DOI: 10.15838/esc.2026.2.104.6
UDC 332.1+330.59, LBC 65.9(2Rus)111

The Boundaries of Population Welfare in the Arctic Regions and Municipalities of the European Part of the Russian Arctic

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Abstract. The territories of the Russian Arctic exhibit pronounced differentiation in their socio-economic development. Disparities are substantial both in living standards and household incomes, as well as in the material costs associated with daily life. Investigating the human capital of Arctic territories requires an integrated analysis of these dimensions. The aim of this study is to delineate the welfare boundaries of the population across the regions and municipalities of the Russian Arctic. An additional objective is to conduct an exploratory spatial analysis of dependencies in the distribution of household income levels, calculated in relation to welfare groups. The object of the study comprises five regions and thirty-two municipalities within the European part of the Russian Arctic. The data sources include findings from sociological surveys of the population conducted in these territories in 2023–2024 (n = 4,871), as well as a series of expert interviews with representatives of business, government, and non-profit organizations. The methodological framework draws upon the principles of regional and spatial economics, the theory of economic behavior, and the economics of living standards. The methodological toolkit combines sociological and econometric techniques for data processing, with spatial analysis performed using Stata and GeoDa software. The study reveals significant territorial differentiation both in the structure of population welfare groups and in the average income levels corresponding to each welfare tier. Based on principles of municipal contiguity and geographic proximity, local Moran's I index statistics were calculated for all welfare groups, and spatial dependencies in the associated income levels were identified. The most

For citation: Volkov A.D. (2026). The boundaries of population welfare in the Arctic regions and municipalities of the European part of the Russian Arctic. *Economic and Social Changes: Facts, Trends, Forecast*, 19(2), 121–138. DOI: 10.15838/esc.2026.2.104.6

pronounced dependencies are observed within the middle-welfare group. A low income threshold for achieving this welfare level is characteristic of the White Sea coastal territories of the Republic of Karelia, whereas a high threshold is found in the Murmansk Urban Okrug and the municipal okrugs of Kolsky, Monchegorsk, and Olenegorsk. A juxtaposition of low and high income levels is recorded in Zapolyarny District of the Nenets Autonomous Area and the Urban Okrug of Naryan-Mar, as well as in the Inta Municipal Okrug and its surrounding areas.

Key words: Russian Arctic, Arctic municipalities, household income, population welfare, income groups, territorial differentiation, Moran's I index, spatial dependencies.

Acknowledgment

The study was conducted within the framework of Russian Science Foundation project No. 23-78-10192 "Formation of the ethnometric basis of the institutional design of the Russian Arctic: Mutual influence of culture, economic space and social selection in macrosystems" (https://rscf.ru/project/23-78-10192/).

Introduction

Issues of population welfare and its spatial differentiation are extremely relevant in the context of current trends and challenges to Russia's development. The need to ensure the manageability of the economy amid geopolitical and macroeconomic turbulence requires a systematic approach to regulating inter-territorial relationships of population welfare levels. These relationships are among the key macroeconomic signals determining population and labor migration and, in a broader sense, the decision-making of economic agents (Minakir, Dem'yanenko, 2010). These aspects are doubly relevant for the geostrategic territory – the Arctic Zone of the Russian Federation (AZRF), since it experiences a shortage of labor resources and a significant migration outflow (Fauzer, Smirnov, 2020), which hinders implementation of the provisions of the Strategy for the Development of the Arctic Zone of the Russian Federation and Ensuring National Security up to 2035[1]. The specifics of transport accessibility of Arctic territories (Chen et al., 2025), increased costs of doing business, as well as local consumption and demand (Skufina, Baranov, 2020) cause territorial differentiation of prices for goods and services. In turn, local economic features determine the income level of the population living there. These factors form objective prerequisites for the territorial differentiation of population welfare of the Russian Arctic and its boundaries: the level of income sufficient to ensure expanded reproduction of human capital in one territory may be insufficient to implement a similar reproduction model in other territorial conditions (Volkov, 2025). The research on aspects of population welfare in the context of household characteristics – the number of family members and total income – is of particular interest. In this approximation, the relevance of the subject field of the study is determined by its compliance with the priority directions of national policy implemented within the framework of the national project "Family"[2] and the Strategy for the Development of the Arctic Zone of the Russian Federation and Ensuring National Security up to 2035. The aim of the presented study is to determine

[1] On the Strategy for the Development of the Arctic Zone of the Russian Federation and Ensuring National Security for the Period up to 2035: Presidential Decree 645, dated October 26, 2020. Available at: http://publication.pravo.gov.ru/Document/View/0001202010260033 (accessed: 20.12.2025).

[2] National project "Family". Ministry of Labour and Social Protection of the Russian Federation. Available at: https://mintrud.gov.ru/ministry/programms/nacproekt_semya (accessed: 20.12.2025).

the boundaries of population welfare of the regions and municipalities of the Russian Arctic (AZRF). In this work, we use data on respondents' subjective assessment of household incomes and welfare, expressed in the ability to meet the family's needs for goods and services. The object of the study is the regions of the European part of the AZRF, as well as their municipal okrugs and districts.

The scientific novelty of the work lies in the detailed analysis of aspects of population welfare at the municipal level, which has not been implemented to date on the scale of the macroregion – the European part of the Russian Arctic. The study is significant as it identifies not only the boundaries of population welfare of the regions and municipalities of the AZRF, but also the spatial dependencies in the distribution of these boundaries at the municipal level. The practical significance of the results is determined by the need to assess both the initial conditions and the trends in the implementation of the national project "Family" and the Strategy for the Development of the Arctic Zone of the Russian Federation and Ensuring National Security up to 2035.

Literature review

In contemporary scientific discourse, there are several approaches to studying and formalizing the phenomenon of population welfare. Most researchers agree that this category combines many structural components corresponding to the spheres and ways of realizing human needs. M.V. Shlyapina and E.A. Tretyakova identify four elements of regional population welfare: economic, social, environmental, and institutional (Shlyapina, Tretyakova, 2024). A.A. Shabunova and co-authors link the concept of material welfare of the population with the concept of standard of living, within which it acts as a key component and is understood as the provision of the population with material, social, and cultural goods necessary for life. The researchers identify four approaches to studying population welfare: the production approach, the consumption approach, the approach based on population incomes, and the cost-of-living approach (Shabunova et al., 2014). At the same time, as noted by S.V. Dokholyan and M.A. Vershinina, "the key factor influencing people's welfare is their incomes, which determine the growth of citizens' welfare, have a direct impact on its level, and determine the process of consumption of goods" (Aleksandrova et al., 2024, p. 310). Monetary income per capita is often taken as a generalizing characteristic of welfare (Belyaevskii, 2016).

Most authors, when studying population welfare and its spatial differentiation, rely on a system of economic-sociological indicators represented by a combination of statistical and author's sociological data, which allows combining objective and subjective assessments of welfare and incomes (Domnina, 2011; Karachurina et al., 2020; Tretyakova et al., 2025). Subjective assessments of welfare make it possible to link the cost of goods in a certain territory with the income level of the population and are used alongside statistical indicators of the price level, replacing the latter in case of limited statistical data. As noted by P.V. Belopashentseva and co-authors, "subjective poverty is a concept growing out of the issues of subjective social well-being" (Belopashentseva et al., 2024, p. 37). The authors note a divergence in the dynamics and scale of subjective and objective poverty according to data from sample surveys and statistical data (Belopashentseva et al., 2024). Issues of the relationship between objective and subjective welfare are also addressed in a number of foreign studies (e.g., Posel, Rogan, 2016).

However, in a number of studies, the issue of relating income level to local price level and cost of living when studying territorial differentiation of welfare and inequality relies on purely statistical data (Bobkov, Stepanov, 2014; Bobkov et al., 2024; Hussain et al., 2020; Argyris et al., 2025). For example, A.E. Surinov and A.B. Luppov

proposed a methodology for recalculating nominal income levels of the population using territorial purchasing power parities of the ruble. They found that territorial differentiation of the cost of living largely offsets the difference in nominal incomes of the population of Russian regions, and per capita household income values adjusted for territorial purchasing power parities demonstrate a more uniform distribution within macroregions than nominal ones (Surinov, Luppov, 2021). Foreign researchers come to similar conclusions: price differences within spatially differentiated socio-economic systems lead to overestimated assessments of existing territorial inequality in population incomes (Janky, Šedivý, 2018).

Works considering spatial aspects of incomes and welfare of the population include (Naiden, Bravok, 2023; Tan et al., 2021; Acosta, Håkonsson, 2025). We also note the study that reveals how the spatial structure of morphological polycentricity influences the subjective well-being (Li et al., 2025). It should be underscored that most studies are implemented at the national or regional level, while analysis at the municipal level is presented in a relatively small number of works (Surinov, Luppov, 2022; Majchrowska, Strawiński, 2021; Mastronardi, Cavallo, 2020).

For the Arctic regions of Russia, studying aspects of population welfare, as well as its territorial differentiation, is critically important in the context of the existing mono-profile nature of local economies and increased risks for the stable functioning of enterprises under sanctions, as well as the growing need for analytical support of regulatory novations. Existing studies make a significant contribution to the development of the considered subject field (Samarina et al., 2024; Chapargina, 2020). At the same time, there are limitations. As a rule, existing works either cover individual regions of the Russian Arctic, or the nature of the data used in the analysis does not allow making detailed research and final conclusions at the municipal level. This is largely driven by the peculiarities of statistical accounting. Data on household incomes, expenditures, and consumption collected by Rosstat within the framework of a sample survey of household budgets are presented at the regional level and are not available in detail at the municipal level. They also do not allow linking the level of income in monetary terms and the subjective welfare of individual population groups by territory. Data on population incomes are also presented at the regional level and are extremely fragmented at the municipal level, which hinders full and highly detailed consideration of territorial differentiation. Nevertheless, the Russian Arctic with its pronounced spatial differences requires precisely this approach. In this context, the presented study fills the existing gap in the study of population welfare of the Arctic regions of Russia, its income boundaries, and their differentiation at the municipal level.

Methods and data

The data source for the presented study was the results of a population survey in the Arctic territories of the European part of Russia, administratively belonging to the Republic of Karelia, Murmansk Region, Arkhangelsk Region, Nenets Autonomous Area, and Komi Republic. The field stage took place from August 2023 to October 2024. Data were analyzed for 32 municipal formations in the European part of the AZRF – municipal okrugs (MO), municipal districts (MD), and urban okrugs (UO) (excluding the closed administrative-territorial formations: Aleksandrovsk, Vidyaevo, Zaozersk, Ostrovnoy, Severomorsk). A quota sampling method was applied. Across the regions, the sample is distributed as follows: Arctic territories of the Arkhangelsk Region, n = 1,145 people; Murmansk Region, n = 1,258 people; Arctic territories of the Republic of Karelia, n = 1,042 people; Arctic territories of Komi Republic, n = 825 people; the Nenets Autonomous Area (AA), n = 601 people.

At the municipal level, the study design assumes a quota sampling method. Quota groups were formed based on municipal statistics data on the age-sex structure of the population. The average deviation of the sample structure from the general population by age-sex groups overall was: in the Murmansk Region – 2.15%, in the Arkhangelsk Region – 0.9%, in the Republic of Karelia – 1.5%, in the Komi Republic – 0.4%, in the Nenets Autonomous Area – 0.7%; at the level of individual municipalities, not exceeding 3.32, 2.9, 2.4, 1.5, and 1.1% respectively.

Table 1 shows the main characteristics of the sample by gender, education, and occupation of respondents.

Respondents were selected randomly through the door-to-door poll. We used direct interviewing to do the survey; in some cases, however, the questionnaire was self-completed by the respondent (with accompanying instruction and completion control). The sociological survey was carried out by the research team itself, but in a number of territories we cooperated with specialists from the Luzin Institute for Economic Studies of the Kola Science Centre of RAS, Murmansk Arctic University, Northern Arctic Federal University, and the sociological service "Public Opinion of the Komi Republic".

Within the applied sociological tools, the following questions were used in the analysis.

1. To assess the level of population welfare, the question "Please assess the living standard of your family" was used. The response scale is represented by options distributed from the lowest welfare level to the highest:

"Not enough money even for food";

"Enough money for food, but buying clothes and paying for housing is difficult";

Table 1. Main sample characteristics

Sample characteristics		Number of people	Share of total respondents, %
Total sample size		4871	100
Gender	Female	2530	51.94
	Male	2341	48.06
Education	High school or lower	534	10.96
	Primary technical school	190	3.90
	Secondary technical school	1865	38.29
	University not completed	240	4.93
	Higher (Bachelor's Degree, Master's Degree)	1963	40.30
	Graduate student	35	0.72
	Candidate or Doctor of Sciences	44	0.90
Occupation	Public sector worker	1505	30.90
	Civil servant	594	12.19
	Military serviceman	70	1.44
	Private employee	1124	23.08
	Individual entrepreneur, self-employed	198	4.06
	Civic leader	13	0.27
	Do odd jobs	59	1.21
	Temporarily unemployed, actively seeking a job	88	1.81
	Student	364	7.47
	Pensioner	718	14.74
	On maternity/childcare leave	40	0.82
	Homemaker	43	0.88
	No answer	55	1.13

Source: own calculation based on the field study data.

"Enough money only for current needs (food, clothes, housing payments), but not for durable goods";

"Enough money for current needs, household appliances, but not for expensive purchases (apartment, car, dacha)";

"Enough money for both current needs and expensive purchases".

According to the respondents' answers, five welfare groups were identified (group 1 – group 5).

2. To assess the level of household income, we used the open-ended question "What is the approximate total income of your family per month? (Please consider all sources of income – business income, rent, wages, pensions, benefits – of all family members you live with), thousand rubles".

3. To calculate the average per capita income, the open-ended question "Number of family members living together with you (including you)" was used.

The indicator of average income per household member (in this study, the concepts of "family member" and "household member" are used interchangeably) was calculated for each welfare group. This allows estimating the boundaries of welfare expressed in income size, as well as correctly presenting territorial differences in its distribution.

The analysis of spatial dependencies was based on the theoretical provisions of spatial analysis, according to which the intensity of interaction and connections between closely located objects is more pronounced than between more distant objects (Tobler, 1970). However, considering the critical importance of the infrastructure factor within the sparse economic space in the Arctic, it seems incomplete to assess the influence of spatial proximity without accounting for the transport connectivity of territorial objects. In this regard, two approaches were implemented within the analysis of spatial dependencies:

– based on the neighborhood of territories, determined by the presence of common borders between territorial objects (implemented through an n×n matrix of territories, where n = 1 for objects with a common border, and n = 0 for objects without a common border); within this approach, a corresponding matrix was constructed for the considered 32 municipalities of the European part of the AZRF;

– based on the geographic connectivity of municipalities we compiled a matrix of inverse distances between geographic centers, calculated from the centroid of the polygon representing the municipality's territory. The information base was the cartographic data. The value of inverse distances was calculated using formula (1):

$$D_{inv} = 1/dist, \quad (1)$$

where *dist* – distance between the centroids of territories *i* and *j* along the geographic distance, km.

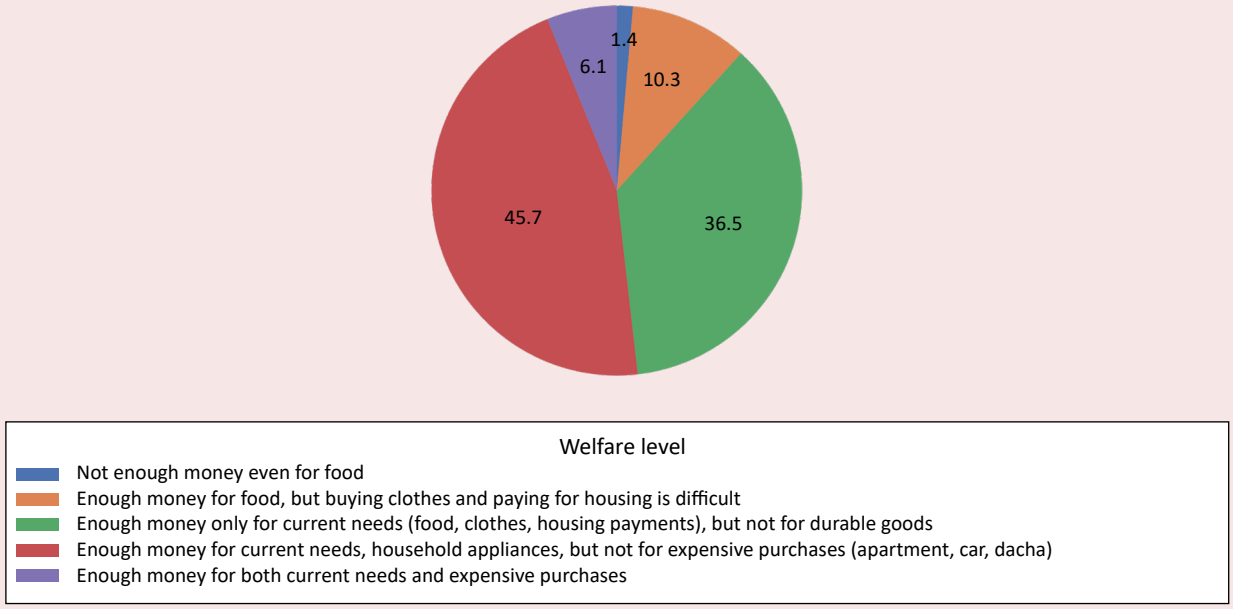
The search for spatial dependencies in the distribution of average household income per family member across welfare groups was carried out using local Moran's indices, reflecting partial (for individual municipalities) dependencies. The significance level of the relationships and their type were identified. Technical calculations and visualization of their results were performed using Stata and GeoDa software packages.

Results

Territorial differentiation of boundaries of population welfare in the European part of the Russian Arctic at the regional level

Consideration of the territorial differentiation of welfare boundaries in the Arctic municipalities of the European part of the AZRF should be preceded by an analysis of the overall picture at the macroregional level. As follows from *Figure 1*, the largest share among the five considered regions has the group characterized by having enough money for current needs, household appliances, but not for expensive purchases (apartment, car, dacha) – group 4 (45.7%). The second most common is group 3, characterized by a welfare level that

Figure 1. Distribution of households in the studied regions by welfare level (total for five regions), %



Source: own compilation.

allows meeting only current needs (36.5%). The population groups representing the pole of poverty (group 1 and group 2) in terms of share among the population (11.7% in total) almost double the share of the pole of wealth (6.1%).

A similar distribution is observed at the regional level. Group 1, characterized by a lack of money even for food and corresponding to a level of destitution, is most prevalent among the Arctic territories of the Republic of Karelia and the Arkhangelsk Region (1.7% and 1.9% respectively). It has the smallest share among the Arctic territories of the Komi Republic (Komi Republic AZ; 0.6%). The share of the population with high affluence varies from 5.1% in the Komi Republic AZ to 7.4% in the Nenets AA. Noteworthy is the relatively low share of the Nenets AA population classified as group 4 (*Fig. 2*).

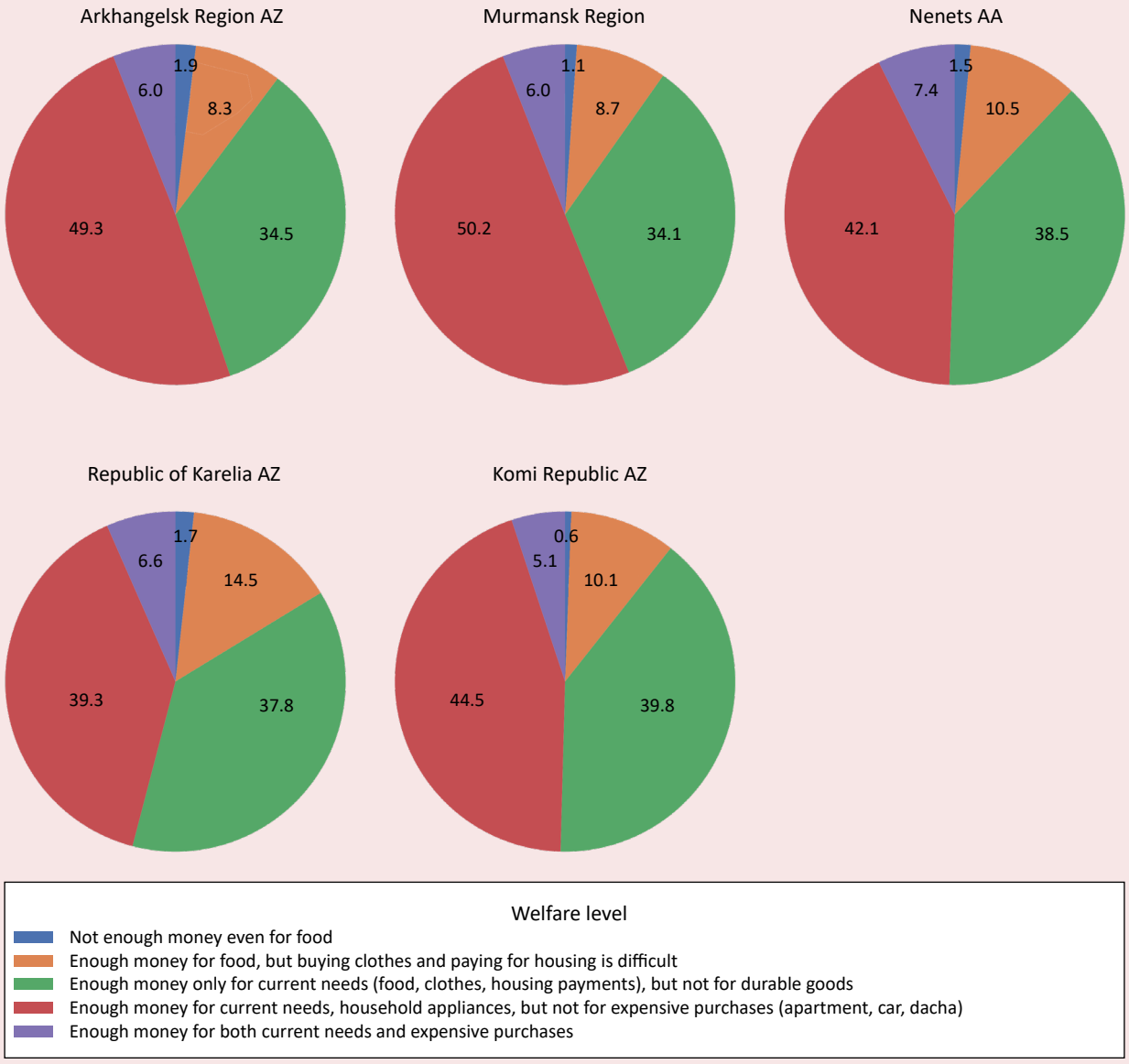
Comparison with the data from Rosstat's sample survey of household budgets (*Tab. 2*) revealed similarity in the general ratios, however, the sociological survey showed a significantly larger

Table 2. Distribution of households in the studied regions by welfare level according to Rosstat data (across five regions), %

Region	Group 1	Group 2	Group 3	Group 4	Group 5
Murmansk Region	0	2.5	34.2	54	9.3
Nenets Autonomous Area	0	1.4	37.3	40.4	20.9
Republic of Karelia	0.3	7.7	45.9	38.9	7.2
Arkhangelsk Region without Nenets Autonomous Area	0.1	12.9	37	46.6	3.4
Komi Republic	0.1	9.6	35.7	44.3	10.3

Note. Group 1 – not enough money even for food; group 2 – enough money for food, but buying clothes and paying for housing is difficult; group 3 – enough money for food and clothes, but durable goods are not affordable; group 4 – enough money for food, clothes, and durable goods, but not enough for a car, apartment, or dacha; group 5 – enough money to buy everything considered necessary.
Source: own compilation based on Rosstat data.

Figure 2. Distribution of households in the studied regions by welfare level according to sociological survey data (across five regions), %

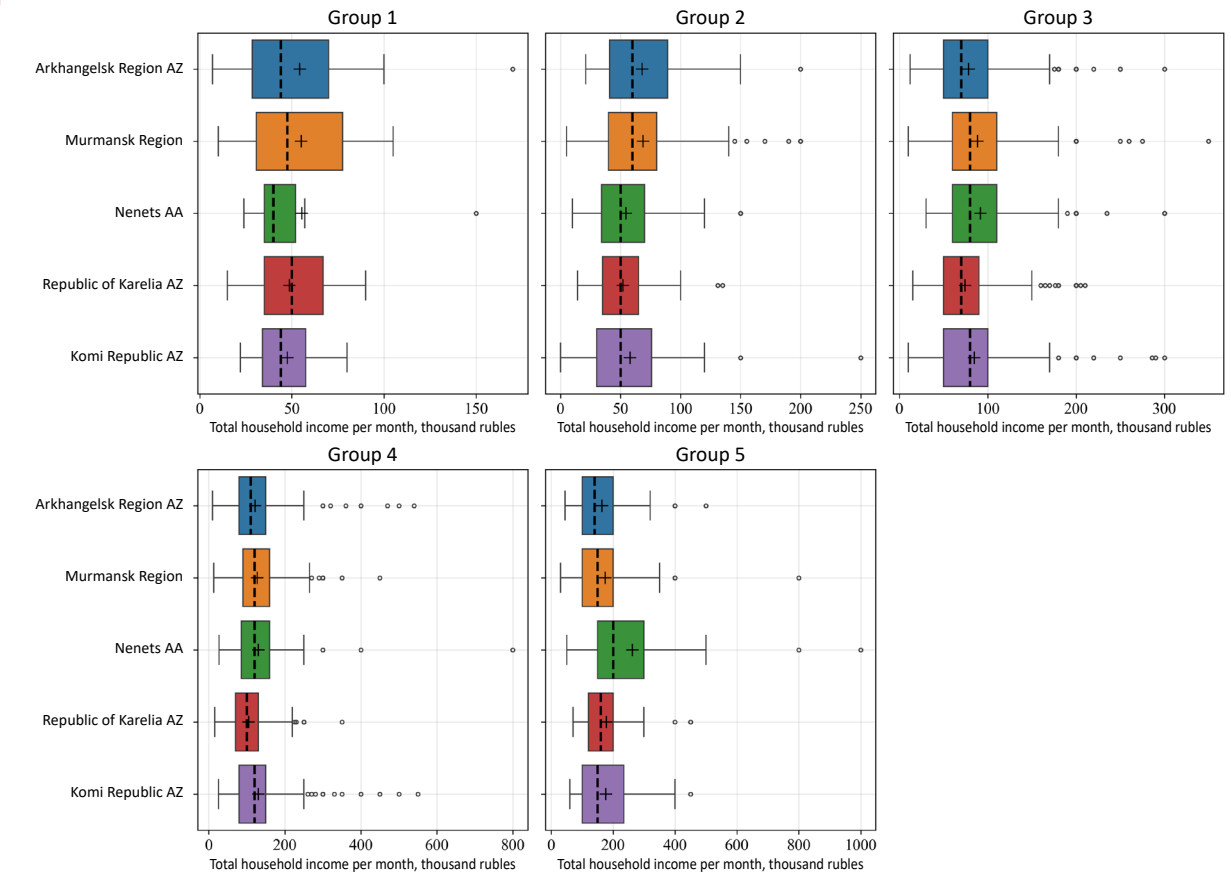


Source: own compilation.

representation of households classified as group 2, which is characterized in both data sources by having money for food but difficulties in paying for other goods and services.

Examination of the correspondence between the average household income level and the welfare level according to the sociological survey across regions indicates that the smallest territorial differentiation within this indicator is characteristic of group 1 (from 47.5 thousand rubles in the Komi Republic AZ to 55.4 thousand rubles in the Nenets AA), and the largest – of group 5 (from 163.6 thousand rubles in the Arkhangelsk Region AZ to 261.9 thousand rubles in the Nenets AA). However, the range in group 5 is wide due to the Nenets AA, an outlier, while the average household income values in the

Figure 3. Aspects of the relationship between welfare level and total household income across regions



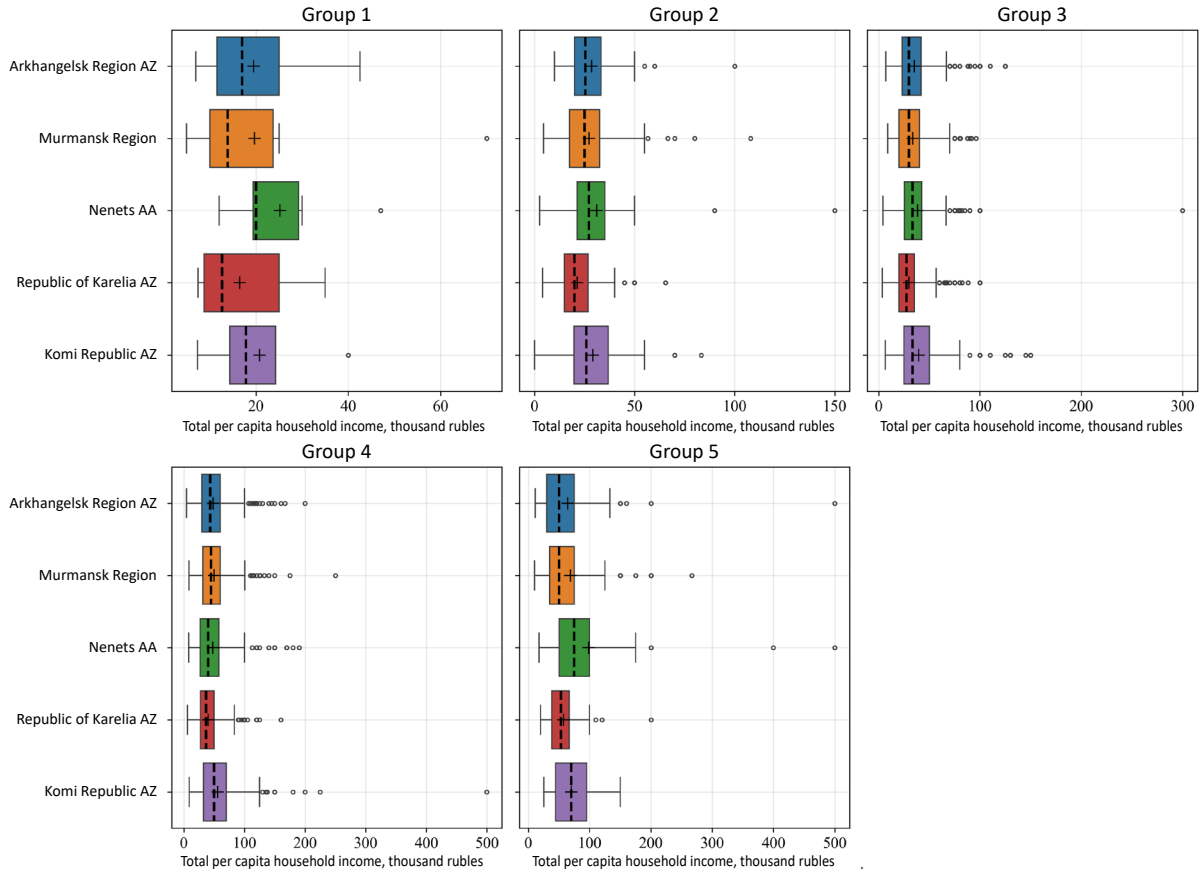
Source: own compilation.

other four regions are in the range of 163.6–178.1 thousand rubles. The Republic of Karelia AZ has the lowest average household income for the population as a whole, 89.2 thousand rubles (in other regions it is within 103.7–114.8 thousand rubles). This is driven by the significant lag of its group 4 from the macroregion's average values (*Fig. 3*).

More precise estimates can be given by taking into account per capita household income. Here we see a more pronounced lag of the Republic of Karelia AZ in most groups, while the leadership of the Nenets AA is less explicit, manifested clearly only in group 5 (80.6 thousand rubles per capita against the macroregion's average of 59.7 thousand rubles per capita). When examining regional distributions of the average values of this indicator for the population as a whole, a significant lag of the Republic of Karelia AZ (31.6 thousand rubles per capita) and a weakly expressed leadership of the Komi Republic AZ (41.8 thousand rubles per capita) are noticeable. At the same time, the values of the Murmansk Region (38.0), the Arkhangelsk Region AZ (38.6), and the Nenets AA (39.3) demonstrate less differentiation (*Fig. 4*).

It is also interesting to compare the results with statistical data, although this can be done only to a limited extent. Rosstat keeps records of sample household surveys data only at the regional level, which does not allow drawing conclusions about the Arctic territories of the regions that are partially

Figure 4. Aspects of the relationship between welfare level and total per capita household income across regions



Source: own compilation.

Table 3. Comparison of per capita household income according to statistics and sociological survey data

Region	Disposable resources (average per household member per month, rubles), Q4 2024, for regions as a whole, Rosstat data	Incomes per household member, for Arctic territories, author's survey data
Murmansk Region	71.2	38.0
Nenets AA	52.0	39.3
Republic of Karelia	63.8	31.6
Arkhangelsk Region (without Nenets AA)	46.6	38.6
Komi Republic	54.1	41.8
Source: own compilation based on Rosstat and field study data.		

included in the AZRF. A correct comparison is possible only for the Murmansk Region and the Nenets Autonomous Area (*Tab. 3*). Moreover, official statistics provide information only for the population as a whole, not by groups corresponding to welfare levels.

Comparison shows that the values of official statistics and field study data differ significantly. This may partly be explained by differences in the methodology for calculating indicators of disposable resources and per capita household income. At the same time, official statistics raise many questions. For example, we see that the value of disposable resources (average per household member per month, rubles) for the Republic of Karelia for Q4 2023 is 41.5 thousand rubles, while the value for Q4 2024 is already 63.8 thousand rubles: more than a 1.5-fold increase in one year. While in the neighboring Arkhangelsk Region (without the Nenets AA), the value for Q4 2023 is 55.3 thousand rubles, and for Q4 2024 is at once 46.6 thousand rubles: a decrease by 15.7%. The explanation of such multidirectional dynamics in neighboring regions, as well as growth rates in the context of individual regions presented in official statistics, is difficult for us as researchers and is probably related to the methodology of surveys conducted by Rosstat. It should be noted that the per capita household income data collected within the sociological survey are more consistent with the data on the distribution of regional households by welfare level presented in Figure 2 and Table 2. A comparison of the author's and statistical data for two regions fully included in the AZRF – the Murmansk Region and the Nenets Autonomous Area – is indicative in this regard.

Territorial differentiation of boundaries of population welfare in the European part of the Russian Arctic at the municipal level

Comparison of income levels across welfare groups implies an immanent accounting of the level of prices for goods and services and the costs of daily life in the territories. In other words, we answer the question "what level of per capita family income is needed on average to maintain a certain level of family welfare in a given territory?". Analysis of municipal-level data suggests a fairly pronounced inter-municipal differentiation of household incomes per family member, which is reflected in the average values for the entire population across municipalities (*Tab. 4*). There is a gap in the indicator values between the deindustrialized periphery and industrial and administrative centers (1.1–2.0 fold). At the same time, we see a number of exceptions. For example, the value of the indicator of average household income per family member in Segezhsky MO is at a fairly low level, despite the presence of a successfully operating industrial enterprise in the administrative center of the okrug.

The boundaries of population welfare of municipal districts and okrugs also demonstrate differentiation both within the entire considered macroregion of the European part of the AZRF and within the economic space of individual regions. As a rule, observations show a gradual and monotonic increase in indicator values when moving from the least to the most financially secure groups. At the same time, in a number of peripheral municipalities, a decrease in the value is observed when moving from group 4 to group 5 (Onezhsky MO, Pinezhsky MO, Tersky MO, Kalevalsky MD), which is also characteristic of individual industrial mono-towns (Kovdorsky MO, Olenegorsk MO). We attribute this phenomenon to three aspects. First, in deeply peripheral and deindustrialized territories, household subsidiary plots significantly increase the welfare of the local population and make more expensive property affordable to them. Second, the cost of expensive property (apartments, houses, cars) in these territories is also relatively lower compared to industrial and administrative centers. For example, in Inta MO, the cost of a well-maintained apartment is one of the lowest in Russia: offers for the sale of apartments started from 70 thousand rubles at the time of the study. Third,

Table 4. Correspondence of average per capita family income and the level of subjective welfare of the population in selected municipalities, thousand rubles

Municipality	Group 1	Group 2	Group 3	Group 4	Group 5	Total
Murmansk Region						
Apatity MO	8.3	26.3	35.1	43.3	50.0	39.0
Kandalakshsky MO	–	24.6	28.6	37.4	40.0	32.9
Kirovsk MO	–	22.3	28.8	52.2	57.1	40.7
Kovdorsky MO	5.0	12.9	34.0	48.9	41.1	39.0
Kolsky MO	–	21.3	29.1	45.2	150.0	40.2
Lovozersky MO	15.8	18.4	24.6	36.8	78.0	27.4
Monchegorsk M*O*	21.0	26.9	31.9	52.0	75.6	42.6
Murmansk UO	23.6	25.5	31.6	47.3	85.5	43.1
Olenegorsk MO	–	16.0	33.9	46.7	42.1	39.5
Pechengsky MO	–	31.2	28.6	36.7	43.1	34.3
Polyarnye Zori MO	13.1	38.2	28.2	51.2	86.2	41.4
Tersky MO	10.0	17.6	22.7	29.0	23.3	25.1
Republic of Karelia AZ						
Belomorsky MO	23.0	25.2	31.9	34.5	48.2	33.3
Kalevalsky MD	–	18.4	23.1	28.6	25.8	23.7
Kemsky MO	8.7	18.9	27.5	38.4	48.2	31.9
Kostomukshsky MO	10.0	18.9	31.4	45.1	66.7	41.8
Loukhsky MD	8.3	19.1	24.0	32.5	43.0	27.3
Segezhsky MO	16.7	17.1	24.9	30.7	48.3	26.0
Arkhangelsk Region AZ						
Arkhangelsk UO	13.8	28.9	36.2	48.1	71.3	44.1
Leshukonsky MO	–	20.0	23.0	39.1	56.0	33.5
Mezensky MO	35.0	36.0	23.0	38.0	43.9	33.1
Novodvinsk UO	25.0	25.0	32.3	42.3	69.5	35.9
Onezhsky MO	18.5	25.0	26.4	37.8	31.2	32.5
Pinezhsky MO	14.1	18.2	26.1	38.5	22.3	28.4
Primorsky MO	18.0	31.1	21.6	34.4	62.0	33.2
Severodvinsk MO	31.7	31.1	38.8	50.1	78.0	46.9
Nenets A*A*						
Zapolyarny MD	19.4	22.9	29.0	36.0	55.8	32.8
Naryan-Mar UO	38.5	30.5	37.8	43.4	93.5	45.2
Komi Republic AZ						
Vorkuta MO	40.0	27.6	37.6	52.1	78.0	45.6
Inta MO	7.3	27.8	29.4	33.7	37.3	30.9
Usinsk MO	17.6	26.9	38.7	57.0	67.9	46.9
Ust-Tsilemsky MD	–	20.8	30.0	34.0	50.0	33.3
Total	**17.0**	**23.2**	**31.0**	**42.8**	**59.7**	**37.4**

Source: own compilation based on field study data.

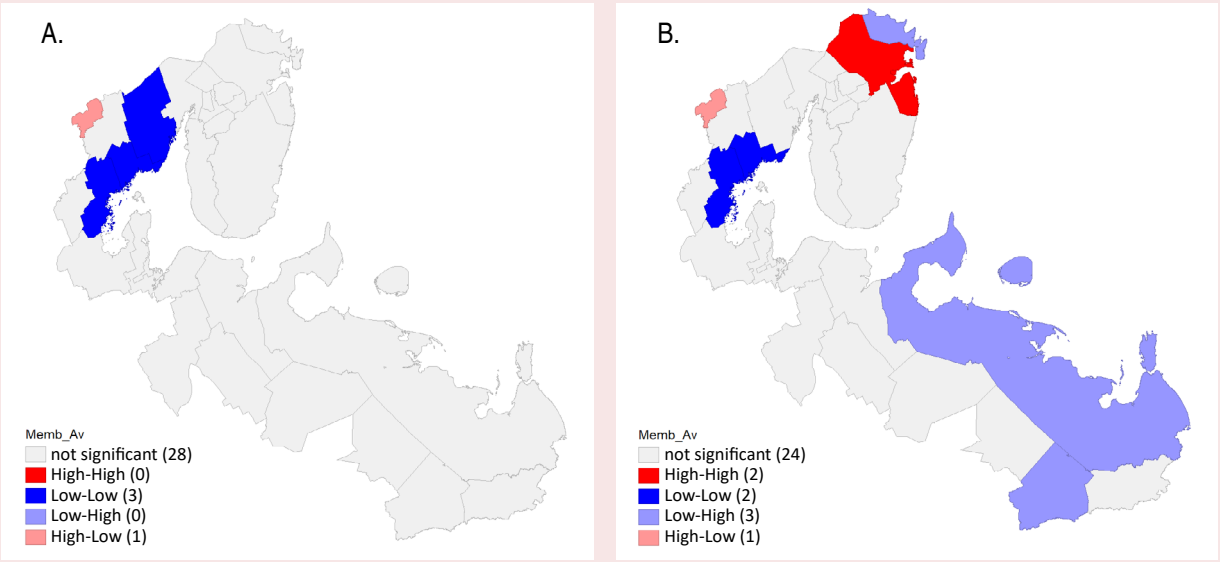
since the number of respondents in the groups with the lowest and highest affluence is relatively small at the municipality level, there is a more pronounced influence of respondents' individual characteristics in a number of cases – considering, for example, large families or, conversely, those living alone. For large families, the indicator value is influenced by a decrease in calculated basic costs per family member and, at the same time, relatively lower final values of per capita income. The latter is also true for industrial mono-towns – expedition results record the relative prevalence of large families with high affluence in these settlements.

The greatest territorial differentiation of indicator values is observed in group 5 with a high welfare level and 6.7-fold difference. At the same time, the most substantiated conclusions can be made for groups 2, 3, and 4, due to the large number of their sample. Territorial differences in average per capita household income for group 2 reach 3-fold, values fluctuate from 12.9 thousand rubles per capita (Kovdorsky MO) to 38.2 thousand rubles per capita (Polyarnye Zori MO) with an average value among municipalities of 23.2 thousand rubles per capita. When examining group 3, we see less pronounced differentiation: territorial values are in the range from 22.7 thousand rubles per capita (Tersky MR) to 38.8 thousand rubles per capita (Severodvinsk MO) with an average value of 31.0 thousand rubles per capita. Group 4 with an average level of affluence is characterized by slightly more pronounced differentiation than group 3. The range of values reaches 2-fold; values fluctuate from 28.6 thousand rubles per capita (Kalevalsky MR) to 57.0 thousand rubles per capita (Usinsk MO) with an average value among municipalities of 42.8 thousand rubles per capita.

Spatial dependencies in the distribution of welfare boundaries at the municipal level

The research on spatial dependencies is the exploratory part of the presented work. We analyzed both the total average per capita household income and each of the five welfare groups. *Figure 5* reflects the spatial dependencies for the first of these aspects,

Figure 5. Spatial effects determined by:
A. territorial neighborhood, average per capita family income;
B. geographic proximity of territories, average per capita family income, average indicator value by territory



Source: own compilation.

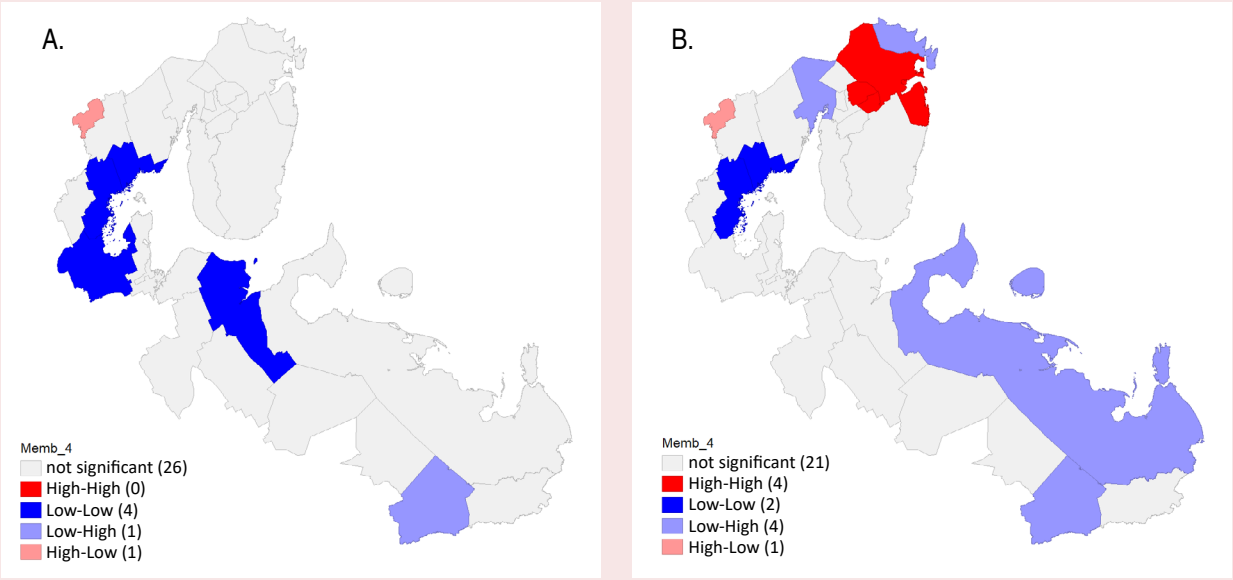
representing a visualization of the distribution of local Moran's indices for the territories of the European part of the AZRF, highlighting the significance level of the relationship and its type.

The most explicit dependencies are manifested under both approaches and are observed in the White Sea territories of Arctic Karelia, characterized by socio-economic stagnation and the same administrative conditions. Kostomukshsky MO – the regional pole of socio-economic development – is characterized by a relatively high level of indicator value despite the socio-economic upheavals of recent years and the closure of a number of medium-sized businesses, which is due to the stable functioning of the city-forming enterprise AO Karelskiy Okatysh. Consideration of geographic proximity allowed identifying a wider range of dependencies. In addition to those already mentioned, we note the relationship of high indicator values in the territories of Murmansk UO and Kolsky District, which we primarily associate with the proximity of administrative and economic centers and the prevalence of commuters among their population. These factors contribute to the territorial distribution of the multiplier effect within broader agglomeration effects. Similar manifestations are recorded for Naryan-Mar UO and Zapolyarny District of the Nenets AA, though their relationship is based on a different dependency. These territories are more heterogenous in terms of their economic development: despite the fact that the main production facilities are located on the territory of Zapolyarny District, they are registrated, as a rule, in Naryan-Mar UO or outside the region.

Analysis within welfare groups also allowed identifying a number of dependencies. They are most pronounced in group 4 (*Fig. 6*).

The analysis of average per capita family income through the lens of geographic proximity allowed identifying more spatial dependencies for group 4, as it was for the previous indicator. Figures 5 and 6 are visually similar. It indicates that the distribution

Figure 6. Spatial effects determined by:
A. territorial neighborhood, average per capita family income;
B. geographic proximity of territories, average per capita family income in group 4



Source: own compilation.

of average income levels correlates in some way with the distribution and spatial dependencies between territorial income values that allow maintaining a certain welfare level (in this case, average and above average). Here, as before, the relationship and mutual influence of Zapolyarny District and Naryan-Mar UO should be noted – the administrative center of the district, Iskateley settlement, is located very close to Naryan-Mar UO, and a significant part of the population commutes to it. Moreover, goods and services, medical care for residents of the most populated settlements and villages of Zapolyarny District of the Nenets AA, located near the administrative center (Iskateley settlement, Krasnoe village, Telviska village, etc.), are also provided by Naryan-Mar UO. Also, interviews with representatives of government and business of the Nenets Autonomous Area show that there is a pronounced local distribution of the multiplier effect between these settlements, which has "Arctic" features and is determined not only by business processes, but also by the redistribution of financial flows as a result of grants and subsidies for business entities.

The established statistical relationship between Inta MO and the surrounding territories is largely driven not by economic ties between territories or resource transfer, but by the persistently depressed state of Inta MO. This municipality faces a significant socio-economic challenge due to the closure of the city-forming coal mining enterprise, which at the peak of its activity employed about 12 thousand residents of the urban okrug. The investor that came to the territory, OOO Carbide and Ferroalloy Plant, provided employment for about 70 people at the time of the study. The situation is aggravated by the virtual absence of road communication between Inta MO and other settlements.

The correspondence between high indicator values of Murmansk UO and Kolsky MO is supplemented in group 4 by a similar relationship between Monchegorsk MO and Olenegorsk MO. In our opinion, this indicates not only a comparable level of incomes in these industrial centers, but also the development of a common consumer market driven by the geographic proximity and improved transport links between these territories.

Conclusion

After the analysis we can make several conclusions. First, the analysis of municipal-level data suggests pronounced inter-municipal differentiation of household incomes per family member. There is a gap in the indicator values between the deindustrialized periphery and industrial and administrative centers, reaching two-fold.

Second, the welfare boundaries of municipal districts and okrugs also demonstrate differentiation both within the entire considered macroregion of the European part of the AZRF and within the economic space of individual regions. Most observations show a gradual and monotonic increase in the values of the average per capita household income when moving from the least to the most financially secure groups. At the same time, the greatest territorial differentiation of values is observed in the group with a high welfare level. For the most numerous groups, represented by households with average affluence and adjacent groups, the differentiation of income values is from one and a half to three-fold.

Based on the experience of personal interviews with respondents, we note that these differences in welfare boundaries are primarily driven by:

– differentiation of the general price level (for example, the cost of goods in Vorkuta MO is objectively higher due to a lack of road communication and difficulties of delivery by railway; the gradual reduction of the list of goods subsidized under the "Northern Delivery" program leads to a general increase in prices in the deeply peripheral territories of Zapolyarny District of the Nenets Autonomous Area, etc.);

– level of prices for some groups of goods (in particular, Inta MO, as well as peripheral territories are characterized by relatively low costs of housing and some other basic expenditures (for example, transport costs for intra-territorial movement), which contributes to respondents' self-classification into groups with a higher welfare level);

– the prevalence of household subsidiary plots in a number of territories with a milder climate (subsidiary plots are a significant source of increasing the welfare of those living in deeply peripheral and deindustrialized territories, as they save monetary incomes to purchase more expensive property).

The most explicit spatial dependencies are recorded in the group with average welfare. A mutually low level of income to achieve this welfare level is observed among the White Sea territories of the Republic of Karelia, and a mutually high level – for Murmansk UO, Kolsky MO, Monchegorsk MO, and Olenegorsk MO. A contrast between low and high levels of income to achieve an average welfare level is observed in Zapolyarny District of the Nenets AA and Naryan-Mar UO, as well as in Inta MO and surrounding territories.

Overall, we highlight that the findings of this research significantly supplement and clarify statistical information on per capita household income at the regional level; the increase in data at the municipal level is even more valuable.

The practical significance of the study lies in the development of analytical foundations for a more correct application of income values to compare the standard of living of the Arctic territories population, as well as for better monitoring of the implementation of the national project "Family" and the Strategy for the Development of the Arctic Zone of the Russian Federation and Ensuring National Security up to 2035. In particular, the findings will be useful in substantiating the territorial specification of material support for large families and childbearing to achieve one of the key indicators of the national project "Family" by 2030 – poverty reduction. Further prospective analysis of spatial dependencies will allow identifying a range of significant regularities in the development of regional economies, related both to the action of the same or similar territorial factors and administrative conditions, and to aspects of the mutual influence of municipalities.

Further research prospects include determination of income intervals corresponding to local welfare levels, as well as calculation of spatial dependencies considering the transport links of the administrative centers of the studied territories.

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Received December 26, 2025.