see Table 4) exceed 100% in all of the cases signifying that in the reviewed period the proportions shifted towards senior age groups approximately by 5% on the average for all the age groups during the five-year period (compare with 9% in 30 years

between 1959 and 1989). This proves the existence of structural shifts in the age structure of the Russian population.

The rate of increase in coordination coefficient values is the highest for the “10-19” age group, forming 257.6 in 2002 as against the 1959 level. Also, one cannot but point to the high rates of increase in coordination coefficients for the “70-79” and “80 or over” age groups of the rural population.

**Table 5: Coordination Coefficients Reflecting Specific Weights of the Neighboring Age Groups of the Rural Population by Federal Okrugs of RF**

Age groups	Federal Okrugs of Russia						
	Central	Northwest	South	Volga	Ural	Siberian	Far-Eastern
10-19	152,79	146,57	130,85	147,19	136,04	133,47	139,75
20-29	103,39	109,86	96,32	87,67	99,76	94,07	94,10
30-39	92,23	82,77	82,99	96,02	83,76	83,57	82,89
40-49	129,87			130,63	127,94	127,48	113,09
50-59	85,63	86,67	74,39	76,00	86,14	86,76	90,09
60-69	74,79	58,43	68,93	67,02	55,07	51,25	50,18
70-79	103,00	104,59	80,10	100,43	87,56	89,68	60,77
80 or over	37,26	33,58	32,53	33,76	32,72	31,37	26,84
Average	90,87	86,66	79,30	85,27	81,66	79,97	74,10

**Table 6: Coordination Coefficients: Rural Population Versus Total Population of the Given Okrug of Russia**

Age groups	Coordination coefficients: rural population versus total population of the Okrug						
	Central	Northwest	South	Volga	Ural	Siberian	Far-Eastern
10-19	111,98	106,74	99,61	104,24	105,13	101,77	103,04
20-29	73,54	77,31	80,39	72,18	75,41	72,20	74,96
30-39	65,60	58,25	69,27	79,05	63,32	64,14	66,03
40-49	113,54	117,26	102,74	110,71	116,61	115,41	110,99
50-59	95,58	93,83	90,95	88,50	96,26	95,84	95,11
60-69	116,13	101,46	104,05	113,22	106,15	97,24	95,65
70-79	129,39	133,59	106,84	122,51	115,32	115,42	110,10
80 or over	94,08	88,78	92,86	96,35	95,22	93,71	90,10
Average	97,68	94,51	92,48	96,93	94,88	92,76	91,95

Analysis of the age structure of the rural population of RF by Federal Okrugs (2006) is presented in Tables 5 and 6.

When drawing up the social policy it is important to take into account the regional features of the process of ageing of the population of RF. The comparative analysis of the coordination coefficients reflecting specific weights of the neighboring age groups of the population of RF by Federal Okrugs shows that the ageing process is the most intensive in the Central, Northwest and Volga Federal Okrugs, where the proportions of the subsequent age

groups are close to that of the preceding groups, the average coordination coefficient values respectively equaling 90.9%, 86.7% and 85.3%. In these Okrugs the coordination coefficient values are especially big for the “70-79” age group, which points at the possible increase in the ageing index in the next time span. The smallest coordination coefficient value is observed in the Far-Eastern Federal Okrug (74.1%).

The coordination coefficient values for the “40-49” age group are very high for the rural population of almost all of the Federal Okrugs, which means that the age structure of the able-bodied population can change in favor of older ages in the nearest future.

The viewed changes in the age structure of the rural population of Russia affect the age structure of the able-bodied population. The role of economically active population of older ages (the “40-49” and “50-59” age groups) is on the increase. The specific weight of the “40-49” age group excels that of the “30-39” and “20-29” age groups by 30%. At the same time, the specific weight of the “60-69” age group is quite modest, making just 60% of that of the “50-59” age group.

All the Federal Okrugs have the ratio of coordination coefficients reflecting specific weights of the neighboring age groups of the rural population to coordination coefficients for the total population of the given Okrug below 100%, which is basically due to the smaller specific weights of the “20-29” and “30-39” age groups, indicating that for the rural population the ageing process is in greater progress. Scenario forecasts of the number and age structure of the rural population of Russia made by various scholars also point at the demographic ageing of the Russian countryside [5].

#### **4 Conclusion**

The demographic development of the rural Russia is featured by considerable demographic differences. Rural regions differ in birth and death rates, migration activity and age structure of the population. The irregularity of the demographic development and the inter-regional social-demographic differentiation of the rural regions imply that different approaches to choosing and following the regional strategies should be applied. The uneven growth of the proportion of the people of senior ages among the population of RF proves that these differences should be accounted for when drawing up economic, social and demographic development strategies. For the purpose of developing a differentiated social policy paying due respect for the noticeable regional differences in the rural population ageing figures, the authors have segmented the Federal Okrugs according to the values of coordination coefficients reflecting specific weights of the neighboring age groups of the rural population. The results show that the demographic ageing touched the Russian regions to a different extent. Being essential elements of the demographic transition, the regional features of the population reproduction and ageing processes should be thoroughly analyzed and taken into account when developing social, economic and innovation policies.

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