

Elena V. Sibirskaia¹
Lyudmila V.
Oveshnikova
Natalia A. Shchukina
Evgeniya P. Tenetova
Natalya P. Kuznetsova

Article info:

Received 03.05.2021.

Accepted 04.09.2021.

UDC – 005.336.3:330.59
DOI – 10.24874/IJQR16.01-06



PEOPLE'S QUALITY OF LIFE IN THE RUSSIAN FEDERATION: INTEGRATED RANKING OF REGIONS BY DYNAMIC MODEL

Abstract: *The study is devoted to the quantitative assessment of the population life quality of the regions of the Russian Federation, obtained based on official statistical data for 2010-2018. The integral indicator of the population life quality is formed based on the values of 33 socio-economic indicators combined into seven groups. The dynamics of changes in the average Russian integral indicator shows a decrease in the standard of living of the population during the period under review. To conduct a comparative analysis of changes in the living standard in the subjects of the Russian Federation for each region, total increments of the integral indicator and its components were obtained. The stable classification of the Russian Federation regions according to the population life quality is obtained by cluster analysis methods. A significant disproportion in the rate of change in the living standard of the regions was revealed and 13 atypical regions were identified.*

Key words: *Quality of Life; Standard of Living; Indicator; Statistics; Regional Economy; Region; Grouping.*

1. Introduction

One of the main objectives of the Russian Federation's Strategy for Spatial Development over the period up to 2025 is "reduction of interregional differences in the level and quality of life of the population." To make assessment at the regional level, researchers have many methods that rest on expert estimates, integrated indices, and social indicators (Kharitonova & Alekseeva, 2016; Bobkov et al., 2017). Rudneva L.N. (Rudneva, 2016) propose and test their own assessment methodology based on a hierarchical system of 37 indicators of the quality of life of the population. The study (Zhmachinskii & Cherneva, 2016) offers a method for assessing the standard of living on the basis of equivalence scales, which can be

built under the method of expert assessments. Similar approach is used by authors for assessing the poverty parameters on the basis of measuring the household income (expenditure) in their paper (Zhmachinskii & Cherneva, 2018). Another assessment of poverty was offered by V.S. Zharomskii (Zharomskii, 2019), who, in his work, showed that "absolute poverty at the low subsistence level identifies households of different types in more than 95% of cases as latently poor". The assessment of inequality in the country's regions based on various socio-economic indicators is demonstrated in studies by K.P. Glushchenko (Glushchenko, 2015), N.V. Zhubarevich, A.O. Makaretseva, and N.V. Mkrtchyan (Zubarevich et al., 2017), O.E. Nikonets and S.V. Sevryukova (Nikonets & Sevryukova, 2018). Another

¹ Corresponding author: Elena V. Sibirskaia
Email: Sibirskaia.EV@rea.ru

author, M.V. Bikeeva (Bikeeva, 2018), considers the cost of living as a main criterion for assessing the poverty level of the population. She proposes a classification of regions based on this indicator. The researchers propose to make inter-regional comparison of the standard of living of the population both on different socio-economic indicators (Sobol', 2018); Dendak et al., 2018); Mishnina & Mishnin, 2016) and on subjective assessment of regions' inhabitants (Belekhova, & Rossoshanskii, 2018; Pishnyak & Popova 2015).

According to E.N. Grishina, I.P. Lapteva, L.N. Trusova, E.V. (Grishina et al., 2019) and Sibirskaya (Sibirskaya et al., 2021), the monetary income of the population is one of the main indicators of people's standard of living. Comparing the subjects of the Russian Federation in terms of average per capita income, it is possible to observe a significant heterogeneity. According to official statistics (Regions of Russia. Socio-economic Indicators 2019, 2019), the minimum level of

average per capita income of the population can be observed in the Tyva Republic (14,963 RUB in 2016, 15,011 RUB in 2017, 15,603 RUB in 2018 and 16,497 RUB in 2019), the maximum is in the Yamalo-Nenets Autonomous Okrug (73,358 RUB in 2016, 76,027 RUB in 2017, 79,398 RUB in 2018, and 84,365 RUB in 2019). Despite the annual increase in the average per capita income of the population, there is a fivefold income difference. The behavior pattern of the average per capita income of the population in the context of federal districts of the Russian Federation is shown in Figure 1. For 2005–2019, there was a significant increase in the level of average per capita income. The largest increase of 5.44 times, occurred in the North Caucasian Federal District, the smallest – 3.85 times – in the Ural Federal District. However, when the average per capita income is brought to the level of 2005, taking into account the level of official inflation, these changes are less significant: 1.88 and 1.33 times in the North Caucasian and Ural Federal districts, respectively.

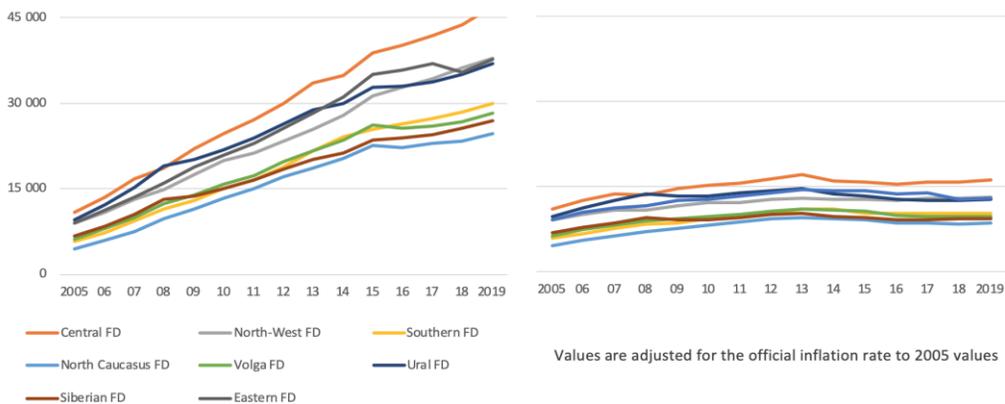


Figure 1. Dynamics of per capita income by federal district of the Russian Federation

According to official statistics (Regions of Russia. Socio-economic Indicators 2019, 2019), for the 2000–2019 period, in Russia there is a downward trend in the share of the population with incomes below the subsistence level (Figure 2). However, there are significant interregional differences in the

poverty rate of the population in this indicator. The maximum value of the share of population with incomes below the subsistence level in the Yamalo-Nenets Autonomous Okrug (6.1% in 2017, 5.8% in 2018) exceeds the minimum level in the Tyva Republic (35.8% in 2017, 34.4% in 2018) by

more than 5.5 times. In Q1 2020, 18.6 million people, or 12.6% of the country's population, had incomes below the subsistence level. The number of Russians with incomes below the subsistence level in the second quarter of

2020, which was affected by the pandemic crisis, amounted to 19.9 million people, or 13.5% of the total population of the country, according to the Rosstat data.

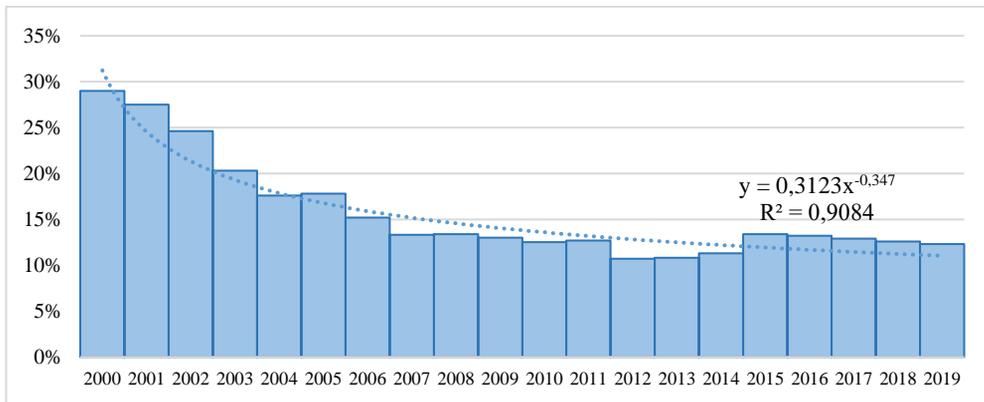


Figure 2. Population of the Russian Federation with money incomes below the subsistence minimum, as a percentage of the total population

The low level of money income in the region can cause not only a high level of poverty, but also an increase in unemployment and migration of the working-age population to wealthier entities.

Despite the decline in the proportion of the population with money incomes below the subsistence level, the average long-term value of the consumer confidence index has continued to be at 13% since 1999. The negative outcome of this pessimism in

consumer sentiment is a decrease in the consumer purchasing power, which affects both the structure of consumption expenditures and the structure of the use of the population's money income (Sibirskaya, 2014). In the structure of consumption expenditures of households, over 60% account for the purchase of food and payment for services (Figure 3).

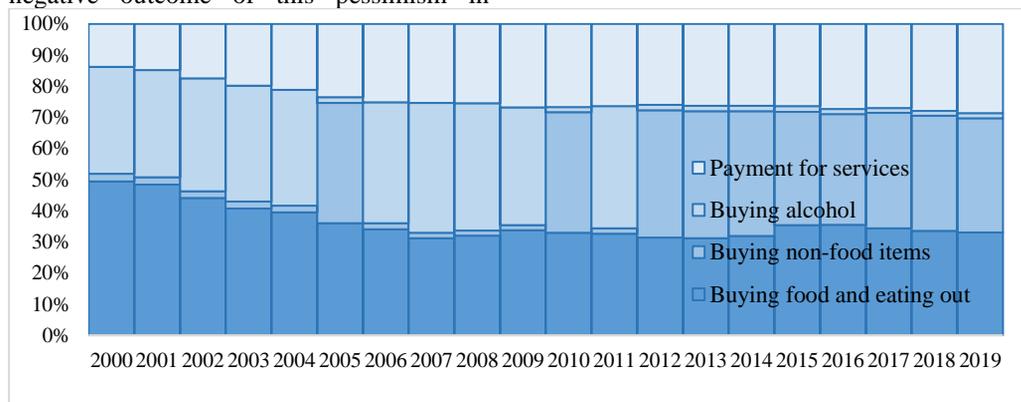


Figure 3. The structure of household consumption expenditure

It should be noted that in the structure of households, more than 70% of the share account for the cost of labor and social benefits. At the same time, for 2000–2019, the share of job compensation and social benefits in the structure of money income increased from 51.7% in 2000 to 77.0% in 2019. The increase in poverty was a consequence of a significant drop in incomes due to the COVID-19 pandemic and quarantine-related restrictions. Real disposable income of Russian nationals in the second quarter of 2020 fell by 8% in annualized terms. The decrease occurred in all components of money income, but the largest impact was due to a 41% decline of revenue from businesses by Q1. The share of

the revenue in the structure of all money income of the population decreased to a record figure of 3.5%.

According to the official statistics (Regions of Russia. Socio-economic Indicators 2019 (2019), the purchases of goods and services in the structure of the use of money income prevail. During 2000 and 2019, their share of the total volume increased from 75.9% to 81.3%. However, the growth of financial assets of the Russian population in 2019 amounted to 3.0% as compared to 14.7% in 2000, and the purchase of real estate in 2019 could be afforded by only 0.4% of the population (Figure 4).

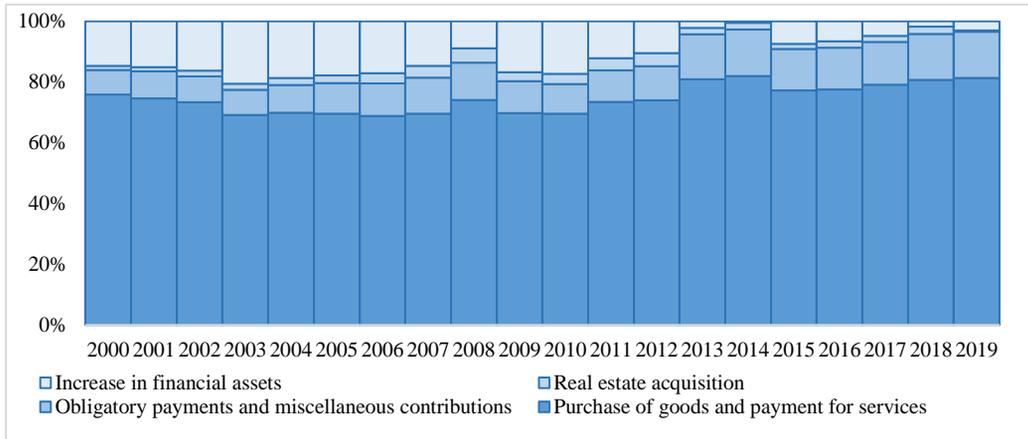


Figure 4. The structure of money income used by the population of the Russian Federation

Thus, a preliminary analysis of the level and quality of life of the population in Russia shows negative changes and the existence of a significant disparity at the regional level.

2. Ranking of Russian subjects by the standard of living of the population

We assess the level and quality of life of the population of the subjects of the Russian Federation, based on 33 socio-economic indicators, organized in seven groups (Table 1, see Appendix).

Thus, the information base of the study was panel data that included 85 subjects, 33 socio-economic indicators, and 9-year timeframe for observation. The preliminary analysis of selected indicators' values demonstrated a sufficient heterogeneity of the structure of the subjects of the Russian Federation in terms of the standard of living. In almost all socio-economic indicators, the variation coefficient in all subjects exceeds 20%.

To assess the standard of living of people in different regions and compare them, we efficiently use the standardized integrated indicator $I_j \in [0; 1], j = 1, \dots, 85$.

In each of seven groups of indicators, the indicator values were converted according to the rule that enabled to translate their values to a single dimensionless parameter [0; 1]:

$$\tilde{x}_{ik}^j = \frac{x_{ik}^j - x_{ik}^{min}}{x_{ik}^{max} - x_{ik}^{min}}, \quad (1)$$

where \tilde{x}_{ik}^j – the standardized value of k -th indicator in i -th group for j -th subject of the Russian Federation,

x_{ik}^j – the initial value of k -th indicator in i -th group for j -th subject of the Russian Federation,

x_{ik}^{min} – the minimum value of k -th indicator in i -th group for all subjects of the Russian Federation;

x_{ik}^{max} – the maximum value of k -th indicator in i -th group for all subjects of the Russian Federation.

If the high values of x_{ik}^j indicator have a negative impact on the standard of living of the population in the selected subject of the Russian Federation, the transformation is carried out according to the formula:

$$\tilde{x}_{ik}^j = 1 - \frac{x_{ik}^j - x_{ik}^{min}}{x_{ik}^{max} - x_{ik}^{min}}. \quad (2)$$

The final integrated indicator of the standard of living in the j -th subject of the Russian Federation is formed as an arithmetic mean of sub-indexes I_{ij} :

$$I_j = \frac{1}{7} \sum_{i=1}^7 I_{ij}, \quad (3)$$

where I_{ij} – the sub-index value of i -th indicator in j -th subject of the Russian Federation, calculated according to the formula:

$$I_{ij} = \frac{1}{m} \sum_{k=1}^m \tilde{x}_{ik}^j, \quad (4)$$

where m – the number of indicators in the group.

We calculated the integrated indicator of the standard of living of the population for each of 85 subjects of the Russian Federation for the period from 2010 to 2018. Under the proposed calculation procedure, the high values of the integrated indicator imply a high standard of living in the chosen region. Thus, we obtained the distribution of Russian subjects by the standard of living of the population in descending order of the integrated index values. The most and the least prosperous subjects of the Russian Federation in terms of living standards are shown in Table 2.

Table 2. The ranking results for the subjects of the Russian Federation by standard of living, based on the integrated indicator for 2010–2018

| Number in the ranking | The most prosperous subjects of the Russian Federation | | Number in the ranking | The least prosperous subjects of the Russian Federation | |
|-----------------------|--|----------------------|-----------------------|---|----------------------|
| | Subject of the Russian Federation | Integrated indicator | | Subject of the Russian Federation | Integrated indicator |
| 1 | Moscow | 0,6896 | 76 | Altai Republic | 0,4729 |
| 2 | St. Petersburg | 0,6563 | 77 | Kurgan Oblast | 0,4725 |
| 3 | Magadan Oblast | 0,6459 | 78 | Chelyabinsk Oblast | 0,4568 |
| 4 | Chukotka Autonomous Okrug | 0,6308 | 79 | Jewish Autonomous Region | 0,4471 |
| 5 | Murmansk Oblast | 0,6270 | 80 | Republic of Crimea | 0,4463 |
| 6 | Yamalo-Nenets Autonomous Okrug | 0,6023 | 81 | Karachay-Cherkess Republic | 0,4452 |
| 7 | Khanty-Mansi Autonomous Okrug–Yugra | 0,5990 | 82 | Kemerovo Oblast | 0,4270 |
| 8 | Kamchatka Krai | 0,5942 | 83 | Chechen Republic | 0,4221 |
| 9 | Republic of Tatarstan | 0,5908 | 84 | Tyva Republic | 0,4045 |
| 10 | Sverdlovsk Oblast | 0,5882 | 85 | Republic of Ingushetia | 0,3521 |

According to the average statistics, for the period from 2010 to 2018 (median value), the most prosperous regions can be considered as follows: Moscow and St. Petersburg, the Magadan, Murmansk and Sverdlovsk Oblast, Chukotka Autonomous Okrug, Yamalo-Nenets Autonomous Okrug, and Khanty-Mansi Autonomous Okrug–Yugra, Kamchatka Krai, and the Republic of Tatarstan. The least prosperous regions, according to the ranking results, include the Republic of Ingushetia, Tyva, Altai, Crimea, the Chechen and Karachay-Cherkess Republics, the Jewish Autonomous Region, the Kemerovo and Kurgan Oblasts.

It should be mentioned that the values of the integrated indicator of the leader in the rating, i.e. the City of Moscow, exceed the average

Russian level by more than 30%, and for the Republic of Ingushetia, this figure, on the contrary, was lower than the average Russian median value by more than 30%. For all subjects of the Russian Federation, the value of the integrated indicator of the standard of living varies from 0.35 for the Republic of Ingushetia to 0.69 for Moscow. This confirms the significant heterogeneity of the subjects of the Russian Federation in terms of the standard of living.

We accept the median value for all territories of the integrated indicator as an assessment of the average Russian standard of living. The change in the average Russian standard of living can be measured by the dynamics of the integrated indicator, shown in Figure 5.

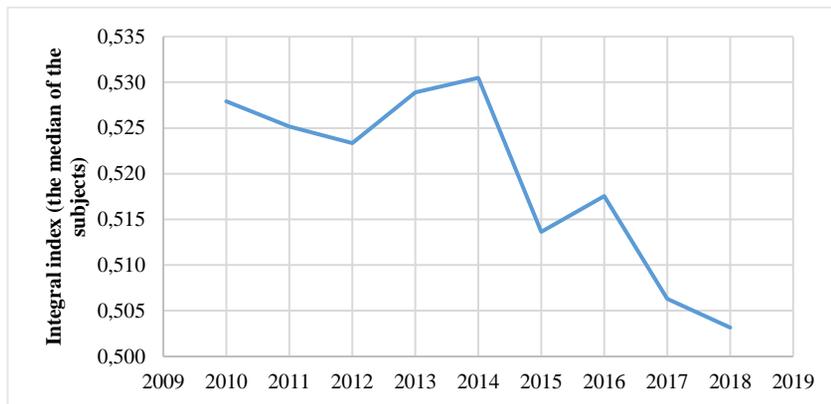


Figure 5. Changes in the Russian average integrated indicator of the standard of living for 2010–2018

Figure 5 shows that between 2010 and 2018, the average Russian integrated indicator of the standard of living fell from 0.528 to 0.506. At the same time, in 2012–2014, it is possible to see a slight increase in this indicator, which in 2014 reached its maximum value, i.e. 0.530.

To assess the change in the integrated indicator of the standard of living of the population in the subjects of the Russian Federation over time, we consider the total increment of this indicator and each of its components for the entire period under study.

We make a transformation based on temporary component, according to the following rule:

$$\Delta I_{ij} = \sum_{t=2}^9 (I_{ij}^t - I_{ij}^{t-1}), \quad (5)$$

where I_{ij}^t и I_{ij}^{t-1} – the values of sub-indexes for i -th indicator in j -th subject of the Russian Federation at the current and earlier point of time.

To conduct a comparative analysis of the change in the standard of living in the subjects of the Russian Federation for 2000–2018, we calculated the total increments of the

integrated indicator for each region. The distribution of subjects of the Russian Federation by the total change in the standard of living is presented in Figure 6 (see Appendix).

The factor of variation of the integrated indicator was more than 1000%, which implies a high disparity in the rate of change in the standard of living in the subjects of the Russian Federation. The greatest changes in the incremental indicator of living standards can be observed in the Republic of Crimea and Sevastopol, the smallest – in the Tula and Lipetsk Oblasts. The Republic of Crimea and Sevastopol occupy the leading positions in the total growth of the integrated indicator for the period under review, and showed an increase in the integrated indicator of more than 100%, however, according to the results of the standard of living assessment on the basis of the integrated indicator, they occupy the 80th and 35th places, respectively. This is indicative of a rather low standard of living in these subjects.

The decline in the standard of living between 2010 and 2018 is observed in 69 subjects of the Russian Federation. The worst of them in terms of the overall increase in the integrated indicator of the standard of living are the Karachay-Cherkess Republic and the Jewish Autonomous Region. The decrease in the integrated indicator in these subjects was 20.29% and 16.48%, respectively. Despite the leading position of Moscow, according to the ranking results based on the integrated indicator of the standard of living, we can observe a total decline in the growth of this indicator by 8.93%.

3. Classification of subjects of the Russian Federation by change in the standard of living of the population

To determine homogeneous groups of subjects by a change in the standard of living of the population, we present their

classification by total increment of 7 sub-indexes of the integrated indicator. To obtain a stable classification of the subjects, we performed a step-by-step clustering procedure, which is proposed in works by T.M. Tikhomirova (Tikhomirova, 2012); Tikhomirova, 2015); Tikhomirova & Sukiasyan, 2018). We apply the method of the nearest neighbor, to assess the heterogeneity of the subjects of the Russian Federation, using the considered informative features. This enabled to reveal 13 regions that differ from the majority of other regions. These 13 regions include the Nenets, Chukotka, Yamalo-Nenets and Khanty-Mansi Autonomous Okrugs, the Republic of Ingushetia, Dagestan, Crimea, the Chechen and Karachay-Cherkess Republics, the Kemerovo and Sakhalin Oblast, Sevastopol and Moscow. The sub-index values of these subjects were analyzed separately. In the next phase, the remaining 72 regions were split into clusters by the method of hierarchical cluster analysis. This split was clarified by the consistent use of the *k*-means method, which enabled to obtain a stable classification, divide the subjects of the Russian Federation into three homogeneous groups, and identify 13 atypical regions by the change in the standard of living.

Assigning the regions to the atypical category is connected primarily with sharp changes in the values of living standards of the population in comparison with both the national median level and the indicators in the selected groups. The distribution of regions by dedicated cluster is presented in Table 3. The highest growth of the integrated index of living standards is observed in the second sub-index – the level of the consumer market development. For all three selected groups, we recognize a positive increase in this component. Sub-indexes that characterize regional demographic indices and the level of employment and unemployment of the population are changing at a decreasing rate in all selected groups.

Table 3. Grouping the subjects of the Russian Federation by the total increment of the integrated indicator of living standards, based on the cluster analysis results

| Cluster number | Number of subjects in the cluster | Subjects of the Russian Federation |
|------------------|-----------------------------------|---|
| Cluster 1 | 20 | Republic: Adyghe. Oblasts: Astrakhan, Belgorod, Bryansk, Vladimir, Voronezh, Ivanovo, Kaluga, Kursk, Leningrad, Lipetsk, Magadan, Moscow, Novosibirsk, Orel, Ryazan, Tula, Chelyabinsk. Krais: Kamchatka, Khabarovsk |
| Cluster 2 | 32 | St. Petersburg Republics: Karelia, Bashkortostan, Mari El, Mordovia, Udmurt, Chuvash, Khakassia, Sakha (Yakutia). Oblasts: Amur, Archangelsk, Volgograd, Vologda, Kirov, Kurgan, Murmansk, Nizhny Novgorod, Orenburg, Penza, Pskov, Rostov, Saratov, Smolensk, Tver, Ulyanovsk, Yaroslavl. Krais: Altai, Zabaikalsky, Krasnodar, Primorsky, Stavropol. Jewish Autonomous Region |
| Cluster 3 | 20 | Republics: Altai, Buryatia, Kabardino-Balkar, Kalmykia, Komi, North Ossetia-Alania, Tatarstan, Tyva. Oblasts: Irkutsk, Kaliningrad, Kostroma, Novgorod, Omsk, Samara, Sverdlovsk, Tambov, Tomsk, Tyumen. Krais: Krasnoyarsk, Perm. |
| Atypical regions | 13 | Moscow, Sevastopol Autonomous Okrugs: Nenets, Chukotka, Khanty-Mansi Autonomous Okrug–Yugra, Yamalo-Nenets. Republics: Dagestan, Ingushetia, Karachay-Cherkess, Crimea, Chechen. Oblasts: Kemerovo, Sakhalin |

The regions of the first cluster are characterized by high growth in the first, second and third group, i.e. indicators of the level of income of the population, the level of the consumer market development, and the level of housing and quality of housing conditions. Moreover, according to the group of indicators of housing supply, only the regions of the first cluster show an increase.

The subjects of the Russian Federation, included in the second cluster, are characterized by fairly neutral values of change in all indicators. However, the rate of change in demographic indicators of this group is the lowest, compared with the first and third clusters.

The third cluster includes the subjects, which have the lowest rates of change in the sub-index of indicators of income and consumer market development. Positive growth can be observed only for indicators of the consumer market development and the level of development of health and education. The

increase in health and education development here is higher than for regions included in the first and second clusters.

Over the observed period from 2010 to 2018, in the first group of regions, there was a total increase in the indicators of the income level of the population by 6.52%, the level of the consumer market development, and in the sub-index of housing supply by 14.81% and 15.04%, respectively. In terms of health and education development, as well as environmental system quality, the increase was less significant and made 1.37% and 1.16%, respectively. Demographics and employment indicators showed a decline by 18.33% and 13.34% over the period, respectively.

In the second group of regions, the total increase in income levels of the population was 2.82%, in the consumer market development – 11.57%. The environmental system quality changed modestly – by 0.32% for 2010–2018. Sub-indexes of housing,

health and education, employment and unemployment, and demographics fell by 11.06%, 3.69%, 19.62% and 15.50%, respectively.

In the regions of the third cluster, there was a slight increase in the level of the consumer market development, i.e. 5.49%. But the sub-index of the level of health and education development in the third group of regions showed the largest increase – by 6.61%. As for the environmental system quality, the increase was 0.84%. For all other indicators

in the third group for 2010–2018, there was a decrease: in the level of income of the population – by 8.62%, in housing supply – by 4.16%, in demographic, employment and unemployment indicators – by 15.15% and 17.61%, respectively.

The cumulative change in sub-indexes $\Delta_i = \Delta I_i, i = 1, \dots, 7$ of integrated indicator of the standard of living in the selected groups of subjects of the Russian Federation for the period from 2010 to 2018 is presented in Figure 7.

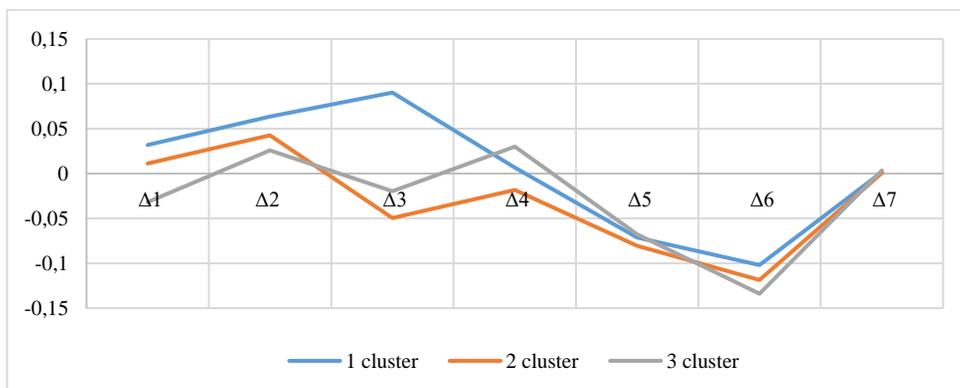


Figure 7. The total change in the sub-indices of the integrated indicator of living standards in selected groups of the subjects of the Russian Federation for 2010–2018

The analysis of annual changes of each component shows unstable development in terms of income of the population, the level of health and education development, as well as environmental system quality in all three selected groups of subjects of the Russian Federation. In terms of income levels, the regions of the first cluster have the highest values. Prior to 2014, we can see an annual increase in this group of indicators, but from 2016 to the present, there has been an annual slowdown in their growth. The nature of changes in the sub-index of income levels of the population in the regions of the second and third clusters demonstrates a slower pace of change, however, in general, the direction of changes is the same in all subjects. The comparative analysis results of selected clusters by the integrated indicator of the

standard of living of the population and the sub-indexes, forming its value, are presented in Table 4.

In terms of indicators of the level of health and education development, the regions of the third cluster have the highest increase throughout the observation period, compared with the subjects of the first and second clusters. Nevertheless, between 2010 and 2012, there is an annual increase in the level of health and education development for the regions of the first and third clusters. For the subjects of the Russian Federation included in the second cluster, the group of indicators in question shows an annual slowdown in the rate of increase. Figure 8 presents changes in each of the sub-indexes under consideration, characterizing the level and quality of life of the population.

Table 4. The results of comparing the values of total increase in the integrated indicator of living standard and its components in the selected groups of the subjects of the Russian Federation for 2010–2018

| Indicator | Cluster 1 | | Cluster 2 | | Cluster 3 | |
|--|----------------------|--------|----------------------|--------|----------------------|--------|
| | Accumulated increase | % | Accumulated increase | % | Accumulated increase | % |
| Income level | 0,0253 | 6,52 | 0,0093 | 2,82 | -0,0293 | -8,62 |
| The level of the consumer market development | 0,0615 | 14,81 | 0,0439 | 11,57 | 0,0205 | 5,49 |
| The level of housing and quality of housing | 0,0853 | 15,04 | -0,0604 | -11,06 | -0,0227 | -4,16 |
| Health and education development | 0,0066 | 1,37 | -0,0176 | -3,69 | 0,0347 | 6,61 |
| Demographics | -0,0688 | -18,33 | -0,0758 | -19,62 | -0,0694 | -15,15 |
| Employment and unemployment | -0,1088 | -13,34 | -0,1221 | -15,50 | -0,1354 | -17,61 |
| Environmental system quality | 0,0078 | 1,16 | 0,0021 | 0,32 | 0,0056 | 0,84 |
| Integrated indicator of living standards | 0,0013 | 0,24 | -0,0315 | -6,12 | -0,0280 | -5,33 |

The decline in the rate of change in sub-indexes $I_i, i = 1, \dots, 7$, which form an integrated indicator of the standard of living, has an impact on the integrated indicator of the standard of living of the entire population. From 2014, we observe a steady downward trend in the integrated indicator for subjects of the second and third clusters, while for the subjects of the first cluster, the decline in the standard of living is recorded from 2016.

Atypical regions differ in values of sub-index increment $I_i, i = 1, \dots, 7$ of the integrated indicator, which are unusual for selected groups. The list of atypical regions includes regions with both high values of integrated indicator of standard of living, and low ones. Nevertheless, in terms of total changes for 2010–2018, these regions differ from the dedicated groups of subjects. The Republic of Crimea and Sevastopol are characterized by a significant increase in the level of income of the population and the level of the consumer market development; it is five times more than the increase in the corresponding indicators of the selected

groups of subjects. In these subjects, we have recorded positive increments of the demographic indicators and indicators of employment and unemployment, while the growth rate is declining for all others. In Moscow and the Sakhalin Oblast, we recorded a decline in the level of the consumer market development, which is not typical for any of the selected groups of regions. It should be also noted that the rate of change in the indicators of health and education development in Moscow was lower than in the subjects of the second cluster more than sevenfold. The Sakhalin Oblast, the Chechen Republic and the Republic of Ingushetia showed positive increase in the health and education development indicators, and in the Republic of Ingushetia these changes were almost four times higher than in the regions of the third cluster. The biggest changes in the environmental system quality indicator were recorded in the Khanty-Mansi Autonomous Okrug–Yugra and the Kemerovo Oblast. The total increment Δ_7 of the corresponding indicator in these subjects

was 0.253 and 0.105, respectively, which is more than 13 times higher than that of a similar sub-index in the regions of the first cluster. Figure 10 shows graphs of total

increment of sub-indexes $\Delta_i = \Delta I_i, i = 1, \dots, 7$ for atypical regions as compared with average values in selected groups of regions.



Figure 8. Dynamics of total changes in sub-indices of the integrated indicator of standard of living in selected groups of the subjects of the Russian Federation for 2010–2018

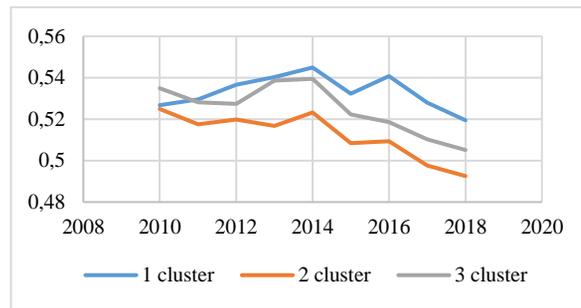


Figure 9. Dynamics of the integrated indicator of standard of living in selected groups of the Russian Federation regions for 2010–2018

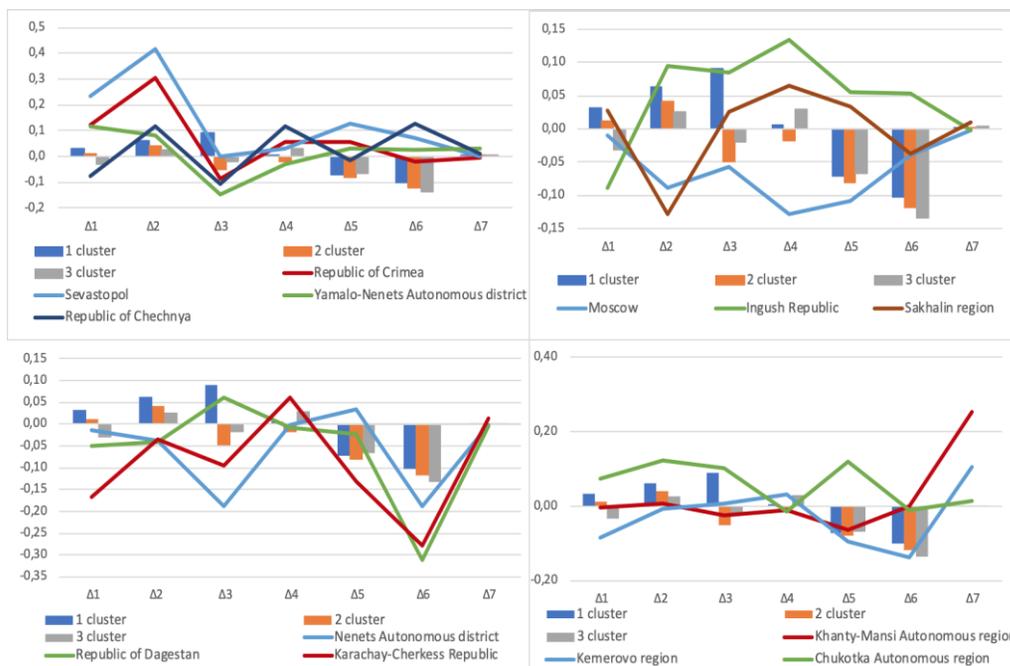


Figure 10. Total increment of sub-indexes of the integrated indicator of standard of living for atypical regions in comparison with the selected groups of subjects of the Russian Federation

4. Conclusions

The study demonstrates the substantial heterogeneity of the subjects of the Russian Federation in terms of living standards of the population, which proves the need to apply a differentiated approach to designing the social policy measures. The identified disparity is indicative of inadequate effectiveness of government planning and implementation of social programs at the

regional level. The classification of regions based on total changes in the selected socio-economic indicators enables to identify homogeneous groups of territories, for which it is possible to adopt general approaches and recommendations in the sphere of social policy and support for the population to improve the standard of living. The findings may be useful in the study of regional specifics of economic and social development.

References:

- Belekhova, G. V., & Rossoshanskii, A. I. (2018). Standard of living as assessed by the population. *Problems of Territory's Development*, 5(79), 77-96. Retrieved from http://pdt.volnc.ru/article/1296/full?_lang=ru
- Bikeeva, M. V. (2018). Analysis of the subsistence minimum as the criterion for assessing the poverty level of the population: The cluster approach. *Socio-Economic Management: Theory and Practice*, 1(32), 7-12. Retrieved from <https://istu.ru/images/izdat/soc/2018/1/2018-1-bikeeva.pdf>
- Bobkov, V. N., Gulyugina, A. A., Zlenko, E. G., & Odintsova E. V. (2017). Comparative Characteristics of Indicators of Living Standards and Quality of Life in Russian Regions: Subjects, Federal Districts, the Arctic Region. *Living Standards of the Population in the Regions of Russia*, 1(203), 50-64. Retrieved from <https://cyberleninka.ru/article/n/sravnitelnye-harakteristiki-indikatorov-kachestva-i-urovnya-zhizni-v-rossiyskih-regionah-subekty-federalnye-okruga-arktika>
- Dendak, G. M., Ivanova, L. A., Afanas'eva, L. A., & Afanas'ev, A. A. (2018). Socio-economic inequality in Russia: The causes and ways to reduce inequalities in modern conditions. *Journal of Economy and Entrepreneurship*, 9(98), 506-511.
- Glushchenko, K. P. (2015). On estimation of inter-regional inequality. *Spatial Economics*, 4, 39-58. doi: 10.14530/se.2015.4.039-058
- Grishina, E. N., Lapteva, I. P., & Trusova, L. N. (2019). Monetary revenues as a major indicator of the living standards of the population of Russia. *Statistics and Economics*, 16(3), 15-23. Retrieved from <https://cyberleninka.ru/article/n/denezhnye-dohody-kak-osnovnoy-indikator-urovnya-zhizni-naseleniya-rossii>
- Kharitonova, T. V., & Alekseeva, S. N. (2016). Living standard of the population: The main approaches to the evaluation of indexes. *Volga Region Farmland*, 2(39), 133-140. Retrieved from <https://cyberleninka.ru/article/n/uroven-zhizni-naseleniya-osnovnye-podhody-k-otsenke-pokazateley>
- Mishnina, E. I., & Mishnin, M. N. (2016). Dynamics of the quality of life and human development in the Ryazan region. *Economics: Yesterday, Today and Tomorrow*, 3, 149-162. Retrieved from <https://docplayer.ru/34412621-Analiz-dinamiki-kachestva-zhizni-naseleniya-i-chelovecheskogo-razvitiya-v-ryazanskoj-oblasti.html>
- Nikonets, O. E., & Sevryukova, S. V. (2018). The socio-economic situation of the Russian population by income level: Assessment of the development of the middle class. *Bulletin NGIEI*, 1(92), 117-129. Retrieved from <https://cyberleninka.ru/article/n/sotsialno-ekonomicheskoe-polozhenie-naseleniya-rossii-po-urovnyu-dohodov-otsenka-razvitiya-srednego-klassa>
- Pishnyak, A. I., & Popova, D. O. (2015). Households' standard of living and quality of life in Moscow: Objective and subjective indicators. *The Journal of Social Policy Studies*, 13(2), 257–272. Retrieved from <https://cyberleninka.ru/article/n/uroven-i-kachestvo-zhizni-moskovskih-domohozyaystv-obektivnye-i-subektivnye-otsenki>
- Regions of Russia. Socio-economic Indicators 2019 (2019). Retrieved from <https://www.gks.ru/folder/210/document/13204>
- Rudneva, L. N. (2016). *Assessment of the quality of life of the population in the subjects of the Russian Federation*. Tyumen, Russian Federation: TIU publication.

- Russian Government. (2019). *On Approval of Spatial Development Strategy of the Russian Federation for the period up to 2025*. Retrieved from <http://static.government.ru/media/files/UVA1qUtT08o60RktoOX122JjAe7irNxc.pdf>
- Sibirskaya, E. V. (2014). The need for enterprises to innovate. *Theoretical and applied issues of economics and services, 1*, 78-88.
- Sibirskaya, E. V., Volkova, M. V., Oveshnikova, L. V., Shchukina, N. A., & Lula, P. (2021). Monitoring of regional labor markets and the main trends of labor underutilization in Russia. *International Journal of Sociology and Social Policy, 41*(1-2), 103-115. doi: 10.1108/IJSSP-03-2020-0090
- Sobol', T. S. (2018). Modern level and the living quality of the Russian population. *Moscow Witte University Bulletin. Series 1: Economics and Management, 2*(25), 7-14. doi: 10.21777/2587-554X-2020-3-7-12
- Tikhomirova, T. M. (2012). Disease rates and losses: Classification of Russian regions on panel data. *Transport Business of Russia, 3*, 3-8. Retrieved from <https://cyberleninka.ru/article/n/ustoychivaya-klassifikatsiya-regionov-rf-po-urovnyu-i-poteryam-ot-zabolevaemosti-na-panelnyh-dannyh>
- Tikhomirova, T. M. (2015). Quantitative methods for assessing the state and losses of health of the population in the regions of Russia. *Federalism, 1*(81), 43-64.
- Tikhomirova, T. M., & Sukiasyan, A. G. (2018). Influence of social adversity on assessments human potential. *Federalism, 2*, 64-78. Retrieved from <https://federalizm.rea.ru/jour/article/view/95/96>
- Zharomskii, V. S. (2019). Building an integrated poverty measure by three poverty profiles. *Population, 22*(1), 92-105. Retrieved from <https://cyberleninka.ru/article/n/postroenie-kompleksnoy-otsenki-bednosti-po-trem-profilyam-bednosti>
- Zhmachinskii, V. I., & Cherneva R. I. (2016). Living standard evaluation technique. *Economic Analysis: Theory and Practice, 15*(9), 55-66. Retrieved from <https://cyberleninka.ru/article/n/metodika-otsenki-urovnya-zhizni-naseleniya>
- Zhmachinskii, V. I., & Cherneva, R. I. (2018). Analysis and assessment of poverty parameters by expert methods. *Economic Analysis: Theory and Practice, 17*(6), 1088–1099. doi: 10.24891/ea.17.6.1088
- Zubarevich, N. V., Makarentseva, A. O., & Mkrtychyan, N. V. (2017). Socio-demographic indicators: Regional dimension. *Russian Economic Developments, 3*, 90-100. Retrieved from <https://cyberleninka.ru/article/n/sotsialno-demograficheskie-indikatory-regionalnoe-izmerenie-po-rezultatam-regulyarnogo-monitoringa-insap-ranhigs>

Elena V. Sibirskaia

Plekhanov Russian University
of Economics,
Moscow, Russia
Sibirskaia.EV@rea.ru
ORCID 0000-0001-5496-1446

Lyudmila V. Oveshnikova

Plekhanov Russian University
of Economics,
Moscow, Russia
Oveshnikova.LV@rea.ru
ORCID 0000-0002-9411-9859

Natalia A. Shchukina

Plekhanov Russian University
of Economics, Moscow,
Russia and Financial
University under the
Government of the Russian
Federation,
Moscow, Russian Federation
shchukinan@yandex.ru
ORCID 0000-0002-2318-2594

Evgeniya P. Tenetova

Plekhanov Russian University
of Economics,
Moscow, Russia
evtenetova@yandex.ru
ORCID 0000-0002-7698-7329

Natalya P. Kuznetsova

Ufa State Aviation Technical
University,
Ufa, Russia
natalerk1977@yandex.ru

Appendix

Table 1. Indicators used in the research methodology

| 1. People's income level | 2. The level of the consumer market development and provision of material goods to the population | 3. The level and quality of housing | 4. The level of development and access to public health services and education | 5. Demographic indices | 6. The level of employment and unemployment | 7. The state of environment (environmental system quality) |
|---|---|--|---|---|--|--|
| 1.1 Average per capita income, RUB | 2.1 Retail trade turnover per capita, RUB | 3.1 Total floor area of residential premises per 1 inhabitant on average, square meters | 4.1 The number of doctors per 10,000 people, number of people | 5.1 The total birth rate, the number of births per 1,000 people | 6.1 Unemployment rate on average for the year; percentage | 7.1 Emission of pollutants into the atmosphere from stationary sources per unit of territory, taking into account the population density, tons per square root of the product of region's area and population size |
| 1.2 Average pensions, RUB | 2.2 The volume of paid services per capita, RUB | 3.2 The share of dilapidated housing stock in the total floor area of the housing stock, percentage | 4.2 The number of nursing personnel per 10,000 people | 5.2 Overall mortality rates, number of deaths per 1,000 inhabitants | 6.2 The workload of unemployed people registered with public employment services, per declared vacancy | 7.2 The volume of wastewater discharge to surface water bodies, considering the population density, thousand cubic meters per square root of the product of the land area of the region and population size |
| 1.3 The proportion of population with incomes below the subsistence level in the total population, percentage | 2.3 The number of privately-owned motor vehicles per 1,000 people, units | 3.3 The proportion of families that obtained dwellings in the number of families registered as those in need of living space, percentage | 4.3 Outpatient clinics' and polyclinics' capacity per 10,000 people, visits per shift | 5.3 Infant mortality rates, the number of children died under the age of 1, per 1,000 live births | 6.3 Employment rate, percentage of the number of employed to the economically active population. | 7.3 The use of fresh water, million cubic meters per 1,000 people |
| 1.4 The money income to subsistence level ratio | 2.4 The proportion of households, having a personal computer, as a percentage of the total number of households of the relevant subject of the Russian Federation | 3.4 The share of household expenditure on housing and public utility services as a percentage of total consumer spending | 4.4 Morbidity per 1,000 people, the number of registered patients with diagnoses established for the first time | 5.4 Life expectancy at birth, number of years | | |

| | | | |
|---|---|---|--|
| 1.5 The share of expenditures on foodstuff in total consumer expenditures, percentage | 3.5 The improvement of the housing stock as the geometric mean of specific weights of the total area equipped with pipe water, drainage (sewerage), heating, bath (shower), gas (network, liquefied) or electric stove, hot water, percentage | 4.5 Availability of places for pre-school children in organizations implementing educational activities under pre-school education programs, and childcare, number of places per 1,000 children | 5.5 Natural increase rates per 1,000 people. |
| | | 4.6 The number of students of State and municipal professional educational organizations, studying under programs for middle-management staff training per 10,000 people, number of people. | 5.6 Migration increase per 10,000 people. |
| | | 4.7 The number of students studying under Bachelor's, Specialist's, and Master's degree programs, per 10,000 people, number of people. | |

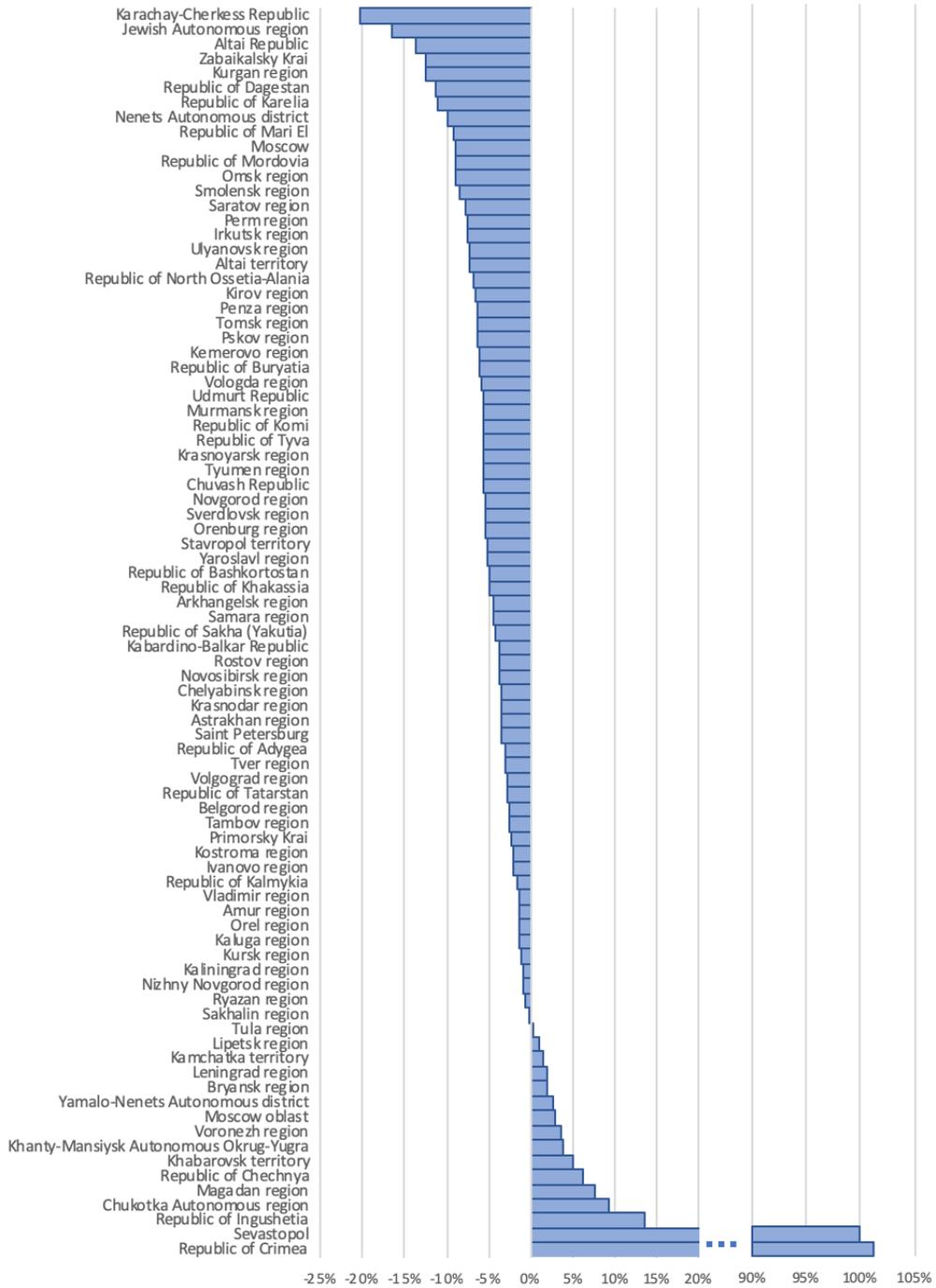


Figure 6. Distribution of subjects the Russian Federation by total change in the standard of living for 2010–2018 as a percentage of integrated indicator