

Integral assessment of the population's quality of life as an urgent task of the digitization program for the regional economy

Menshikova L.I.

FSBI "Central Research Institute of Health Organization and Informatization" of the Ministry of Healthcare of the Russian Federation
Moscow, Russia
menshikova1807@gmail.com

Zykova N.V.

Northern State Medical University of the Ministry of Healthcare of the Russian Federation
Arkhangelsk, Russia
zykovanv@gmail.com

Mordovsky E.A.

Northern State Medical University of the Ministry of Healthcare of the Russian Federation
Arkhangelsk, Russia
ulimwengumea@gmail.com

Abstract — For the successful implementation of national development programs of the country, the informed choice of the objects and technologies of "impact" provided by them on the part of state authorities, it is necessary to develop a unified interdisciplinary approach to assessing the quality of life of citizens, combining an objective characteristic of the macroeconomic situation and a subjective individual self-assessment of their personal feelings in the context of their culture and value system, convenient for organizing dynamic monitoring as part of a digitization program of the country's economy. The purpose of the study is to give an integral assessment of the objective and subjective component of the quality of life of the population in the territories of the Arctic Zone of the Russian Federation and justify the feasibility of organizing its comprehensive monitoring within the framework of the digitization program for the regional economy.

Research methodology. At the first stage, in a group of 1,616 people (including 504 men (31.2%) and 1,112 women (68.8%)) - residents of the Arctic Zone of Arkhangelsk Region and Nenets Autonomous Okrug, a sociological survey was carried out using the questionnaire method to determine individual assessments of the quality of life (used by the World Health Organization (WHO) Quality of Life (WHOQOL-BREF)). At the second stage, a comparative consolidated socioeconomic assessment of the population's quality of life was carried out by the method of multivariate analysis of statistical data of the Federal State Statistics Service of Russia (the author's method). An analysis of the results of two stages of the research allowed us to calculate an integral assessment of the quality of life of the population in the Arctic Zone of Arkhangelsk Region and Nenets Autonomous Okrug. The method developed by the authors for calculating the integral assessment of the citizens' quality of life can be used to organize its monitoring as part of the digitalization program for the regional economy.

Keywords — *quality of life, Arctic Zone of the Russian Federation, digitization of the economy, integral assessment.*

I. INTRODUCTION

By the Decree of the Government of the Russian Federation dated November 17, 2008, No. 1662-r, *The Concept of Long-Term Socioeconomic Development of the Russian Federation for the Period until 2020*, which determined "ensuring balanced socioeconomic development [of the country], reducing the level of ... differentiation in the socioeconomic condition of the regions and the population's quality of life" [1] has been approved. The solution of these problems in the Arctic Zone of the Russian Federation seems to be especially relevant, given, on the one hand, their significant resource potential (the development of which is recognized as one of the factors for ensuring the country's national security in the 21st century) [2], on the other hand, there is a historically determined lag in the development of the social sphere, low transport accessibility, and, as a result, the low quality of life of the local population, manifesting in the form of large-scale processes of deruralization and depopulation [3,4]. Thus, an assessment of the citizens' quality of life can be considered not only a criterion for the effectiveness of the national development programs of the country currently being implemented, but also a tool for choosing the objects and technologies of "influence" provided by them on the part of state authorities.

Currently, the assessment and analysis of the population's quality of life are based on a wide scientific base formed by representatives of domestic and foreign science. Moreover, in the economy, special attention is traditionally paid to assessing the level of well-being of citizens; in the sociology of medicine—to an analysis of the state of individual and public health; in the ecology—to environmental conditions.

Currently, the number of publications on the problems of the digital economy is increasing: M. Belonozhko, O. Barbakov, L. Belonozhko (M. Belonozhko et al, 2018), G. Litvintseva, A. Shmakov, E. Stukalenko, S. Petrov (Litvintseva et al, 2019). Among the studies of the impact of digitalization on the population’s quality of life, one can single out: A. Guryanova and others (A. Guryanova et al, 2019), E. Gomes and others (E. Gomes et al., 2019), K. Schmidt and others (K. Schmidt et al., 2019).

Works on the assessment of the regional policy has appeared, namely: regional digital inequality (M. Szeles, 2018), the territory of the Arctic Zone (I. Efremova et al, 2017), G. Tugushkina and others (G. Tugushkina et al, 2019).

At the same time, a unified interdisciplinary approach to assessing the quality of life, combining the objective characteristics of the macroeconomic situation and the subjective individual self-assessment of personal feelings of citizens in the context of their culture and system of values, personal goals, standards and interests (in fact, “quality of life”, as it is understood by experts of the World Health Organization, WHO), taking into account, inter alia, the spatial factor of residence, have not yet been developed. The relevance of solving this problem is not in doubt, given the scale of the national goals and strategic tasks of the country’s development, as well as the technical capabilities that the current digitalization program of the economy is opening up [5].

The purpose of the study is to give an integral assessment of the objective and subjective component of the quality of life of the population in the territories of the Arctic Zone of the

Russian Federation and justify the feasibility of organizing its comprehensive monitoring within the framework of the digitization of the regional economy.

II. RESEARCH METHODOLOGY

The study was carried out as part of the implementation of the RFBR grant No. 18-410-290002 *Socioeconomic Aspects of the Quality of Life of the Population of the Arctic Zone of Arkhangelsk Region and NAO* and included two stages.

At the first stage, a sociological survey was carried out using a questionnaire survey in a group of respondents living in Arkhangelsk Region and Nenets Autonomous Okrug to determine individual assessments of personal feelings of citizens in the context of their culture and system of values, personal goals, standards, and interests (collectively defined as “quality of life”) [6]. The sample was presented by residents of Arkhangelsk, Severodvinsk, and Novodvinsk, as well as Primorsky, Onezhsky, and Mezensky Districts of Arkhangelsk Region; by residents of the city of Naryan-Mar of Nenets Autonomous Okrug (NAO). These territories are assigned to the Arctic Zone of the Russian Federation in accordance with Presidential Decree No. 296 of May 2, 2014 [7]. The World Health Organization (WHO) Quality of Life (WHOQOL-BREF) was used as a questionnaire tool. The sample size was calculated using software developed by WHO experts (STEPS Sample Size Calculator) and amounted to (with an expected response rate of 90%) 1,287 people. 1,616 people (including 504 men (31.2%) and 1,112 women (68.8%)) were surveyed in total. The characteristics of the group of respondents depending on their gender and place of residence are shown in Table 1.

TABLE I. DISTRIBUTION OF RESPONDENTS BY GENDER AND PLACE OF RESIDENCE, ABS. (%)

Place of residence	Men	Women
Arkhangelsk Region, including	449 (31.3)	985 (68.7)
Arkhangelsk	212 (42.1)	291 (57.9)
Severodvinsk	101 (20.2)	400 (79.8)
Novodvinsk	19 (31.7)	41 (68.3)
Primorsky District	53 (28.5)	133 (71.5)
Onezhsky District	41 (31.3)	90 (68.7)
Mezensky District	23 (43.4)	30 (56.6)
Nenets Autonomous Okrug	55 (30.2)	127 (69.8)
Total	504 (31.2)	1,112 (68.8)

A quantitative assessment of the respondents’ quality of life was performed in two forms: in points (presented, in turn, as a simple arithmetic mean (with its 95% confidence interval, CI)); in the form of recalculated proportion values (interpreted as follows: 0-20% (of the maximum possible score) – “Low rate”; 21-40% – “Reduced rate”; 41-60% – “Average rate”; 61-80% – “Increased rate”; 81-100% – “High rate”). For statistical analysis, quantitative and categorical variables were used: quantitative ones were presented as a median (with 1 and 3 quartiles), simple arithmetic mean (with its 95% confidence interval, CI), categorical ones—as percent stakes. In order to determine the relationship between categorical variables, the Pearson’s Chi-square test was used. The differences were considered to be significant when the probability of type 1 error was less than 5% ($p < 0.05$). Statistical data processing was performed using the SPSS ver. 23.

At the second stage, a comparative summary socioeconomic assessment of the population’s quality of life was carried out by the method of multivariate analysis of statistical data of the Federal State Statistics Service of Russia. In order to compare the results and correctly assessment, the authors of the study selected the following socioeconomic rates of the quality of life: the volume of goods and services production; the volume of sold goods of improper production; the volume of investments in fixed assets; the number of organizations’ employees; the average monthly salary of organizations’ employees; retail turnover of organizations; turnover of public catering organizations; the number of families who received housing and improved housing conditions; number of sports facilities; the commissioning of residential buildings; number of births. The algorithm for the consolidated assessment of socioeconomic indicators is based on taking into account the proximity of the elements of

analysis by the compared rates to the element—the standard, that is, to the element with the maximum value of the rate. For each analyzed municipal unit (MU), its value was determined by the formula:

$$R = \sqrt[n]{x_{1m}^2 * x_{2m}^2 * x_{3m}^2 * \dots * x_{nm}^2}, \quad (1)$$

where R = summary assessment,
 X_m – standardized rates of the m^{th} of MU,

n – number of rates.

III. RESULTS

The recalculated scores of the quality of life (the WHO method) of the majority of men and women living in municipal units of Arkhangelsk Region belonging to the land territories of the Arctic Zone of the country corresponded to the “average” and “increased” level (Table 2).

TABLE II. ASSESSMENT OF THE QUALITY OF LIFE OF RESPONDENTS DEPENDING ON THEIR GENDER AND PLACE OF RESIDENCE (THE WHO METHOD)

Respondent's place of residence	Gender	0-20% Low rate	21-40% Reduced rate	41-60% Average rate	61-80% Increased rate	81-100% High rate	p
		abs. (%)	abs. (%)	abs. (%)	abs. (%)	abs. (%)	
Arkhangelsk Region, including	men	4 (0.9)	24 (5.3)	183 (40.8)	219 (48.8)	19 (4.2)	0.066
	women	1 (0.1)	46 (4.7)	428 (43.5)	484 (49.1)	26 (2.6)	
Arkhangelsk	men	3 (1.4)	9 (4.2)	83 (39.2)	107 (50.5)	10 (4.7)	0.347
	women	0 (0.0)	15 (5.2)	117 (40.2)	147 (50.5)	12 (4.1)	
Severodvinsk	men	0 (0.0)	3 (3.0)	38 (37.6)	58 (57.4)	2 (2.0)	0.968
	women	1 (0.3)	15 (3.8)	153 (38.2)	221 (55.2)	10 (2.5)	
Novodvinsk	men	0 (0.0)	1 (5.3)	10 (52.6)	6 (31.6)	2 (10.5)	0.250
	women	0 (0.0)	0 (0.0)	18 (43.9)	21 (51.2)	2 (4.9)	
Primorsky District	men	0 (0.0)	3 (5.7)	25 (47.1)	23 (43.4)	2 (3.8)	0.558
	women	0 (0.0)	5 (3.8)	75 (56.4)	51 (38.3)	2 (1.5)	
Onezhsky District	men	1 (2.4)	7 (17.1)	20 (48.8)	11 (26.8)	2 (4.9)	0.059
	women	0 (0.0)	8 (8.9)	51 (56.7)	31 (34.4)	0 (0.0)	
Mezensky District	men	0 (0.0)	1 (4.3)	7 (30.5)	14 (60.9)	1 (4.3)	0.320
	women	0 (0.0)	3 (10.0)	14 (46.7)	13 (43.3)	0 (0.0)	
Nenets Autonomous Okrug Naryan-Mar	men	0 (0.0)	3 (5.5)	27 (49.1)	24 (43.6)	1 (1.8)	0.704
	women	1 (0.8)	3 (2.4)	71 (55.8)	49 (38.6)	3 (2.4)	
Total	men	4 (0.8)	27 (5.4)	210 (41.6)	243 (48.2)	20 (4.0)	0.130
	women	2 (0.2)	49 (4.4)	499 (44.9)	533 (47.9)	29 (2.6)	

The lowest values of the rate of quality of life were noted in the group of respondents—residents of Onezhsky and Primorsky Districts of Arkhangelsk Region. There were no statistically significant differences in the distribution of citizens' responses depending on gender.

Socioeconomic rates of quality of life of the population in the Arctic Zone of Arkhangelsk Region and Nenets Autonomous Okrug in 2018 are shown in Table 3. The highest values of the rates adopted for the standard prevail among Naryan-Mar (volume of investments in fixed assets; number of organizations' employees; average monthly salary of organizations' employees; turnover of public catering organizations; the number of families who received housing and improved housing conditions; the number of births) – 6 rates out of 11 analyzed. Mezensky District has 3 reference rates: e volume of goods and services production; retail turnover of organizations; the number of sports facilities.

Primorsky District has 3 rates: the volume of sold goods of improper production; the commissioning of residential buildings.

Summary assessment of socioeconomic rates of the quality of life of the population in the Arctic Zone of Arkhangelsk Region and NAO (Table 4) reflected the highest value of the rate in the Naryan-Mar (NAO) municipality, the lowest—in the Onezhsky District municipality.

Integral assessment of quality of life of the population in the territories of the Arctic Zone of Arkhangelsk Region and Nenets Autonomous Okrug was calculated as the product of two coefficients: (A) the proportion of the actual average arithmetic score of the respondents' quality of life obtained by the WHO method from the maximum possible (130 points) and (B) the proportion of the actual value of the consolidated assessment of socioeconomic rates of the population's quality of life from the maximum possible (Table. 4).

TABLE III. SOCIOECONOMIC RATES OF QUALITY OF LIFE OF THE POPULATION IN THE ARCTIC ZONE OF ARKHANGELSK REGION AND NENETS AUTONOMOUS OKRUG, 2018 (THE AUTHOR'S METHOD)

Socioeconomic rates of quality of life	max	Arkhangelsk Region						NAO
		Arkhangelsk	Novodvinsk	Severodvinsk	Onezhsky District	Primorsky District	Mezensky District	Naryan-Mar
Volume of goods and services production per capita, thousand rubles	3,111.6	288.5	1,110.7	540.0	228.8	958.9	3,111.6	2,864.2
		0.0927	0.3570	0.1735	0.0735	0.3082	1.0	0.9205
Volume of goods of improper production sold by organizations without small business entities per capita, thousand rubles	279.1	265.8	58.3	89.5	20.9	279.1	168.3	232.1
		0.9523	0.2089	0.3207	0.0749	1.0	0.6030	0.8316
Volume of investments in fixed assets per inhabitant, thousand rubles	1,103.6	37.9	256.0	53.1	18.5	98.0	78.0	1,103.6
		0.0343	0.2320	0.0481	0.0168	0.0888	0.0707	1.0
The number of organizations' employees per 1,000 inhabitants, persons	490.3	246.0	282.8	386.5	211.6	276.6	390.9	490.3
		0.5017	0.5768	0.7883	0.4316	0.5641	0.7973	1.0
The average monthly salary of organizations' employees (excluding small business entities), rubles/month	77,247.8	50,419.6	41,476.8	59,153.0	39,470.3	54,702.8	61,392.5	77,247.8
		0.6527	0.5369	0.7658	0.5110	0.7081	0.7947	1.0
Retail turnover of organizations without small business entities per capita, thousand rubles	186.3	112.2	50.9	63.3	18.0	146.4	186.3	97.2
		0.6023	0.2732	0.3398	0.0966	0.7858	1.0	0.5217
Turnover of public catering organizations without small business entities per capita, thousand rubles	27.4	2.7	1.6	4.1	0.6	0.1	11.1	27.4
		0.0985	0.0584	0.1496	0.0219	0.0036	0.4051	1.0
Number of families who received housing and improved housing conditions, as well as those registered as needing housing, families per 1,000 inhabitants	3.1	0.3	0.8	0.3	0.3	1.3	1.1	3.1
		0.0968	0.2581	0.0968	0.968	0.4194	0.3548	1.0
Number of sports facilities, units per 1,000 inhabitants	5.1	1.7	2.1	1.5	1.8	3.7	5.1	1.9
		0.3333	0.4118	0.2941	0.3529	0.7255	1.0	0.3725
The commissioning of residential buildings, square meters of total area per 1,000 inhabitants	891.6	236.5	70.6	369.2	128.9	891.6	46.5	360.4
		0.27	0.08	0.41	0.14	1.0	0.05	0.40
Number of births per 1,000 people	14.5	9.1	9.1	9.8	10.4	10.6	10.9	14.5
		0.6276	0.6276	0.6759	0.7172	0.7310	0.7517	1.0

TABLE IV. INTEGRAL ASSESSMENT OF QUALITY OF LIFE OF THE POPULATION IN THE TERRITORIES OF THE ARCTIC ZONE OF ARKHANGELSK REGION AND NENETS AUTONOMOUS OKRUG

Respondent's place of residence	Overall quality of life score (A)		Summary assessment of socioeconomic rates of the population's quality of life (B)		Integral assessment of the population's quality of life (A×B)
	Arithmetic mean (95% CI)	Proportion of the highest possible score, %	Actual value of the summary rate	Proportion of the highest possible score, %	
Arkhangelsk	90.3 (89.1; 91.4)	69.5	1.59	47.9	0.333
Severodvinsk	91.0 (90.0; 92.0)	70.0	1.49	44.9	0.314
Novodvinsk	90.5 (87.6; 93.3)	69.6	1.25	37.7	0.262
Primorsky District	87.6 (85.9; 89.2)	67.4	2.19	66.0	0.445
Onezhsky District	82.5 (80.1; 84.9)	63.5	1.07	32.2	0.204
Mezensky District	88.7 (85.3; 92.2)	68.2	2.34	70.5	0.481
Naryan-Mar	88.3 (86.7; 89.9)	67.9	2.85	85.8	0.583

The population of the most northern territories—Naryan-Mar (Nenets Autonomous Okrug) and Mezensky District of

Arkhangelsk Region have the maximum values of the integral assessment of the quality of life; the population of the

Onezhsky District of Arkhangelsk region, located geographically south of the rest,—the minimal ones.

IV. DISCUSSION

The lack of relevant information necessary to make informed management decisions on improving the citizens' quality of life, balanced socioeconomic development of the country's regions, is one of the important problems that public authorities are currently facing. The situation is aggravated by the lack of management mechanisms and the efficient use of existing information resources owing to the obsolescence of traditional methods of its collection and dissemination used by the territorial bodies of the federal state statistics service as part of federal statistical monitoring. A universal mechanism for solving these problems can be the program of digitization of the economy, which provides for the construction of a qualitatively new infrastructure for accumulating statistical information, its personification, and, as a result, "improving the availability and quality of public services for citizens, as well as security both within the country and abroad" [5].

The results of the study prove the need to supplement the subjective (using the questionnaire method) assessment of the population's quality of life with objective indicators characterizing the macroeconomic situation in the region, as well as the calculation of the integral indicator of the quality of life based on it. Without taking this fact into account, the complex of measures implemented by the state and municipal authorities under *The Concept for the Long-Term Socioeconomic Development of the Russian Federation for the Period until 2020, Strategies for the Development of the Arctic Zone of the Russian Federation and National Security for the Period until 2020* may not to give the expected results, since the points of application of the necessary efforts remain, in fact, unknown. Thus, it seems advisable to organize a system for comprehensive assessment and monitoring of the subjective and objective components of the population's quality of life, which can be implemented as an element of the digitization program for the regional economy [8]. The best option for placing such a system can be research centers, which will be created on the basis of regional universities. The acceptors of the information they generate should be considered the bodies of the state legislative and executive, municipal authorities, which, based on it, will be able to build a balanced socially-oriented model for improving the quality of life of individual social groups of citizens.

V. CONCLUSIONS

1. To increase the reliability of assessments of the citizens' quality of life, it seems advisable to supplement the subjective individual self-assessment of their personal feelings in the context of their culture and value system with indicators characterizing the macroeconomic situation in the territory of their residence.

2. The method of integral assessment of the population's quality of life, combining the subjective individual self-assessment of personal feelings of citizens in the context of their culture and value system with indicators characterizing the macroeconomic situation in their area of residence, can be

used to organize a quality of life monitoring system as part of the digitalization program for the regional economy.

Acknowledgments

The reported study was funded by RFBR, project number 18-410-290002 *Socioeconomic Aspects of the Quality of Life of the Population of the Arctic Zone of Arkhangelsk Region and NAO*.

References

- [1] Rasporiyazheniye Pravitel'stva RF ot 17.11.2008 N 1662-r (red. ot 28.09.2018) «O Kontseptsii dolgosrochnogo sotsial'no-ekonomicheskogo razvitiya Rossiyskoy Federatsii na period do 2020 goda»
- [2] «Strategiya razvitiya Arkticheskoy zony Rossiyskoy Federatsii i obespecheniya natsional'noy bezopasnosti na period do 2020 goda» (utv. Prezidentom RF)
- [3] Efremova I., Didenko N., Rudenko D., Skripnuk D. Disparities in rural development of the Russian Arctic zone regions // *Research for rural development*. – 2017. – Vol. 2. – pp. 189-194.
- [4] Ignatova O.A., Men'shikova L.I., Irkha L.A., Mordovskiy E.A. Otsenka kachestva zhizni naseleniya arkticheskikh territoriy Arkhangel'skoy oblasti // *Vestnik ural'skoy meditsinskoy akademicheskoy nauki*. 2019, Tom 16, №2, S. 309–314, DOI: 10.22138/2500-0918-2019-16-2-309-314.
- [5] Pasport natsional'noy programmy "Tsifrovaya ekonomika Rossiyskoy Federatsii" (utv. prezidiumom Soveta pri Prezidente Rossiyskoy Federatsii po strategicheskomu razvitiyu i natsional'nym proyektam 24 dekabrya 2018 g. N 16).
- [6] Murphy B, Herrman H, Hawthorne G, Pinzone T, Evert H (2000). Australian WHOQoL instruments: User's manual and interpretation guide. Australian WHOQoL Field Study Centre, Melbourne, Australia.
- [7] Ukaz Prezidenta RF ot 02.05.2014 N 296 (red. ot 13.05.2019) «O sukhopotnykh territoriyakh Arkticheskoy zony Rossiyskoy Federatsii»
- [8] Ukaz Prezidenta RF ot 09.05.2017 N 203 «O Strategii razvitiya informatsionnogo obshchestva v Rossiyskoy Federatsii na 2017 - 2030 gody» // *Sobraniye zakonodatel'stva RF*, 15.05.2017, N 20, st. 2901
- [9] Belonozhko M., Barbakov O., Belonozhko L. The Problems of Social and Information Support of the Population of the Arctic Zone of Russia in the Cut of the Industrialization of the Development of the Region // *UTOPIA Y PRAXIS LATINOAMERICANA*. AÑO: 23, n° 82 (JULIO-SEPTIEMBRE), 2018, pp. 270-279
- [10] Litvintseva, G. P., Shmakov, A. V., Stukalenko, E. A., and Petrov, S. P. (2019). Digital component of people's quality of life assessment in the regions of the Russian Federation. *Terra Economicus*, 17(3), 107–127. DOI: 10.23683/2073-6606-2019-17-3-107-127
- [11] Gomes, E., Bustinza, O. F., Tarba, S., Khan, Z., & Ahammad, M. (2019). Antecedents and implications of territorial servitization // *Regional Studies*, 53(3), 410–423.
- [12] Szeles, M. R. (2018). New insights from a multilevel approach to the regional digital divide in the European Union // *Telecommunications Policy*, 42(6), 452–463.
- [13] Schmidt, K., Martín-López, B., Phillips, P. M., Julius, E., Makan, N., & Walz, A. (2019). Key landscape features in the provision of ecosystem services: Insights for management // *Land Use Policy*, 82, 353–366.
- [14] Guryanova A.V., Korotaeva T.V., Chedzhemov G.A. Digital economy as a social phenomenon: ethical challenges and perspectives of development // *International Scientific Conference "Global Challenges and Prospects of the Modern Economic Development"*, 2019, 263-273 <https://dx.doi.org/10.15405/epsbs.2019.03.27>
- [15] Efremova Irina, Didenko Nikolay, Rudenko Dmitry, Skripnuk Djamilia Disparities in rural development of the Russian arctic zone regions // *research for rural development 2017, volume 2, 189-194* doi:10.22616/rrd.23.2017.067
- [16] Tuguskina G.N., Rozhkova L.V., Taktarova S.V., Salnikova O.V. The role of human capital in the digital economy // *International Scientific Conference "Global Challenges and Prospects of the Modern Economic Development"*, 2019, 960-968 <https://dx.doi.org/10.15405/epsbs.2019.03.95>