UDC 314

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SOCIO-DEMOGRAPHIC MEASURING OF RELATION OF LIFE QUALITY AND LEVEL OF POPULATION REPRODUCTION IN RUSSIA AND FOREIGN COUNTRIES ON BASIS OF RATING EVALUATIONS[1]

During the finishing of the second demographic transition in the countries with relatively high level of socio-economic development, the tendencies of rise in the total birthrate and the changing of a calendar of births were revealed. At the same time, the process of delayed marriage of both men and women, and increased number of single households were continued. The developing tendency of rise in births required from demographers an additional analysis of causes of this phenomenon, especially as the growth of total birthrate coefficient become stable after millennium. The attempt to analyze the newest tendencies of the influencing of growth of the life quality on the differential birthrate in safe regions of the world, to compare the pro-

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cesses of socio-economic, sociocultural, and reproductive differentiation of indexes of population movement on Russian territories with rating evaluations were made in the article.

The hypothesis of the research is related to the assumption that the global changes in life quality in a number of the world's regions stimulated the renewal of the tendency to alternation of generations in demographic processes. The authors of the research draw a conclusion that this process in Russia was just started and developing. It gives a chance to develop the tendency of alternation of generations in the future and reduce the treats of depopulation and the need of superfluous recruiting of foreign labor force.

Keywords: quality of life, demographic transition, alternation of generations, safe region

The first decade of the XXI century is marked by a dynamic formation of a new structural fertility model in most developed countries. In Europe, in particular, there is a widespread growth in the average number of children born by women of the hypothetical generation and, more importantly, this is noted in those countries which previously showed clear evidence of depopulation in contrast to the catching up countries. This new fertility model, at the same time, is observed to be only partially affected by the active governmental pronatalist policy measures and migration trends. We should agree that it took a while for the shift in the births calendar caused by transformation of marriage to come from Europe to Russia.

Several observations can be made in this regard. Firstly, the growing trends in total fertility rate after 2000 in Central, Southern and Eastern Europe in general are evidently clear. This fact is noted by J. Bongaarts and T. Sobotka [9, p. 220, 10, p. 272-273]. In their review of the total fertility trend the researchers noted that European countries (including those of Eastern Europe and Russia) have experienced an increase in the total fertility *(TFR)*. Having discussed the problem related to the period of dynamic growth in fertility and contributions made thereto by different groups of women, J. Bongaarts and G. Fini accentuated the usefulness of a new index, namely the correction for rate and parity with correction for total fertility rate *(TFRp*)* or $TFR = TFR^*(1-c)$ [5, p. 274-275]. The second observation was made later and it was a severer one. The point is that the total fertility continued to grow also during the protracted global economic recession [7, p. 270-271]. Thirdly, the second demographic transition in post-communist countries was of a more depressed nature due to a decline in fertility (Ukraine, for example, reached an average of 1.1 births per woman of hypothetical generation). The exceptions to these are countries such as Albania and Serbia & Montenegro where the *TFR* index stayed at 2.00–1.75 [8, p. 221]. Anyhow, the activities of the golden billion countries population have changed its quality during the first decade of the new century in science, technology and many other realms, as well as in terms of social and professional mobility of the population. The concepts of the third demographic transition and of migration as a determining factor influencing the population reproduction trends set forth by Van de Kaa, Ron Lesthaeghe and David Coleman can not provide an irrefragable answer to how the quality of life affects the reproductive behavior of family and individual [9, 132]. Being highly multidimensional and complex, this relationship does not fit into the framework of the demographic transition concept. In this we can agree with M. Klupta, who believes that proper consideration of the effects that factors of socio-economic development of modern countries have on their fertility trends requires at least the methods of cluster and historical analysis [10].

The rapid worldwide development of expert and evaluation technologies has made it possible to compare well-being ratings of various countries as aggregate estimates of quality of life with total fertility rates differentiation. Such total fertility rates are fully comparable from territorial and historical aspects. We acquired the most recent quality of life indexes of the so-called good countries («The Good Country Index», 2014) [11]. The total fertility rate *(TFR)* and the «Aggregated rating» proved to be interdependent, which allows to formulate a working hypothesis of a positive relationship possibly existing between the reproduction levels in the group of countries having a high level of general well-being. This implies not only the characteristics and indexes of socio-economic development, but a social and cultural context of the problem as well. The regional demographics in the good countries turned out to be quite good (Fig. 1).

The aggregated index «The Good Country Index, 2014» revealed Russia's generally outlying position in respect to the groups of countries with favorable quality of life levels and modes of generations replacement.

Decomposition of the index into its constituent elements revealed a vast heterogeneity in the relationship between index components within the group of high ranking «good countries» and total fertility (Table 1).

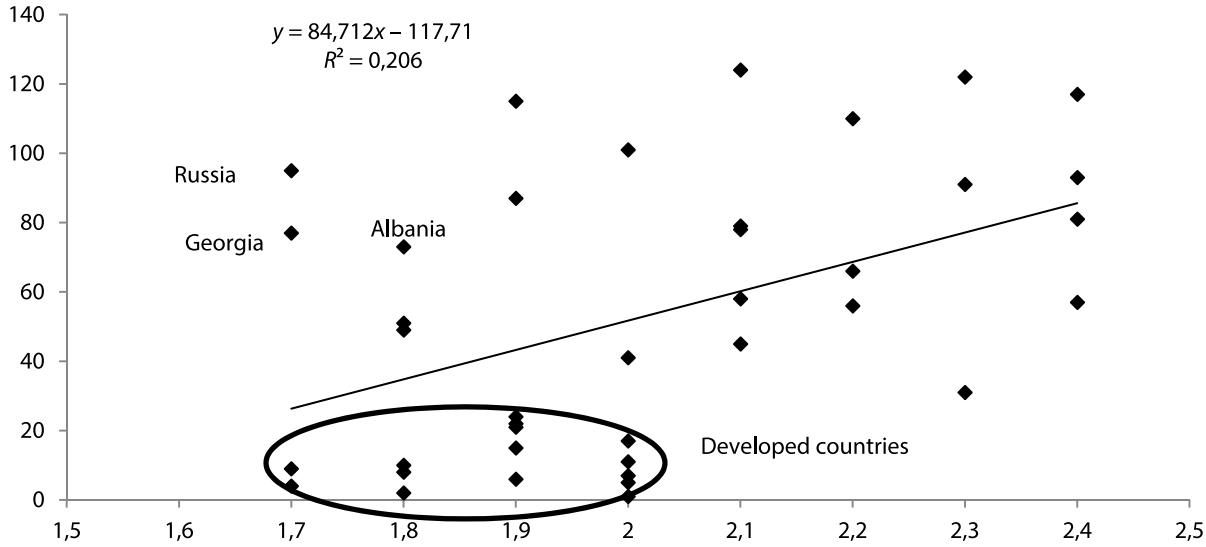

Fig. 1. *Total fertility rate and the «Aggregated rating» relationship*

Table 1

Evaluation of reproduction levels by components of The Good Country Index [2], [11]

Good countries component rating by relationship closeness to *TFR*	Component denomination	Correlation index value (*R*2)	TFR value to gross rate	Net coefficient of reproduction	Share of countries with *TFR* >2 per woman of hypothetical generation
1	Culture	0.263	1.900 / 0.927	0.909	0.462
2	Science and technology	0.187	1.885 / 0.920	0.902	0.384
3	Prosperity and equality	0.181	2.115 / 1.031	1.010	0.384
4	Global stability	0.159	2.108 / 1.029	1.008	0.384
5	Health and well-being	0.120	2.092 / 1.021	1.001	0.384
6	Planet and climate	0.082	2.077 / 1.014	0.994	0.384
7	Peace and safety	0.065	1.992 / 0.972	0.953	0.538

Decomposition of the index into its constituent elements revealed a vast heterogeneity in the relationship between index components within the region of high ranking good countries and total fertility.

The countries rating 1st through 20th were found to be within the total fertility rates of averagely 1.7–2 children per woman of hypothetical generation. Thus, almost half of the good countries remains threatened by a prospect of depopulation processes capable of destroying the conservative ethnic basis of statehood. The other half of the most well-off countries of the first twenty has moved towards maintaining the ordinary mode of generations replacement. The key position in determination of the narrowed mode of generations replacement is held by culture, which is the strongest component of the rating. Similar positions belong to science and technology components. The latter correlates directly with low total fertility and population reproduction rates. The combination of these depopulation factors determines the lion's share (43% total) of fertility in the most well-off countries. The opposing group of factors includes prosperity, stability and health. But their total contribution to demographic processes development amounts to only one third. The climate factors effect is generally positive but at the same time paradoxical, since it is the countries with extreme temperatures that display higher fertility than that of the countries with moderate climates. Statistically the relationship turned out to be significant enough.

Extended reproduction and generations replacement is maintained due to the following components: prosperity and equality (gross rate = 1.031), global stability (1.029), health and well-being (1.021) and planet and climate (1.014).

Let us make this supposition more precise. The following is the recalculation of the gross rate, as applied to the most well-off countries, into net rate. Thus the net generation replacement value will exceed 1 only for the following components: prosperity and equality, global stability, health

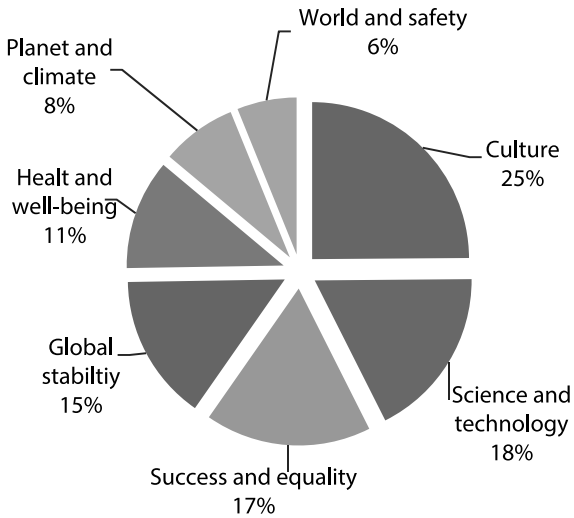

Fig. 2. *Countries aggregate rating structure by components*

and well-being. The overall picture of the components structure by demographic criteria is shown in bar chart in Fig.2. Recalculation showed the most significant share in The Good Country Index belongs to the components of culture, science and technology, prosperity of the territory.

It is worth noting that the least share belongs to peace and safety component. This is quite surprising considering the current military and political situation in the world. Component specific fields in the index do not overlap. The requirements of safety, stability, prosperity and well-being are applied primarily to the developing countries, not just those rated as well-off. Oddly enough, the value of health is within the fields of the most well-off countries and corresponds to the fields of science, culture, stability and prosperity of the countries considered good by its quality of life (Table 2).

Cultural component (Fig. 3) proved to be the strongest due to the systemic nature inherent to the formation of public and individual views on the acceptable number of children in the family or reproductive attitudes and ideas about normal number of children existing on society and eth-

Table 2

Morphological table of the well-off countries quality of life components

Country name	Component							Rating nucleus
	Science	Culture	Peace and safety	Stability	Climate	Prosperity	Health	
USA	+	–	+	–	–	–	+	+
Finland	+	+	–	+	+	+	+	+
Iceland	+	+	–	+	+	–	–	+
Ireland	+	+	–	+	–	+	+	+
Norway	+	+	–	+	+	+	+	+
Sweden	+	+	+	+	+	+	+	+
Great Britain	+	+	+	+	–	+	+	+
Belgium	+	+	+	+	–	+	+	+
France	+	+	+	+	+	+	+	+
Australia	+	+	–	+	+	–	+	+
New Zealand	+	+	–	+	+	–	+	+
The Netherlands	+	+	+	+	+	+	+	+
Denmark	+	+	–	+	–	–	+	+
Malaysia	–	+	+	–	–	+	–	–
Mexico	–	–	+	–	–	–	–	–
Dominica	–	–	+	–	–	–	–	–
Azerbaijan	–	–	+	–	–	–	–	–
Turkey	–	–	+	–	–	–	+	–
Vietnam	–	–	+	–	–	–	–	–
Albania	–	–	+	–	–	+	–	–
Costa Rica	–	–	–	+	+	–	–	–
Brazil	–	–	–	–	+	–	–	–
Chile	–	–	–	–	+	–	–	–
Colombia	–	–	–	–	+	–	–	–
Uruguay	–	–	–	–	+	–	–	–
Trinidad and Tobago	–	–	–	–	–	+	–	–
Sri Lanka	–	–	–	–	–	+	–	–
Georgia	–	–	–	–	–	+	–	–

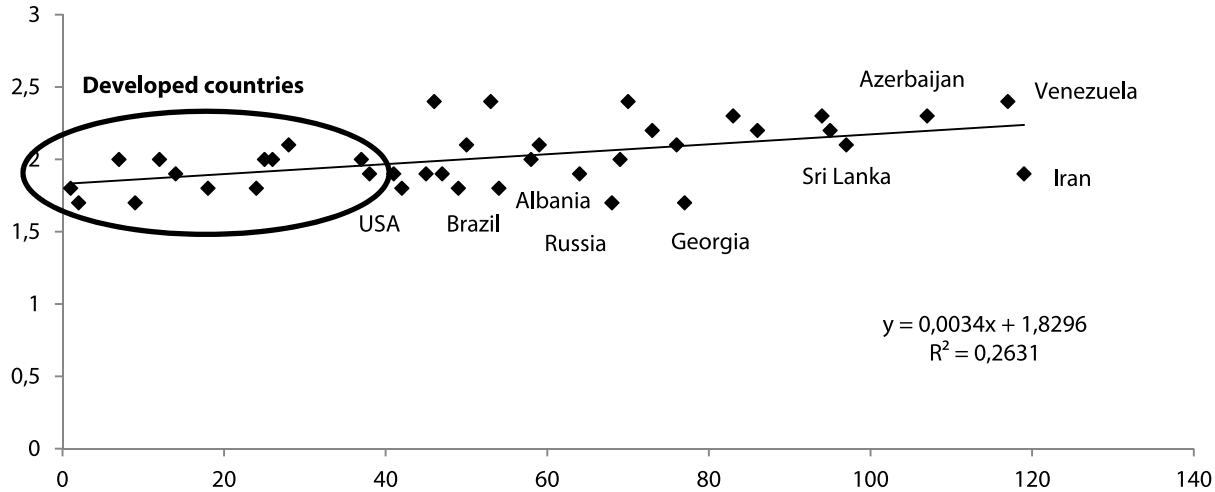

Fig. 3. *Total fertility rate and culture component relationship*

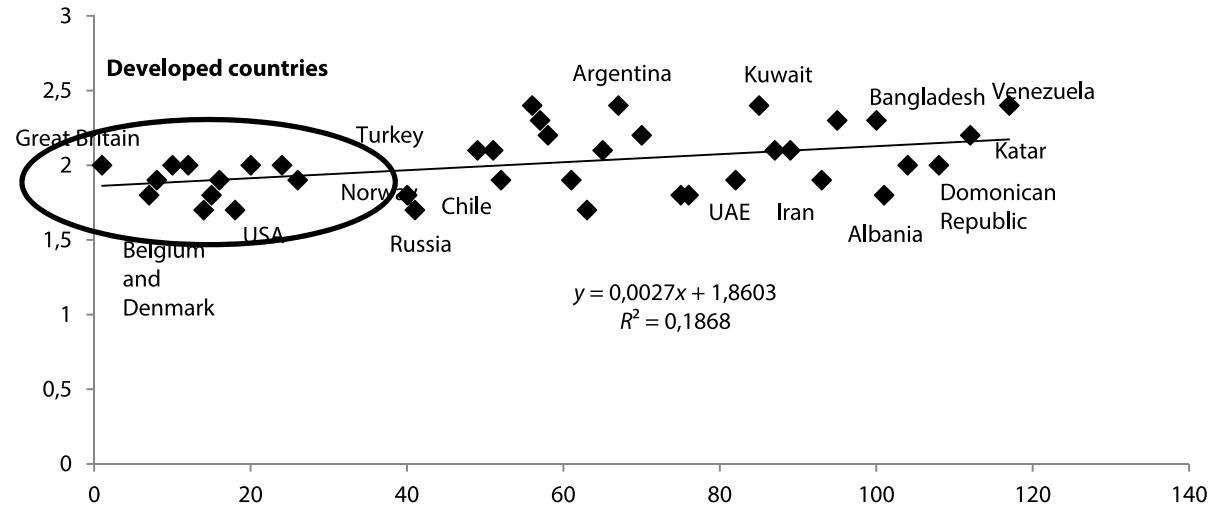

Fig. 4. *Total fertility rate and science and technology component relationship*

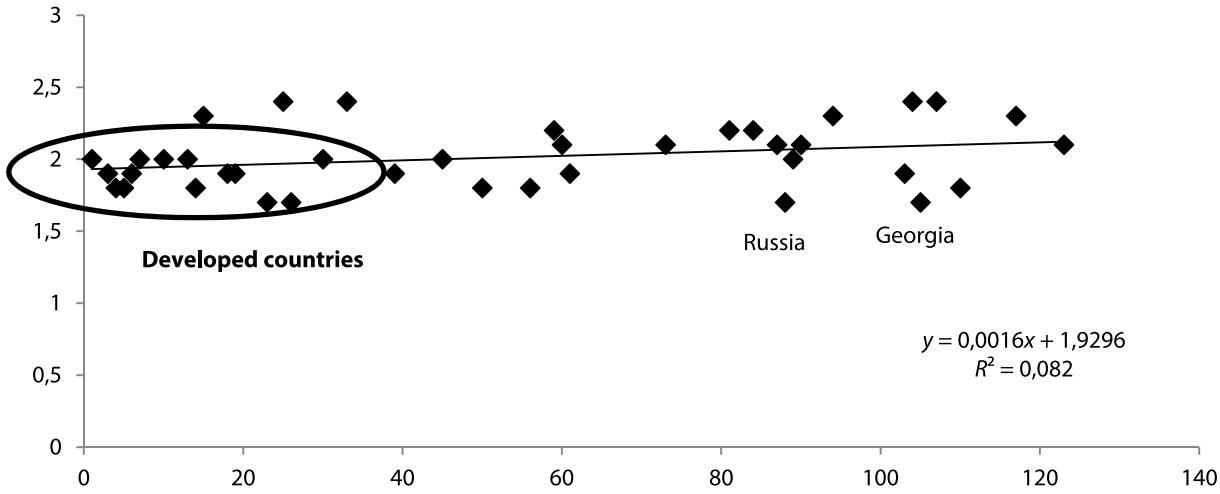

Fig. 5. *Total fertility rate and prosperity and equality component relationship*

nical levels. The only component which is more powerful than that of culture is the religious affiliation.

Statistically, the relationship between culture and fertility is significant, but, unfortunately, it is of an inverse type. It is clearly evident that the most culturally developed countries are found on the left side of the chart and represent the cluster of the top twenty countries. Moreover, the United States, let alone Brazil and Russia, are found close to the periphery of the cluster, among the countries rated 40 through 60. The relationship between general vector of rating and total fertility is shaped in a clearly negative manner.

A similar pattern is observed in Fig. 4 presenting the relationship between the level of scientific and technological development and the total fertility rate. However, the boundaries of the first cluster (Great Britain, Denmark, USA, etc.) are better outlined. The intermediate cluster of the catching up countries (Turkey, Chile, Russia, etc.) and that of the least well-off countries (Dominica, Bangladesh, Venezuela, etc.) are clearly identifiable.

The distribution of countries by prosperity and equality component relationship to the total fertility rate is entirely different (Fig. 5). Almost all of the countries are densely grouped in the proximity of the ordinary generations replacement axis. Statistically the relationship between prosperity component and the total fertility rate is worth considering.

However, the relationship as a whole is inverse, the highly rated good countries are grouped closer to the axis of values obtained for the top twenty. Those with a low rating tend to have higher rates of total fertility which «pulls up» the axis. The overall picture is presented in composition table 3. Russia has been included for value comparison. Generally, Russia's position is in the intermediate group, outside the boundaries of the good countries cluster. The demographic status of the country, however, looks quite good thanks to its total fertility rates and generations replacement level (such an evaluation can not yet be given referring to life span criterion).

Given the impressive life span in the most well-off countries and practically negligible probability of mortality among mothers in reproductive period, it is quite easy to recalculate the total fertility rate into the generations replacement coefficient. TFR value is multiplied by the biological constant of probability of a female baby being born to a mother (0.488). This allows to accurately determine the probability threshold of ordinary generations replacement in the country not requiring engagement of migrants (gross reproduction rate, Table 4). Conversely, if the generation replacement goes below 1, a deficit of reproduced stationary population with respective need for further engagement of human capital from outside the country will be observed.

Let's assume the aspirations for material and spiritual well-being are a quality of life indicator of the Russian population everyday life. It is clear that less well-off countries are marked by generally higher fertility rates. This is proved by the law of well-being and fertility inverse relationship, commonly known since J. Bertillon's times. However, the group of most well-off countries demonstrates total fertility rates allowing to come tightly close to the ordinary generations replacement level.

As examples we can mention Ireland (where abortions are prohibited), New Zealand, France, Spain and Great Britain. However, practically all of these countries are actively engaging borrowed foreign man power. Russia's position in the rating just by culture component turned out to be higher than that obtained w a combination of all components (technology, safety, etc.).

Component method has been used for a long time in Russia for quality of life rating evaluation. The number of components is still seven, but the nominations are different. An aggregated rating of regions by differentiated quality of life rates (including factors as life span, income rates, living conditions, infrastructure, ecological conditions and safety) has been prepared by RIA rating agency (RIA Novosti group) experts under a project shared with Moscow News newspaper [11].

Based on the RIA group rating, we have identified a group of the best areas of Russia for well-be-

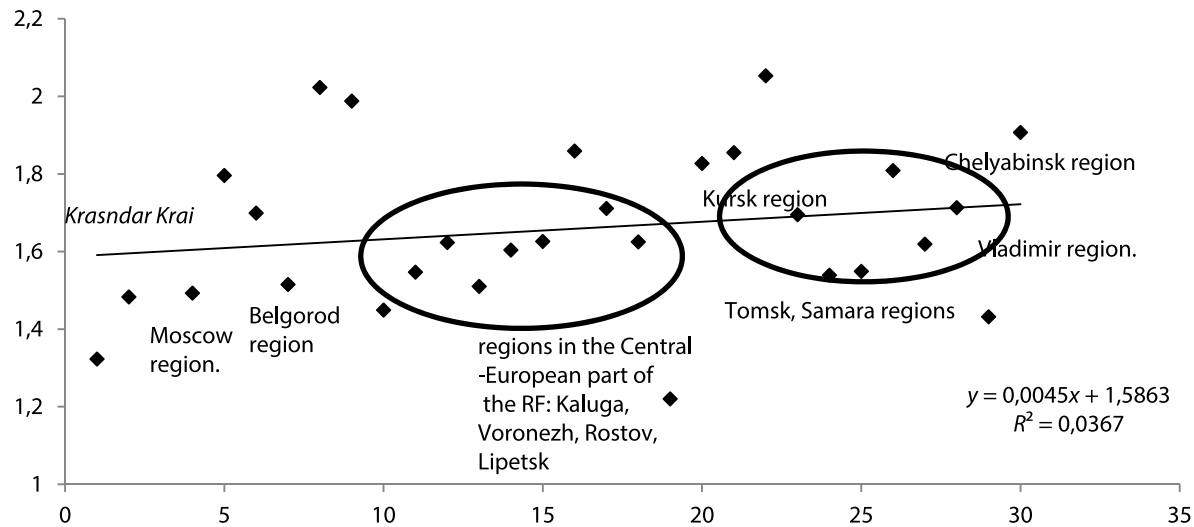

Fig. 6. *Russian regions rated by RIA rating scores and TFR value*

Table 3

Summary table of countries differentiation by level of well-being and its components, Russia included (index per 2014 rating)

Continent, Territory, Country	Total fertility rate (average number of children per woman)	№1	№2	№3	№4	№5	№6	№7	Rating
Most well-off									
Great Britain	2	1	12	94	9	30	9	6	7
Ireland	2	20	7	33	4	45	1	9	1
Iceland	2	24	37	27	15	1	101	44	17
New Zealand	2	10	25	37	17	7	41	17	5
France	2	12	26	92	18	10	28	15	11
Denmark	1.7	14	9	88	5	26	35	5	9
The Netherlands	1.7	18	2	97	3	23	8	2	4
Belgium	1.8	15	1	100	16	56	5	3	10
Norway	1.8	40	24	58	7	4	14	16	8
Finland	1.8	7	18	53	12	14	3	12	2
Australia	1.9	16	38	89	13	6	36	14	15
USA	1.9	26	41	114	28	39	53	7	21
Sweden	1.9	8	14	111	8	3	4	8	6
Less well-off countries									
Tunis	2.2	58	86	31	82	59	54	68	56
Costa Rica	1.9	61	64	35	25	19	42	76	22
Mexico	2.2	70	73	91	69	84	47	30	66
Jamaica	2.1	65	59	23	62	87	51	72	45
Trinidad and Tobago	1.8	76	42	25	64	110	22	86	51
Argentina	2.4	67	46	55	29	25	105	112	57
Brazil	1.8	75	49	83	37	5	123	52	49
Chile	1.9	52	47	42	27	18	31	114	24
Colombia	2.3	57	83	43	107	15	29	29	31
Uruguay	2	104	58	5	35	13	94	95	41
Malaysia	2.1	49	28	113	87	73	10	91	58
Albania	1.8	101	54	95	65	50	18	99	73
Georgia	1.7	63	77	51	102	105	13	87	77
Least well-off countries									
Dominica	2	108	69	99	46	89	113	35	101
Venezuela	2.4	117	117	34	77	33	124	118	117
Azerbaijan	2.3	95	107	122	74	94	86	100	122
Kuwait	2.4	85	70	18	108	104	72	83	93
Qatar	2.2	112	95	50	118	81	68	78	110
Turkey	2.1	51	50	112	111	60	97	20	79
United Arab Emirates	1.9	82	45	74	122	61	76	53	87
Bangladesh	2.3	100	94	52	67	117	55	34	91
India	2.4	56	53	44	91	107	117	37	81
Iran	1.9	93	119	72	97	103	56	73	115
Sri Lanka	2.1	87	97	54	55	90	23	94	78
Vietnam	2.1	89	76	103	123	123	79	111	124
Russia	1.7	41	68	90	106	88	112	42	95

ing level. The following table shows the relationship between rating indicators, both by number and total score, and total fertility rate value in the best well-off regions of Russia (Table 5).

It should be noted that Russia's axis of relationship between rating scores and total fertility rates is located relatively «lower» than the respective one on the global chart (Fig. 6). The Russia's

Table 4

Reproduction rates by culture component for groups of countries

Most well-off countries	Gross reproduction rate	Culture component rating	Country's overall rating
Belgium	0.878	1	10
The Netherlands	0.830	2	4
Ireland	0.976	7	1
Denmark	0.830	9	9
Great Britain	0.976	12	7
Sweden	0.927	14	6
Finland	0.878	18	2
Norway	0.878	24	8
New Zealand	0.976	25	5
France	0.976	26	11
Malaysia	1.025	28	58
Iceland	0.976	37	17
Australia	0.927	38	15
Less well-off countries			
USA	0.927	41	21
Trinidad and Tobago	0.878	42	51
United Arab Emirates	0.927	45	87
Argentina	1.171	46	57
Chile	0.927	47	24
Brazil	0.878	49	49
Turkey	1.025	50	79
India	1.1712	53	81
Albania	0.878	54	73
Uruguay	0.976	58	41
Jamaica	1.025	59	45
Costa Rica	0.927	64	22
Russia	0.830	68	95
Least well-off countries			
Dominica	0.976	69	101
Kuwait	1.171	70	93
Mexico	1.074	73	66
Vietnam	1.025	76	124
Georgia	0.830	77	77
Colombia	1.122	83	31
Tunis	1.074	86	56
Bangladesh	1.122	94	91
Qatar	1.074	95	110
Sri Lanka	1.025	97	78
Azerbaijan	1.122	107	122
Venezuela	1.171	117	117
Iran	0.927	119	115

«best well-off areas» (regions) turned out to be located in the field of clearly depopulation type with total fertility rates less than 1.5–1.7. However, statistically the relationship between indicators of total fertility rating is not sufficient enough for formulation of working hypotheses.

A thorough examination of how the regions of the most well-off group are distributed by total fertility rate revealed no significant relationship, but showed there are big differences between central regions of Russia and other regions. More importantly, the relationship between reproduction rate and rating score (which already includes life span and health along with other components) is positive (Fig. 7).

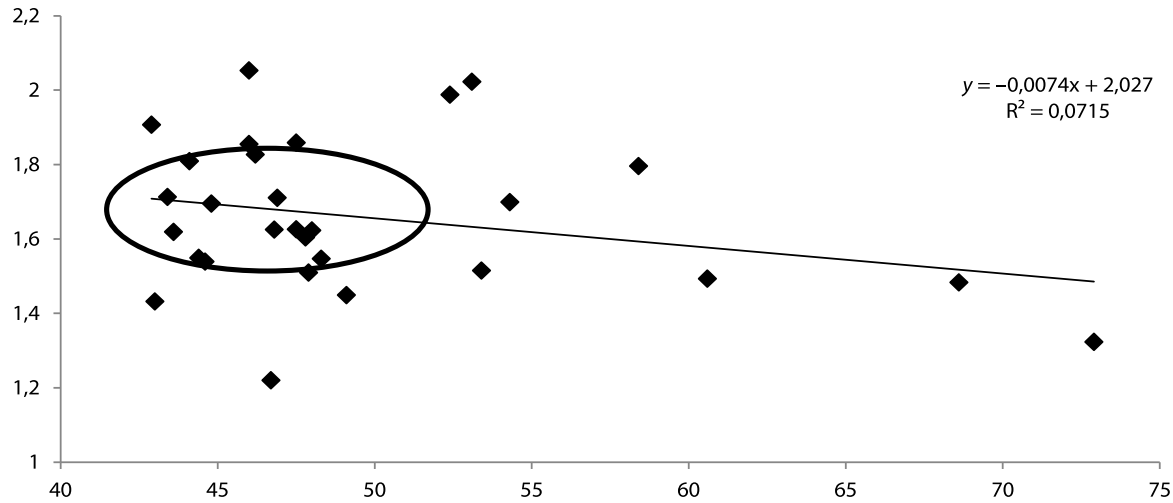

Fig. 7. *Relationship between region's total fertility and score in overall rating of the best well-off regions*

Table 5

Relationship between rating indicators and total fertility rate for Russia's 30 best regions for quality of life, 2012–2013

Rating	Russian region	Total rating score	*TFR*
1	city of Moscow	72.9	1.323
2	city of St. Petersburg	68.6	1.483
4	Moscow region	60.6	1.493
5	The Republic of Tatarstan	58.4	1.796
6	Krasnodarskiy kray	54.3	1.699
7	Belgorodskaya region	53.4	1.515
8	The Khanty-Manskiysk-Ugra autonomous district	53.1	2.023
9	Tyumenskaya region	52.4	1.988
10	Voronezhskaya region	49.1	1.449
11	Nizhegorodskaya region	48.3	1.547
12	Kaluzhskaya region	48.0	1.623
13	Rostovskaya region	47.9	1.510
14	Yaroslavskaya region	47.8	1.604
15	Lipetskaya region	47.5	1.626
16	The Republic of Bashkortostan	47.5	1.859
17	Novosibirskaya region	46.9	1.711
18	Kaliningradskaya region	46.8	1.625
19	Leningradskaya region	46.7	1.220
20	Sverdlovskaya region	46.2	1.827
21	Omskaya region	46.0	
22	The Yamalo-Nenetskiy autonomous district	46.0	2.053
23	Kurskaya region	44.8	1.695
24	Samarskaya region	44.6	1.539
25	Tomskaya region	44.4	1.549
26	Chelyabinskaya region	44.1	
27	Vladimirskaya region	43.6	1.619
28	Sakhalinskaya region	43.4	1.713
29	Tul'skaya region	43.0	1.432
30	Permskiy kray	42.9	1.907

Quality of life index of Russia's regions included the following: income level, housing conditions, social infrastructure availability, environment and climate, safety, population satisfaction, demographics, health and education, industrial and economic development of the area, transportation infrastructure, business activities.

The current total fertility rate in the Urals Federal District was to some extent predicted by the authors of demographic adversity index of Russia's regions (A.G. Grishanova, N.I. Kozhevnikova, L.L. Rybakovskiy), which based on the method of comparing standard total fertility and mortality rates to indices of mechanical movement of russian areas in 2006–2007 came to the conclusion that the Urals and the Southern districts are the demographically best regions [3, p. 36], [4, p. 34-35]. The authors of the method noted that the total fertility rate grew up significantly in the Middle and the Southern Urals in 2005–2008. The most demographically adverse regions of the Urals Federal District were then the Sverdlovsk and the Chelyabinsk region (1.031 and 1.034 respectively). Tyumen region areas looked less adverse (0.878), [4, p. 220]. We can't help but agree with this. The demographic situation in the compared regions depends on the differentiation of social groups and requires a correction to be introduced for particular historical and cultural developments [5, p. 30-32].

In general, the total rate dynamics in the Urals Federal District of Russia is in line with the nationwide Russian trend. But the clearly marked increase in the trend of years 2001 through 2012–2013 confirms the total fertility rate has almost fully recovered to the 1990 rate. The urban trend is especially remarkable. This is to partly confirm the hypothesis of an ongoing formation of a new fertility model. This model is influenced by an in-

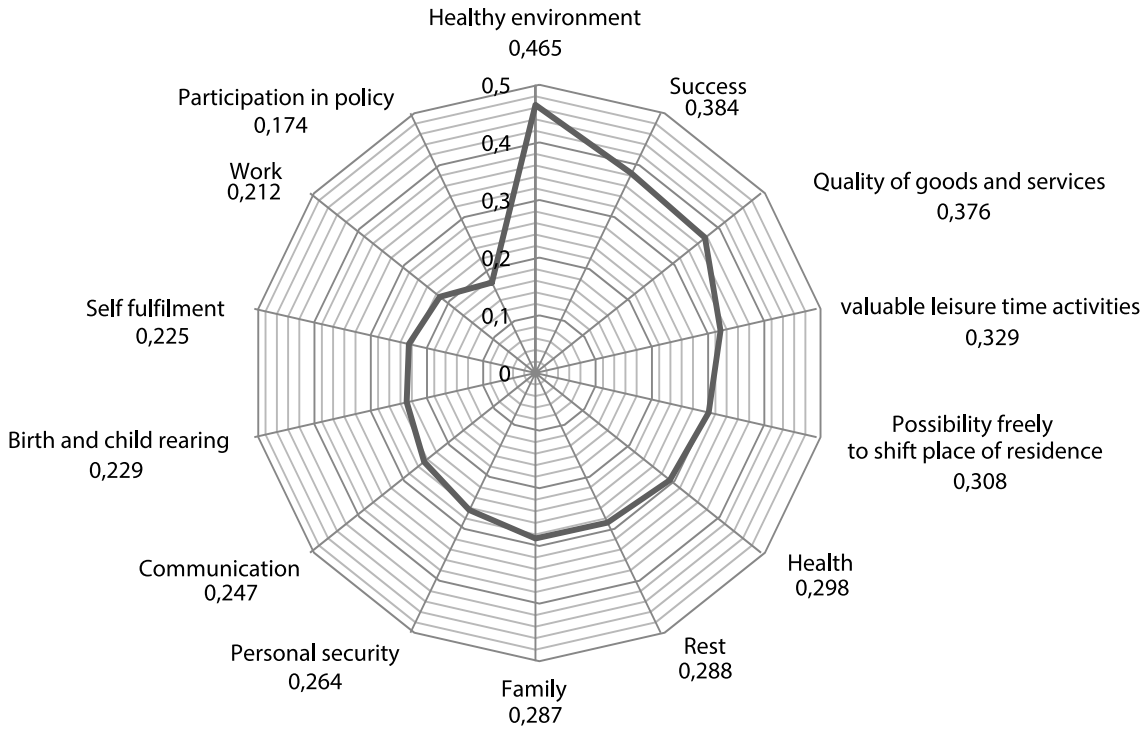

Fig. 8. *Most important wishes for material and spiritual well-being, variables defined by Cramer's coefficient application*

crease in the age of marriage and a shift towards the older age groups.

The selective sociological study of population that we conducted in 2013–2014 in the neighboring regions of the Urals Federal District revealed a significant relationship between the respondents' views of quality of life and material and spiritual well-being of family.

During the selective study of Ural Federal District population several attempts were made to «semiotize the dimensions of human life, providing an axiological significance to all of their elements» [1]. In our study «material» and «spiritual» well-being are understood as a combination, as most studies do not separate the categories one from another and note how much harmony there is in such a combination.

We used the Cramer coefficient of VORTEX statistical system to identify the statistical relationships between variables, that is when the value of one variable is completely determined by the value of the second variable that resembles the material and spiritual well-being of the population (Fig. 8).

According to Cramer coefficient, the value of the «material and spiritual well-being» variable is completely determined by variables with values equal to or exceeding 0.3. The healthy environment is at the first place among the most important factors (0.465). Personal interests aimed at «achieving success in life» hold the second place with 0.384, and to complete the list of the most important factors are the following respondents' wishes: to «consume quality goods and services» (0.376), to take full advantage of free time (0.329), to «live where one wants and to freely change the place of residence»(0.308).

In general, the significant factors shown in italics in the table define the population's possibilities to achieve material and spiritual well-being. Most interestingly, healthy environment is at the top of the list, as it represents a set of favorable conditions understood as characterizing the quality of human environment and human life; integrally it is represented by the average life span and indicators of population's health.

Thus, the results of the study contribute to a deeper understanding of the respondents wishes and aspirations, as well as to identification of important functional elements needed to achieve well-being.

In conclusion it should be noted that the group of the most «good» countries and regions, both in cultural and socio-economic terms, the relationship between population reproduction rates and well-being turned out to be inverse. However, after 2000 high ratings of area's (region's) development tend to correlate with rates approaching those of ordinary reproduction of population. Ever more «good» countries and regions can demonstrate the ordinary generations replacement model which does not require vast engagement of foreign labor from outside the country or region. The structural changes in total fertility rate, in their turn, have somewhat acquired an inner impulse for a

new kind of development. This trend is starting to show also in the post-industrial areas of Russia. In the long run the positive relationship between quality of life indicators may occur in the regions of the Urals and Siberia that have the most advantageous combination of components of scientific and technological development, culture, stability, prosperity and health.

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