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© Patrakova S.S., Kopytova E.D.

Current State of Food Security in the Regions of the European North of Russia

**Svetlana S. PATRAKOVA**

Vologda Research Center, Russian Academy of Sciences

Vologda, Russian Federation

e-mail: sspatrakova@bk.ru

ORCID: 0000-0002-4834-3083; ResearcherID: B-5054-2019

**Ekaterina D. KOPYTOVA**

Vologda Research Center, Russian Academy of Sciences

Vologda, Russian Federation

e-mail: ekaterina-razgylina@yandex.ru

ORCID: 0000-0001-6406-3148; ResearcherID: I-8190-2016

Abstract. Ensuring food security is one of Russia's strategically important tasks. In the context of increasing sanction pressure and the emergence of numerous external financial, regulatory, and other constraints on production and logistics in the food sector, this task becomes particularly significant, involving almost all regions of both the Chernozem and non-Chernozem zones of the country. The aim of the article is to assess the food security of the regions of the European North of Russia and to substantiate directions for its strengthening based on the activation of economic and non-economic factors. The information base consists of scholarly works and regulatory acts of the Russian Federation on food security, as well as data from Rosstat. To achieve this goal, we propose a methodological approach to assessing food security, based on calculating indicators of economic and physical accessibility of food, which allows for ranking the regions. As a result of its testing, it was found that in 2021–2023, the leaders in terms of food security among the regions of the European North were the Murmansk and Arkhangelsk regions, which is due to

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the high level of monetary income of the population and the action of Engel's law, as well as the conformity of the diet structure to rational norms. It was revealed that Vologda Region and the Nenets Autonomous Area had fundamentally different regional positions in terms of economic and physical accessibility of food. We put forward ways to strengthen the food security of the regions based on the use of economic and non-economic factors. The novelty of the research lies in establishing the relationship between economic and physical accessibility of food in the context of ensuring food security at the regional level; for the northern territories of Russia, high economic accessibility is a mechanism that, to a certain extent, offsets the low level of physical accessibility due to unfavorable natural and climatic conditions for economic activity.

Key words: food security, physical and economic accessibility of food, agriculture, region, European North of Russia.

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Introduction

Food security is one of the most important components of the national security of Russia (as well as any other country in the world), a necessary condition for maintaining health and ensuring a high quality of life. The relevance of this issue is noted in a significant part of the strategic planning documents at the federal level, in particular, in the National Security Strategy of the Russian Federation (approved by Presidential Decree 400, dated July 2, 2021), the Strategy of Scientific and Technological Development of the Russian Federation (approved by Presidential Decree 145, dated February 28, 2024). The key document regulating the solution of this issue, namely the Food Security Doctrine of the Russian Federation (approved by Presidential Decree 20, dated January 21, 2020), states that "food security is one of the main directions of ensuring the national security of the country in the long term, a factor in preserving its statehood and sovereignty, an essential component of socio-economic policy, as well as a prerequisite for the implementation of a strategic national priority – improving the quality of life of Russian citizens by guaranteeing high standards of living".

The problem of ensuring food security has become more acute in modern conditions of increasing sanctions pressure on Russia. One of the priorities of the country's government authorities has become the intensive development of Russian agriculture by supporting agricultural producers, improving the quality of products, scientific and technological development of the industry and the development of Russian breeding and seed production, etc. At the same time, the focus is on the industry's development not only in the chernozem, but also in the non-chernozem regions of Russia, which conditionally include 1/3 of the constituent entities of the Russian Federation, occupying 14% of its territory and producing more than 20% of the total agricultural output. Due to the considerable extent of the Non-Chernozem region from West to East and from North to South, a wide variety of climatic conditions of agriculture is observed in this zone. For example, the Arkhangelsk, Vologda and Murmansk regions, the Komi Republics and the Republics of Karelia, and the Nenets Autonomous Area, which are part of the European North of Russia (ENR) macro region, are located in three climatic zones at once – Arctic, subarctic, and temperate.

The strategic importance of ensuring food security is noted not only by practice, but also by science. For instance, Doctor of Sciences (Economics) A.G. Semkin (Semkin, Voronin, 2023; Semkin, Zadvorneva, 2022) in his writings sees one of the main tasks of any state to provide the country with high-quality and affordable food, an appropriate level of food security, which should consist in the stability of agricultural food supply not only for domestic consumption, but also in the formation of the necessary reserves in the food and social reserve funds. At the same time, one cannot but agree with the opinion of scientists (see, for example, the works: Pankova, Tsypin, Popov, 2019; Kosmin, Kuznetsov, 2023) that the development of directions and mechanisms for strengthening food security should be based on the results of a scientifically based assessment of its current level.

The aim of the article is to assess the food security of the regions of the European North of Russia and to substantiate the directions of its strengthening based on the activation of economic and non-economic factors.

The hypothesis of the study is based on the assumption that at the regional level, food security is ensured by both physical and economic accessibility of food; at the same time, in the northern regions of the country, a lower level of physical accessibility due to difficult natural and climatic conditions for economic activity corresponds to high economic accessibility.

We set the following tasks to achieve the aim and test the hypothesis:

1) to identify key controversial, “bottlenecks” in assessing food security based on a critical analysis of the scientific literature;

2) to develop and test a methodological approach to food safety assessment based on materials from the regions of the European North of Russia;

3) to substantiate promising areas for improving food security based on the activation of economic and non-economic factors.

Theoretical and methodological foundations of food security assessment

The problem of providing the population with food products of the required quantity, range and quality was solved centrally in the early stages of the formation of states, and only later the scientific community began joining its solution. International organizations such as the FAO¹, IFAD, UNICEF, WFP, WHO², and others conduct research in terms of analyzing trends, factors that contribute to or hinder food security in states, as well as searching for food supply opportunities for peoples of different countries.

For the first time, the term “food security” was used at the World Food Conference in Rome in 1974, organized by the Food and Agriculture Organization of the United Nations (FAO), and was formalized in the Rome Declaration on World Food Security on November 13, 1996, according to which food security is a situation in which all people at any given time have physical and economic access to sufficient safe food necessary for an active and healthy life³. The emergence of the concept was due to a global contradiction that developed in those years when the absolute overproduction of food in developed countries was accompanied by mass starvation and malnutrition of the population in a number of third world countries. For instance, according to the FAO, from 0.8 to more than 0.9 billion people on the planet are hungry, and from 2.7 to 3.1 billion people are unable to eat properly⁴.

¹ Food Security Indicators. Statistics. Food and Agriculture Organization of the United Nations. 2017. Available at: <http://www.fao.org/economic/ess/ess-fs/ess-fadata/en/#.VkhbzXbhDIU> (accessed: 01.11.2024).

² FAO – Food and Agriculture of the United Nations; IFAD – International Fund for Agricultural Development; UNICEF – United Nations International Children’s Emergency Fund; WFP – World Food Program; WHO – World Health Organization.

³ Rome Declaration on World Food Security. World Food Summit Plan of Action. Available at: <https://www.fao.org/4/w3613e/w3613e00.htm> (accessed: 20.04.2025).

⁴ The UN Report: In 2021, the number of hungry people in the world reached 828 million (07.06.2022). FAO. Available at: <https://www.fao.org/newsroom/detail/un-report-global-hunger-SOFI-2022-FAO/ru> (accessed: 20.04.2025).

Scientists point out various reasons for this situation: from natural and climatic problems to the COVID-19 pandemic effects⁵ (Shchetinina, 2023).

The international sanctions imposed on the Russian Federation, in terms of a ban on certain types of agro-industrial complex products, restrictions on international transportation, insurance, financial transactions and other measures, pose a serious threat to the effective functioning of the domestic agro-food complex. The current situation and the available historical experience indicate that the bulk of food and agricultural raw materials for them should be produced domestically (Shchetinina, 2023). The standards for the own production of the most important food products are defined in the Food Security Doctrine of the Russian Federation, approved by Presidential Decree 20, dated January 21, 2020. The document presents food security as the state of socio-economic development of the country, which ensures the food independence of the Russian Federation, guarantees the physical and economic accessibility for every citizen of the country of food products that meet mandatory requirements, in volumes not less than rational standards of food consumption necessary for an active and healthy lifestyle⁶.

In this regard, since food security is one of the most important strategic tasks of preserving Russia's national security, the analysis and assessment of its provision in modern conditions and constraints is becoming particularly relevant.

⁵ The state of food security and nutrition in the world. Repurposing food and agricultural policies to make healthy diets more affordable. Rome: Food Agriculture Organizations of the United Nations, IFAD, UNICEF, WFP, WHO, 2022. 260 p. DOI: 10.4060/cc0639en; The future of food and agriculture — drivers and triggers for transformation. The Future of Food and Agriculture. 2023. No. 3. 68 p. DOI: 10.4060/cc0959en

⁶ The Food Security Doctrine of the Russian Federation: Approved by Presidential Decree 20, dated January 21, 2020. Available at: <https://base.garant.ru/73438425/> (accessed: 20.04.2025).

Issues related to the assessment of food security at the regional level are among the most controversial among representatives of the scientific community and practitioners of public administration. This is manifested in a number of aspects, presented below.

1. *Debate about the expediency of assessing food independence* as one of the components of food security, since regions objectively cannot produce all basic foodstuffs themselves (based on natural and climatic conditions, social division of labor, and other reasons).

This aspect is considered in some detail and using specific examples in the work of V.V. Tyutyunik, Candidate of Sciences (History), an employee of the Amur Institute of Agroecconomics and Business, where he explicitly states: “The regional economy cannot and should not be autonomous by definition, since it is part of a single economic complex of the country, within which its own system of territorial division has developed. labor. The production of industrial and food products is geographically distributed in accordance with the availability of the best conditions for their production in a particular region...” (Tyutyunik, 2016). A.P. Yats, who served as Minister of Agriculture of the Khabarovsk Territory in 2012–2015, has a similar position: “Every constituent entity of the Russian Federation cannot and should not fully provide itself with food. According to the Doctrine approved by the President, the Khabarovsk Territory's task is to contribute to the overall consumer basket of the Russian Federation. What is produced in the region is aimed at meeting the needs of every resident of the country”⁷. It is worth noting that we hold a similar point of view.

However, some works in the Russian scientific literature assess independence at the regional level. At the same time, some papers consider the region

⁷ The Khabarovsk Territory's food security doctrine will become a long-term one. PrimaMedia. Available at: <https://primamedia.ru/news/280090/> (accessed: 01.11.2024).

from the point of view of administrative division as a RF constituent entity, others – from the point of view of the territorial approach developed in the works of academician A.G. Granberg, as a certain territory that differs from others in a number of ways and has some integrity, interconnectedness of its constituent elements. For example, Candidate of Sciences (Economics) E.N. Antamoshkina suggests comparing the current production level of certain types of agricultural products with the required amount of food determined in accordance with rational consumption standards to analyze the level of food independence of the region (Southern Federal District) (Antamoshkina, 2015). Head of the Siberian Research Institute of Agricultural Economics, Siberian Federal Scientific Centre of Agro-BioTechnologies of RAS, RAS Academician P.M. Pershukevich evaluates the independence of the Siberian Federal District based on a comparison of the cost of officially approved consumption standards for recommended foods included in the consumer basket and the actual average per capita expenditure of the population on food purchases (Pershukevich, 2018). The scientist justifies the need for such an assessment by the fact that, due to the territorial remoteness of most producers of cheap agricultural products, the agro-industrial complex of the Siberian regions is largely based on the territorial division of labor within the district. The work of authors, Doctor of Sciences (Economics) I.V. Mitrofanova, Doctor of Sciences (Economics) S.G. Pyankova, Candidate of Sciences (Economics) O.T. Ergunova, uses self-sufficiency coefficients (covering consumption rates for the region with actual production) and food import coverage (covering imports with exports) to assess independence (Mitrofanova et al., 2020).

2. *Debate about the choice of methodological approaches and specific indicators that characterize the economic availability of food.*

According to the Food Security Doctrine of the Russian Federation (section “General provisions”),

the economic availability of food is “the opportunity to purchase food products of proper quality at current prices, in volumes and assortment that meet the recommended rational consumption standards”. However, it is defined as the ratio of the actual consumption of basic foodstuffs per capita to rational consumption standards that meet the requirements of a healthy diet, and, accordingly, does not directly take into account the financial possibilities of purchasing food by the population (section of the Doctrine “Indicators of food security and indicators of their assessment”). In this regard, the scientific community has spread as indicators (indicators) of economic accessibility:

A) The Engel coefficient, which represents the share of household spending on food in total consumer spending⁸. At the same time, we should understand that the high proportion of food costs in their total volume potentially forces the population, first, to limit their nutrition in quantitative or qualitative terms, which can negatively affect their health, and second, to limit consumption of other goods and services, including socially and economically significant ones (additional education, leisure, etc.) (Gumerov, 2020). The generally accepted limits of the Engel coefficient are as follows: 20% or less – the population belongs to the category of affluent, affluent; 20–30% – well-off; 30–40% – relatively well-off; 40–50% – meeting the basic needs of the population; 50–60% – the presence of some problems in meeting the basic needs of the population; 60% and above –

⁸ The coefficient as a whole follows from the Engel’s law, according to which, as family income increases, the percentage of food expenses decreases, although the total amount of food expenses increases. It is worth noting that the structural shift in consumption from food to non-food products and services as household income increases is confirmed by studies of household consumption patterns in many countries, including Russia, China, Africa, Europe, etc. Source: (Ovcharova, Popova, 2013); Ritchie H. Engel’s Law: Richer people spend more money on food, but it makes up a smaller share of their income. (2023). Our World in Data. Available at: <https://ourworldindata.org/engels-law-food-spending> (accessed: 01.11.2024).

the presence of serious problems meeting the basic needs of the population (Zhiltsova, 2017⁹).

It is worth saying that a similar indicator – the ratio of food costs to the total costs of all types of goods and services – is used in the Concept of Improving the Food Security of the CIS Member States¹⁰, used in the assessment of the economic accessibility of food by the Economist magazine (Borodin, 2018). The indicator of the share of food expenditures in the budget of poor families is used as one of the indicators of the economic availability of food in accordance with the methodological approach of the Food and Agriculture Organization of the United Nations (FAO) (Borodin, 2018).

Among the authors who use or propose to use the Engel coefficient (the share of food expenses in total expenses) to assess economic accessibility are K.G. Borodin, N.I. Shagaida and V.Ya. Uzun, and others (Borodin, 2018; Shagaida, Uzun, 2015).

B) The poverty rate, which reflects the share of the population with monetary incomes below the minimum wage in the total population, the Gini index, which characterizes the degree of unevenness of the distribution of the population by income level, and the purchasing power coefficient of the income of the population, reflecting the ratio of the minimum wage to the average per capita income (see, for example, work: Uskova et al., 2014). However, in our opinion, these indicators characterize the standard of living as a whole, only partially and indirectly making it possible to assess the economic availability of food to the population.

C) Gross domestic product per capita, the index of domestic food prices, the extent of

malnutrition, the extent of food shortages, *the extent of food shortages, the share of food expenditures in the budget of poor families*, as indicators reflecting the economic availability of food in accordance with the FAO methodology. We should note that some of these indicators are not monitored in Russia (Borodin, 2018).

D) The share of the population living below the global poverty line, gross domestic product per capita at purchasing power parity, *food consumption as a share of household spending*, tariffs on agricultural imports, availability of food safety programs, access to financing for farmers (in the context of the methodology of the Economist Intelligence Unit¹¹). Some of these indicators, as well as those presented above, are not monitored in Russia (Borodin, 2018).

3. *Debate about the indicators characterizing the physical accessibility of food.*

According to the Food Security Doctrine of the Russian Federation (section “General provisions”), the physical availability of food is “the level of development of the distribution infrastructure, which in all localities of the country provides the opportunity for residents to purchase food products or organize catering in volumes and assortment that meet the recommended rational consumption standards”. It is defined as the percentage of the actual provision of the population with various types of retail facilities for the sale of food products and facilities for the sale of catering products to the standards established by the Government of the Russian Federation (section of the Doctrine “Indicators of food security and indicators of their assessment”). However, assessing physical accessibility from the perspective of this approach has a number of difficulties related to the difficulties

⁹ The Engel coefficient in China is approaching the standards of the wealthy population. (2017). Available at: <http://russian.people.com.cn/n3/2017/1016/c31518-9280305.html> (accessed: 01.11.2024).

¹⁰ The Concept of Improving the Food Security of the CIS Member States. Website of the Eurasian Center for Food Security of Lomonosov Moscow State University. Available at: https://ecfs.msu.ru/Low_documents/International/%D0%A1%D0%9D%D0%93.pdf?ysclid=m3a4nboc57199045506 (accessed: 01.11.2024).

¹¹ Global Food Security Index 2017. Measuring Food Security and the Impact of Resource Risks. The Economist Intelligence Unit. Available at: https://www.eiu.com/public/topical_report.aspx?campaignid=gfsi2017 (accessed: 01.11.2024).

of statistical accounting and assessing the level of development of the commodity distribution infrastructure¹², the lack of a direct reference in the Doctrine to the standards established in the Russian Federation¹³, etc.

The scientific literature often uses the percentage ratio of the nutritional structure in terms of volume or caloric content of the main types of products to the rational norms of their consumption among the indicators of physical availability of food. It is the consumption of food at the level of rational norms and above that indicates that the population physically had access to food (at the expense of all possible sources of financing (personal funds; government subsidies for food, etc.) and the use of all possible types of commodity distribution infrastructure of the food market (fixed and mobile retail facilities, public catering; dairy kitchens to provide special meals for families with children, as well as pregnant and lactating women; northern delivery, etc.). For example, the work of A.V. Minenko uses the following indicators to assess the physical accessibility of food for the population: indices of the volume of food resources

and the volume of own food production, *the actual and regulatory levels of food supply*, the level of stocks, as well as *the physical accessibility level* as the ratio of the volume of food resources of the territory to their required volume, determined in accordance with rational norms and population size (Minenko, 2018). A.A. Kaigorodtsev evaluates the level of physical accessibility by meeting the dietary requirements for caloric content, balance of fats, proteins and carbohydrates (Kaigorodtsev, 2021).

In addition to questions regarding food independence, economic and physical accessibility of food, the scientific literature raises the discussion that the Food Security Doctrine of the Russian Federation is insufficiently focused on improving the level of technological development in the food sector (Abanina, Olifirenko, 2025) and food quality assessment (Sannikova, Prikhod'ko, 2022), and also has other the shortcomings.

Thus, the conducted review showed that the problems of assessing food security at the regional level of the Russian Federation are very controversial, especially with regard to indicators of economic and physical accessibility of food. At the same time, the scientific literature often uses indicators that differ from those proposed by strategic planning documents, in particular, the Food Security Doctrine. This is due to a number of reasons, including the imperfection of statistical observation and methodological approaches to calculating indicators fixed by regulatory legal acts; the need for scientists to conduct a deeper and more comprehensive assessment of food security, etc. However, it is precisely this approach, based on the constant scientific search for alternative indicators, new methods of their processing and aggregation, and application to territories at different levels of the hierarchy (local, regional, macroregional, and national) that can ultimately increase the effectiveness of government policy in the field of food security.

¹² For instance, N.I. Shagaida notes the ambiguity of the percentage of the actual provision of the population with different types of retail facilities for the sale of food products and facilities for the sale of catering products to the standards established by the Government of the Russian Federation. The indicator itself and its dynamics are difficult to interpret. For example, areas can grow, but only at the expense of urban settlements. Source: Komrakov A. (2019). Food security will be assessed by the availability of food. Available at: https://www.ng.ru/economics/2019-03-11/1_7527_food.html (accessed: 01.11.2024).

¹³ For example: On the Fundamentals of State Regulation of Trading Activities in the Russian Federation: Federal Law 381-FZ, dated December 28, 2009 (as amended on 01.03.2025). Available at: <https://base.garant.ru/12171992/> (accessed: 01.11.2024); On Approval of the Rules for the Establishment by the constituent entities of the Russian Federation of Standards for the minimum provision of the population with the Area of Retail facilities and the Methodology for calculating Standards for the minimum provision of the population with the area of Retail facilities, as well as on the Invalidation of Certain Acts of the Government of the Russian Federation: Government Resolution 704, dated 05.05.2023 (as amended on 06.07.2024). Available at: <https://www.garant.ru/products/ipo/prime/doc/406744886/> (accessed: 01.11.2024).

Materials and methods

The methodological approach to assessing food security at the regional level is three-stage, based on the calculation of indicators of economic and physical accessibility of food as its key components and the use of official statistics, allows ranking regions and determining the main directions of its strengthening.

At the first stage, the economic accessibility of food is assessed on the basis of the Engel coefficient, the closest analogue of which in Russian official statistics is the indicator “the share of food costs in total household consumer spending” (published by Rosstat in the collection “Social status and standard of living of the Russian population”).

At the second stage, an assessment of the physical availability of food is carried out based on an analysis of the percentage of the population’s nutrition structure by main types of products to the rational norms of their consumption specified in the Order of the Ministry of Health of the Russian Federation 614, dated August 19, 2016 (as amended on December 30, 2022) “On approval of recommendations on rational norms of food consumption that meet modern requirements of healthy nutrition”. This indicator is calculated on the basis of Rosstat data published, among other things, in the collection “Social status and standard of living of the Russian population”.

At the third stage, regions are ranked based on the ranks assigned to the regions according to the levels of economic and physical accessibility of food over an average three-year period (due to the fact that the assessment for one year may give incorrect results due to the high degree of dependence of the key branch of agro-industrial complex – agriculture – on natural and climatic conditions; taking into account data for several years makes it possible to smooth emissions from “lean” or, conversely, “abnormally productive” years). The time period covered 2021–2023 in the framework of our study.

The information base of the calculations is made up of open data from the Federal State Statistics Service, as well as the freely available legislative base of the Russian Federation and its constituent entities, which makes the methodological approach fairly simple to replicate and use by both researchers and representatives of government authorities.

Food security assessment in the regions of the European North of Russia

An analysis of the dynamics of the share of household spending on food in total consumer spending in 1990–2023 allowed making a number of important observations and conclusions related to the problems of ensuring economic accessibility of food in the ENR regions (*Tab. 1*).

First, the dynamics of this indicator during 1990–2023 did not have a steady upward or downward trend at both the national and macro-regional levels. As a result, in households in one region of the European North of Russia – the Vologda Region – in 2022, the share of food costs was even higher than in the “pre-crisis”¹⁴ 1990 (by 4.3 p.p.).

In the three ENR regions in 2020–2023 (the period of the coronavirus pandemic spread and the introduction of appropriate restrictions aimed at reducing the rate and scale of its spread, increasing external sanctions pressure and related disruption of logistics supply chains of food products, as well as materials, equipment, spare parts, and components used in agricultural production), the share of food expenses increased by 0.1–2.0 p.p. At the same time, by the end of 2023, in five of the six regions of the European North (except for the Vologda Region), the share of food costs was lower than the average for the Northwestern Federal District (32.5%) and Russia (31.5%).

Second, according to the generally accepted gradation of the Engel coefficient, households in the Nenets Autonomous Area and the Murmansk

¹⁴ This refers to the transformational crisis associated with the transition from a planned economic model to a market one in 1991.

Table 1. Share of food and non-alcoholic beverages in household consumer spending, %

Territory	1990	1995	2000	2002	2005	2010	2015	2020	2021	2022	2023	2023 to 1990, +/- p.p.	2023 to 2000, +/- p.p.	2023 to 2020 +/- p.p.
RF	35.5	52.0	49.4	44.1	33.2	29.6	32.1	33.2	32.2	32.9	31.5	-4	-17.9	-1.7
NWFD	N.d.	N.d.	54.1	46.5	33.1	29.8	31.7	31.4	31.5	31.0	32.5	-	-21.6	1.1
Nenets Autonomous Area (NAA)	N.d.	N.d.	41.5	40.3	31.0	24.3	32.6	31.5	26.5	27.1	25.3	-	-16.2	-6.2
Murmansk Region	32.9	48.8	48.6	40.4	31.0	25.1	28.0	26.0	24.6	26.9	26.4	-6.5	-22.2	0.4
Republic of Karelia	35.0	49.8	53.0	44.0	37.9	31.7	34.2	32.0	34.4	32.0	27.8	-7.2	-25.2	-4.2
Arkhangelsk Region (with NAA)	35.2	53.9	50.2	38.9	31.4	28.5	30.5	27.5	30.7	30.1	29.1	-6.1	-21.1	1.6
Arkhangelsk Region (without NAA)	N.d.	N.d.	N.d.	N.d.	N.d.	N.d.	30.4	27.3	31.0	30.2	29.3	-	-	2.0
Komi Republic	31.4	48.6	49.4	40.8	28.4	32.5	33.1	32.8	31.4	32.6	30.6	-0.8	-18.8	-2.2
Vologda Region	31.3	51.7	49.3	46.0	37.9	35.4	37.1	35.5	36.3	37.1	35.6	4.3	-13.7	0.1

Note: data for 1990, 1995, and 2000 are provided for the purchase of food products (according to Rosstat data). For data from 2002–2023, Rosstat indicated that meals outside the home, i.e. in restaurants, cafes and other catering establishments, were not taken into account due to their statistical accounting along with the costs of hotel services. The RF constituent entities, which are part of the European North of Russia, are ranked in ascending order of the share of food costs in 2023.

Source: Rosstat data (collection “Social status and standard of living of the Russian population”, collection “Regions of Russia. Socio-economic indicators”, bulletin “Household food consumption”).

Region, the Republic of Karelia and the Arkhangelsk Region can be assessed as fairly well-off by the end of 2023, having no problems with the purchase of food (the share of food costs ranges from 20 to 30%). Moreover, the first two regions have held this position since 2021. Households in the Komi Republic and the Vologda Region can be assessed as relatively well-off (the share of food costs ranges from 30 to 40%).

At the same time, the ENR regions' ranking presents the constituent entities in terms of the share of food in household consumer spending on average in 2021–2023 as follows: 1st place is for the Murmansk Region (26.0%), 2nd place – the Nenets Autonomous Area (26.3%), 3rd place – the Arkhangelsk Region without NAA (30.2%), 4th place – the Republic of Karelia (31.4%), 5th place – the Komi Republic (31.5%), 6th place – the Vologda Region (36.3%; 10.0 p.p. more than the leader of the rating).

The separation of the Murmansk Region and the Nenets Autonomous Area by 3 p.p. or more from the rest of the ENR is to some extent due to higher levels of monetary incomes of the population¹⁵ and the effect of Engel's law. The Vologda Region is lagging behind with lower incomes of the population¹⁶, despite the fact that the cost of food for a significant part of food groups is at the level of the above-

¹⁵ In particular, according to Rosstat data, the average per capita monetary income of the population in the NAA was 104.1 thousand rubles in 2022 (1st place among the NWFD regions), in the Murmansk Region – 62.6 thousand rubles (3rd place among the NWFD regions); the median per capita monetary income in the Nenets Autonomous Area. In 2022, it amounted to 71.5 thousand rubles (1st place among the NWFD regions), in the Murmansk Region – 48.4 thousand rubles (3rd place among the NWFD regions). The fact that in these regions the share of food costs is lower, in our opinion, may just be an illustration of the effect of Engel's law.

¹⁶ According to Rosstat, the average per capita monetary income of the population in the Vologda Region was 35.4 thousand rubles in 2022 (8th place among the NWFD regions), the median per capita monetary income in 2022 was 29.4 thousand rubles (8th place among the NWFD regions).

Table 2. Cost of meals for the main food groups in 2023, rubles on average per consumer per month

Territory	Bread and bread products	Potato	Vegetables and melons	Fruits and berries	Meat and meat products	Milk and dairy products	Eggs	Fish and fish products	Sugar and confectionery products	Vegetable oil and other fats	Food salt
RF	1290.6	202.6	1037.1	811.3	2857.8	1594.1	171.5	761.0	699.8	119.0	8.6
NWFD	1462.3	196.8	1087.5	827.1	2894.9	1787.3	159.4	687.9	595.2	95.3	8.6
Republic of Karelia	1231.5	200.5	1065.4	853.1	2774.8	1613.5	187.1	629.3	596.9	121.9	10.2
Komi Republic	1333.3	195.5	1027.6	905.9	2456.8	1625.1	159.2	731.6	639.7	88.8	5.8
Arkhangelsk Region (with NAA)	1581.1	232.7	1094.3	864.5	2541.9	1757.4	164.1	707.9	809.5	122.0	8.5
Arkhangelsk Region (without NAA)	1597.0	232.7	1090.9	851.5	2540.8	1752.7	162.4	679.2	817.9	122.2	8.4
Nenets Autonomous Area	1183.7	233.8	1179.5	1190.2	2570.1	1874.3	207.5	1425.8	598.4	117.4	12.2
Vologda Region	1644.8	209.6	1127.2	886.3	2888.6	1925.1	193.4	707.6	766.2	114.8	4.9
Murmansk Region	1499.9	258.7	1264.9	1092.3	3075.2	1935.8	178.3	1034.4	673.1	94.0	7.6
Source: Rosstat data (bulletin "Household food consumption").											

mentioned Arctic regions, and in some cases exceeds it. For instance, if the cost of products of the "bread and bread products" category averaged 1,645 rubles per consumer in the Vologda Region in 2023, then in the Nenets Autonomous Area, it was 1,184 rubles. (28% less; *Tab. 2*), in the Murmansk Region – 1,450 rubles. (12% less).

We should mention that the Vologda Region has the highest share of households among the ENR regions that spend more than half of consumer spending on food purchases (in 2023 – 32.5%, which is 9.9 and 8.5 p.p. higher than the average for the Northwestern Federal District and Russia, respectively; *Tab. 3*).

Table 3. Distribution of households by the share of food purchase expenses in consumer spending in 2023, %

Territory	Share of expenses, %							
	Up to 20.0	20.1–30.0	30.1–40.0	40.1–50.0	50.1 and more	including		
						50.1–60.0	60.1–70.0	more than 70.0
RF	12.0	18.7	23.0	22.2	24.0	15.2	6.7	2.1
NWFD	11.7	20.1	23.8	21.8	22.6	15.1	5.9	1.6
Nenets Autonomous Area	15.4	30.6	32.4	16.3	5.3	4.0	0.9	0.4
Murmansk Region	19.5	26.9	25.8	17.5	10.3	7.8	2.2	0.3
Republic of Karelia	19.3	18.2	21.6	23.6	17.4	10.9	4.6	1.9
Komi Republic	11.3	18.8	26.9	22.8	20.3	11.7	6.4	2.2
Arkhangelsk Region (with NAA)	15.9	18.9	22.5	21.5	21.2	14.6	5.2	1.4
Arkhangelsk Region (without NAA)	16.0	18.5	22.2	21.7	21.8	15.0	5.4	1.4
Vologda Region	7.3	13.4	24.1	22.8	32.5	17.2	10.5	4.8
Note: the RF constituent entities, which are part of the European North of Russia, are ranked in ascending order of the share of households spending 50.1% or more on food purchases.								
Source: Rosstat data (bulletin "Household food consumption").								

Table 4. Share of food purchase expenses* in the total volume of consumer spending by 20% of the Vologda Region population groups, depending on the level of per capita disposable resources in 2023, %

Household type	20% of the population					Difference between the cost shares I and V groups, +/- p.p.
	I**	II	III	IV	V***	
All households	50.1	46.6	41.9	38.6	27.8	+22.3
Households in urban areas	48.2	45.3	41.6	36.8	26.7	+21.5
Households in rural areas	54.0	50.0	42.8	42.4	37.7	+16.7

* – including meals outside the home; ** – the least affluent population; *** – the most affluent population.
Source: data from the Vologdastat based on the materials of a sample survey of household budgets ("Statistical Yearbook of the Vologda Region. 2023").

At the same time, the largest share of food purchase expenses in the total volume of consumer spending is typical for the least affluent population. For example, it was 50.1%, in the Vologda Region as a whole in 2023, which is 22.3 p.p. higher than the share of food expenses borne by the wealthiest residents (*Tab. 4*). In urban areas, the difference in the share of expenses of the least and most affluent population was 21.5 p.p. (48.2 versus 26.7%), in rural areas – 16.7 percentage points (54.0 versus 37.7%). A similar situation is observed in other ENR regions. For example, in the Nenets Autonomous Area, the gap in the share of food purchase costs between the least and most affluent populations is 20.1 p.p. (37.6 versus 17.5%). This directly indicates the greater vulnerability of the low-income population regarding the economic availability of food.

Analysis of the percentage ratio of the population's nutrition structure by main types of products to the rational norms of their consumption in natural weight in 1990–2023 (*Tab. 5*) allows making a number of important observations and conclusions related to the issue of ensuring physical accessibility of food in the ENR regions.

First, the consumption of bread and bread products (by 0.1–31.3%), potatoes (by 37.9–49.8%), vegetables and melons (by 21–42%), fruits

and berries (by 18.4–32.8%) was below the rational standards in all ENR regions in 2023. Consumption of fish and fish products – in all regions except the Nenets Autonomous Area (by 19.7–33.3%; autonomous Area – 144.8%), milk and dairy products – in all regions except the Vologda Region (by 13.4–16.6%; the Region – 104.6%), eggs – in all regions except Vologda Region and the Republic of Karelia (by 1.2–11%; the Region – 105.5%, the Republic – 106.7%). In turn, the consumption of meat and meat products was at a level above the rational norms (by 20.5–40.2%) in all ENR regions with the exception of the Nenets Autonomous Area (98.8% of the norms).

We should say that in almost all ENR regions, consumption of bread and bread products, potato, milk and dairy products, as well as eggs has decreased since 1990. The decrease in the consumption of bread products is generally positively assessed by most scientists and specialized specialists as a shift towards a healthy diet (see, for example: Baturin et al., 2020¹⁷), while eggs and dairy products, which are sources of proteins, fats, and a complex of useful substances, on the contrary, negatively.

¹⁷ "Food trends are laid in the family": 15 questions about the nutrition of Russians. Available at: <https://journal.tinkoff.ru/eda-talk/> (accessed: 01.11.2024).

Table 5. Structure of population's nutrition by food groups, % of the rational consumption standards

Territory	1990	2000	2010	2020	2021	2022	2023	2023 to 1990, +/- p.p.	2023 to 2020, +/- p.p.	2023 to 2022, +/- p.p.
Milk and dairy products										
RF	119.9	66.8	81.5	84.3	82.2	81.9	81.0	-38.9	-3.3	-0.9
NWFD	127.3	62.1	92.2	93.2	89.7	89.0	86.2	-41.1	-7	-2.8
Vologda Region	132.3	73.0	86.7	108.4	105.4	108.4	104.6	-27.7	-3.8	-3.8
Arkhangelsk Region (without NAA)	N.d.	N.d.	N.d.	82.4	84.6	88.9	88.4	–	6	-0.5
Arkhangelsk Region (with NAA)	112.4	37.3	77.5	83.1	84.5	88.6	88.3	-24.1	5.2	-0.3
Murmansk Region	124.5	39.4	88.2	87.4	83.6	85.3	86.6	-37.9	-0.8	1.3
Nenets Autonomous Area (NAA)	N.d.	N.d.	70.7	99.1	82.2	81.6	85.3	–	-13.8	3.7
Komi Republic	123.0	65.5	91.6	86.3	86.7	84.6	84.8	-38.2	-1.5	0.2
Republic of Karelia	115.8	59.9	82.0	92.8	85.8	89.0	83.4	-32.4	-9.4	-5.6
Meat and meat products										
RF	101.4	60.8	106.8	124.7	126.7	127.4	132.4	31	7.7	5
NWFD	101.4	55.4	116.8	123.5	125.6	127.5	133.4	32	9.9	5.9
Vologda Region	104.1	59.5	101.6	121.9	126.8	135.2	140.2	36.1	18.3	5
Murmansk Region	93.2	43.2	117.7	118.6	118.2	123.0	136.4	43.2	17.8	13.4
Republic of Karelia	77.0	58.1	111.5	134.7	120.9	126.8	132.2	55.2	-2.5	5.4
Komi Republic	94.6	68.9	110.8	110.2	121.2	120.0	124.5	29.9	14.3	4.5
Arkhangelsk Region (without NAA)	N.d.	N.d.	N.d.	124.5	113.1	115.3	120.5	–	-4	5.2
Arkhangelsk Region (with NAA)	82.4	36.5	98.6	123.4	112.6	114.7	119.6	37.2	-3.8	4.9
Nenets Autonomous Area (NAA)	N.d.	N.d.	80.5	96.4	98.7	101.1	98.8	–	2.4	-2.3
Fish and fish products										
RF	N.d.	N.d.	75.7	79.2	77.6	78.4	80.3	–	1.1	1.9
NWFD	N.d.	N.d.	75.7	66.1	64.0	64.5	61.8	–	-4.3	-2.7
Nenets Autonomous Area (NAA)	N.d.	N.d.	6.5	157.3	152.7	157.6	144.8	–	-12.5	-12.8
Murmansk Region	N.d.	N.d.	9.5	74.0	78.8	78.1	80.3	–	6.3	2.2
Komi Republic	N.d.	N.d.	90.0	70.8	80.5	75.7	79.4	–	8.6	3.7
Arkhangelsk Region (with NAA)	N.d.	N.d.	90.4	88.8	84.9	84.1	76.8	–	-12	-7.3
Vologda Region	N.d.	N.d.	7.9	79.7	78.7	72.1	76.4	–	-3.3	4.3
Arkhangelsk Region (without NAA)	N.d.	N.d.	N.d.	86.1	82.3	81.1	74.1	–	-12	-7
Republic of Karelia	N.d.	N.d.	95.4	81.2	69.2	73.5	66.7	–	-14.5	-6.8
Eggs										
RF	114.2	88.1	85.0	92.1	89.5	92.2	91.3	-22.9	-0.8	-0.9
NWFD	115.4	89.6	91.9	91.7	90.0	92.4	89.3	-26.1	-2.4	-3.1
Republic of Karelia	122.7	78.1	90.4	109.8	101.9	106.9	106.7	-16	-3.1	-0.2
Vologda Region	120.8	88.1	100.0	95.8	96.7	104.5	104.5	-16.3	8.7	0
Murmansk Region	98.8	77.3	83.8	94.5	89.2	99.3	98.8	0	4.3	-0.5
Komi Republic	111.5	99.6	87.3	83.5	86.7	84.9	92.6	-18.9	9.1	7.7

Continuation of Table 5

Territory	1990	2000	2010	2020	2021	2022	2023	2023 to 1990, +/- p.p.	2023 to 2020, +/- p.p.	2023 to 2022, +/- p.p.
Nenets Autonomous Area (NAA)	N.d.	N.d.	68.5	88.7	79.6	92.2	91.4	-	2.7	-0,8
Arkhangelsk Region (with NAA)	113.5	58.5	83.8	95.4	87.5	90.5	89.1	-24.4	-6.3	-1,4
Arkhangelsk Region (without NAA)	N.d.	N.d.	N.d.	95.7	87.8	90.4	89.0	-	-6.7	-1,4
Bread and bread products										
RF	122.7	120.6	104.6	98.7	92.9	93.1	89.6	-33.1	-9.1	-3,5
NWFD	116.5	113.4	94.2	87.6	81.6	83.4	79.7	-36.8	-7.9	-3,7
Vologda Region	137.1	121.6	113.1	103.5	96.0	103.7	99.9	-37.2	-3.6	-3,8
Arkhangelsk Region (without NAA)	N.d.	N.d.	N.d.	100.2	88.7	90.1	86.3	-	-13.9	-3,8
Arkhangelsk Region (with NAA)	116.5	112.4	102.0	99.8	88.2	89.5	85.7	-30.8	-14.1	-3,8
Komi Republic	119.6	119.6	104.3	83.6	83.8	83.4	80.7	-38.9	-2.9	-2,7
Republic of Karelia	113.4	106.2	93.8	93.5	83.8	85.8	76.2	-37.2	-17.3	-9,6
Nenets Autonomous Area (NAA)	N.d.	N.d.	78.0	90.7	76.6	73.5	70.5	-	-20.2	-3
Murmansk Region	73.2	96.9	81.4	67.7	64.2	69.4	68.7	-4.5	1	-0,7
Potato										
RF	117.8	N.d.	73.7	62.7	58.3	58.2	60.8	-57	-1.9	2,6
NWFD	105.6	N.d.	76.8	59.6	53.7	54.6	53.9	-51.7	-5.7	-0,7
Vologda Region	128.9	N.d.	90.3	64.0	58.2	59.0	62.1	-66.8	-1.9	3,1
Republic of Karelia	91.1	N.d.	73.3	69.4	53.3	54.5	55.1	-36	-14.3	0,6
Murmansk Region	68.9	N.d.	61.3	53.2	48.7	50.4	54.8	-14.1	1.6	4,4
Arkhangelsk Region (without NAA)	N.d.	N.d.	N.d.	57.2	48.8	48.3	54.4	-	-2.8	6,1
Arkhangelsk Region (with NAA)	72.2	N.d.	75.1	57.2	48.9	48.5	54.3	-17.9	-2.9	5,8
Nenets Autonomous Area (NAA)	N.d.	N.d.	43.0	57.3	51.8	52.9	52.9	-	-4.4	0
Komi Republic	105.6	N.d.	61.7	49.3	49.8	48.7	50.2	-55.4	0.9	1,5
Vegetables and melons										
RF	63,6	N.d.	68,9	74,2	72,1	74,3	76,1	12,5	1,9	1,8
NWFD	55.0	N.d.	71.8	73.6	70.7	73.2	71.2	16.2	-2.4	-2
Vologda Region	46.4	N.d.	73.5	78.7	73.8	77.7	79.0	32.6	0.3	1,3
Arkhangelsk Region (without NAA)	N.d.	N.d.	N.d.	69.8	64.3	70.0	72.6	-	2.8	2,6
Arkhangelsk Region (with NAA)	50.7	N.d.	61.6	69.1	63.7	69.4	72.0	21.3	2.9	2,6
Republic of Karelia	52.9	N.d.	58.4	67.1	58.5	62.2	68.5	15.6	1.4	6,3
Murmansk Region	55.0	N.d.	67.1	66.6	61.3	67.5	67.3	12.3	0.7	-0,2
Komi Republic	64.3	N.d.	70.2	64.6	65.9	65.8	66.0	1.7	1.4	0,2
Nenets Autonomous Area (NAA)	N.d.	N.d.	34.6	52.7	50.2	53.6	58.0	-	5.3	4,4

End of Table 5

Territory	1990	2000	2010	2020	2021	2022	2023	2023 to 1990, +/- p.p.	2023 to 2020, +/- p.p.	2023 to 2022, +/- p.p.
Fruits and berries										
RF	N.d.	N.d.	70.2	77.1	72.1	70.3	71.6	-	-5.5	1,3
NWFD	N.d.	N.d.	77.1	78.6	74.8	71.8	68.5	-	-10.1	-3,3
Murmansk Region	N.d.	N.d.	90.2	88.1	81.3	77.9	81.6	-	-6.5	3,7
Vologda Region	N.d.	N.d.	67.3	89.8	79.2	76.7	76.9	-	-12.9	0,2
Arkhangelsk Region (without NAA)	N.d.	N.d.	N.d.	85.6	77.8	74.3	75.1	-	-10.5	0,8
Arkhangelsk Region (with NAA)	N.d.	N.d.	65.8	84.7	77.0	73.8	74.8	-	-9.9	1
Komi Republic	N.d.	N.d.	88.9	75.1	79.4	74.4	73.0	-	-2.1	-1,4
Nenets Autonomous Area (NAA)	N.d.	N.d.	41.9	61.6	57.2	61.6	68.4	-	6.8	6,8
Republic of Karelia	N.d.	N.d.	73.3	79.8	66.0	66.8	67.2	-	-12.6	0,4

Note: the comparison was carried out with the standards set out in the source: On approval of recommendations on rational standards of food consumption that meet modern requirements of healthy nutrition: Order of the Ministry of Health of Russia 614, dated 08/19/2016 (as amended on 12/30/2022). Available at: <https://www.garant.ru/products/ipo/prime/doc/71385784/> (accessed: 11/01/2024).

According to the Order, the standard of consumption of bread products (bread and pasta in terms of flour, flour, cereals, legumes) is 97 kg/ year/ person, potatoes – 90 kg/ year/ person, vegetables and melons – 140 kg/ year / person, fresh fruits – 100 kg/ year/ person., sugar – 8 kg/year/person, meat products – 74 kg/year/person, fish and fish products – 28 kg/year/person, milk and dairy products in terms of milk – 322 kg/year/person, eggs – 260 pieces/year/person, vegetable oil – 12 kg/year / person, table salt – 1.8 kg / year / person. At the same time, according to the Order of the Ministry of Health of Russia 614, dated 08/19/2016, rational norms of food consumption that meet modern requirements of a healthy diet are the average per capita values of the main food groups, as well as their assortment in kilograms per capita per year, which take into account the chemical composition and energy value of food products, provide the estimated per capita need for food substances and energy, as well as the variety of food consumed. In the framework of this study, the calculations assume the constancy of rational consumption standards. The table does not show data on salt consumption due to their absence in 2006–2022, sugar, since Rosstat calculates sugar consumption together with confectionery, vegetable oil, since Rosstat calculates oil consumption together with other fats. The regions are ranked in descending order of the percentage of actual consumption from rational norms in 2023 within each food group.

Source: Rosstat data (2006–2023 – bulletin “Household food consumption”, 1990–2000 – collection “Regions of Russia. Socio-economic indicators”).

The consumption of vegetables and melons, meat and meat products, fruits and berries by the ENR population, as well as in the NWFD and Russia as a whole, has increased, which, according to A. Safonov, professor at the Financial University under the Government of the Russian Federation, is explained by a change in the standard of living toward improvement; head of the National Meat Association, S. Yushin also refers to the fact that that “meat remained an economically affordable product, while fish

became more expensive and its consumption decreased”¹⁸.

Second, the ENR regions can be ranked as follows based on the consumption rate of the main food groups on average in 2021–2023: 1st place belongs to the Vologda Region, 2nd place – the Arkhangelsk Region without the Nenets Autonomous Area, 3rd place – the Murmansk Region, 4th place – the Republic of Karelia, 5th place – the Komi Republic, 6th place – the Nenets Autonomous Area¹⁹.

¹⁸ Russians began eating a record amount of meat. Which foods have increased and which have decreased in consumption. Available at: <https://www.rbc.ru/economics/09/08/2024/66b4b9919a7947473323a075> (accessed: 01.11.2024).

¹⁹ The ranking was based on the arithmetic average of food consumption by groups in 2021–2023.

Table 6. Composition of food substances in consumed food in 2023, on average per consumer per day

Territory	Proteins			Fats			Carbohydrates			Kilocalories		
	g	% of the norm		g	% of the norm		g	% of the norm		kcal	% of the norm	
		M	W		M	W		M	W		M	W
RF	81.4	108.5	135.7	109.4	151.9	191.9	311.9	103.6	131.1	2569.3	119.5	151.1
NWFD	77.8	103.7	129.7	107.2	148.9	188.1	282.4	93.8	118.7	2416.8	112.4	142.2
Republic of Karelia	76.7	102.3	127.8	114.3	158.8	200.5	291.4	96.8	122.4	2511.8	116.8	147.8
Komi Republic	76.8	102.4	128.0	104.9	145.7	184.0	289.9	96.3	121.8	2422.1	112.7	142.5
Arkhangelsk Region (with NAA)	77.4	103.2	129.0	111.4	154.7	195.4	318.4	105.8	133.8	2598.2	120.8	152.8
Nenets Autonomous Area	70.4	93.9	117.3	88.1	122.4	154.6	265.1	88.1	111.4	2145.4	99.8	126.2
Arkhangelsk Region (without NAA)	77.7	103.6	129.5	112.4	156.1	197.2	320.6	106.5	134.7	2616.3	121.7	153.9
Vologda Region	89.6	119.5	149.3	124.5	172.9	218.4	339.1	112.7	142.5	2848.4	132.5	167.6
Murmansk Region	79.0	105.3	131.7	110.9	154.0	194.6	268.9	89.3	113.0	2402.2	111.7	141.3

Note: according to the guidelines "MP 2.3.1.0253-21. 2.3.1. Food hygiene. Rational nutrition. Norms of physiological energy and nutritional requirements for various population groups of the Russian Federation. Guidelines", physiological energy requirements for adults range from 2,150 to 3,800 kcal/day for men and from 1,700 to 3,000 kcal/day for women. Energy consumption for adaptation to the cold climate in the Far North increases by an average of 15%. The physiological protein requirement for the adult population ranges from 75 to 114 g/day for men and from 60 to 90 g/day for women. The physiological requirement for fats is from 72 to 127 g/day for men and from 57 to 100 for women. The physiological requirement for digestible carbohydrates is from 301 to 551 g/day for men and from 238 to 435 g/day for women.

When calculating food intake as a percentage of the norm, the lower limits of physiological needs for men (M) and women (W) were taken as the latter.

Source: Rosstat data (bulletin "Household food consumption").

It is important to note that the structure of consumption of the main food groups largely determines the caloric content of the diet, the sufficiency of macronutrients such as proteins, fats and carbohydrates. As follows from the data presented in *Table 6*, there are deviations from the lower and upper limits of recommended standards for men and women in the composition of food substances in consumed foods. For example, the average daily protein intake in the Nenets Autonomous Area was lower than the norm for men

by 6.1% (70.4 g with a norm of at least 75 g), and taking into account the correction factor for the regions of the Far North – by 18.1% (70.4 g with a norm of at least 86 g). In the Vologda Region, the average daily fat intake is 24% higher than the upper limit of the norm for women (124 g with a norm of no more than 100 g). The average daily carbohydrate intake was 3.2–11.9% lower than the norm for men in the Komi Republic and the Republic of Karelia, the Nenets Autonomous Area and the Murmansk Region.

Thus, we can conclude that ensuring food security, in particular, its components such as economic and physical accessibility of food, is an urgent issue for the regions of the European North. Currently, the Murmansk Region occupies relatively high positions in the ranking of the ENR regions (1st place in terms of economic accessibility, 3rd in terms of physical accessibility; *Tab. 7*) and the Arkhangelsk Region without the Nenets Autonomous Area (3 and 2 places, respectively). The Komi Republic and the Republic of Karelia share 4th and 5th places in terms of economic and physical accessibility of food. The Vologda Region and the Nenets Autonomous Area have quite radically different positions on the economic and physical accessibility of food.

The data in Table 7 generally confirm the hypothesis that in the northern regions of the country, there is a high level of economic accessibility of food, provided by significant per capita incomes, compensates for a low level of physical accessibility due to difficult natural and climatic conditions for economic activity (for example, in the Nenets Autonomous Area, the Murmansk Region). In the more southern regions, in particular, in the Vologda Region, the situation is different. With relatively high physical availability of food, due to favorable natural and climatic

conditions for economic, including agricultural, activities and a developed transport infrastructure, low economic accessibility is observed. However, we should understand that economic and physical accessibility are not interchangeable and, therefore, should be ensured simultaneously.

The above indicates the need to implement a set of measures and directions to strengthen food security in the regions of the European North as one of the key tasks of Russia's spatial development by activating both economic factors (government support, technological and innovative development, etc.) and non-economic factors (socio-cultural development (culture, medicine, education, etc.).

Suggestions and conclusion

The tasks of ensuring food security are complex, intersectoral and interdepartmental in nature. As the researchers (Zhigunova, Logvinova, 2025) noted, these tasks cover the social sphere (income, food consumption, social protection) and the economic sphere (trade, urban planning, transport), etc. At the same time, food security in each region is determined by specific factors that influence it. This suggests the need to develop a differentiated regional policy and prioritize support measures depending on the levels of economic and physical availability of food.

Table 7. Ranks of the regions of the European North of Russia in terms of economic and physical accessibility of food

Territory	Economic accessibility	Physical accessibility
Murmansk Region	1	3
Nenets Autonomous Area	2	6
Arkhangelsk Region (without NAA)	3	2
Republic of Karelia	4	4
Komi Republic	5	5
Vologda Region	6	1

Note: 1st place corresponds to a higher availability level, 6th place belongs to a lower availability level. It is ranked in descending order of rank according to the economic availability of food.

As part of the development of food security issues, the development of a generalized, integral indicator of food availability seems promising. It can be based on the indicators of economic (the share of food costs in the total volume of household consumer spending) and physical (the percentage of the population's nutrition structure by main types of products to rational standards of consumption) food availability used in this study, as well as weighting factors reflecting their importance. The scientific justification of the latter is a debatable, but at the same time very important task, which can be solved by involving experts (see, for example, the work (Gumerov et al., 2021).

Source: own compilation based on the calculation results.

The situation with the *economic accessibility* of food in Russia has become much more complicated as a result of the sanctions imposed, which has created conditions for its assessment and regular monitoring both at the national and regional levels. Measures aimed at increasing the economic availability of food should be aimed primarily at stimulating demand. In this direction, programs can be implemented to support the most vulnerable groups of the population, whose incomes do not allow them to purchase a set of food products necessary to maintain a healthy and active lifestyle. For example, it is possible to provide subsidies for catering to socially vulnerable segments to increase the economic accessibility of food (children, pregnant and lactating women, pensioners, and the disabled). An important issue in this regard is to increase the income level, which allows purchasing the necessary set of products. At the same time, as I.V. Shchetinina noted, priority measures include the development of food balances at all levels of government (federal, regional and municipal) to increase the physical and economic accessibility of food in Russia (Shchetinina, 2023). Such balances of production and use of products can be used in making managerial decisions in the process of concluding contracts for the export of agricultural products, planning humanitarian assistance and participating in international food projects.

In addition, it is necessary to *stimulate investments* in the rural economy. Investments in the development of agricultural producers will allow the production of homogeneous products to meet mass demand, including food products at affordable prices. The expansion of the scale of production facilities, in turn, will contribute to an increase in demand for labor, a decrease in unemployment, and the interest of manufacturers in training or retraining workers and the population living in the area.

In the context of ensuring food security, we should also note the *importance* of the necessary *logistical and information resources* for agricultural production for the economic and physical accessibility. Moreover, such resources should be based *on Russian technologies* that meet international standards, which will make it possible to mitigate the threats associated with the external economic situation and possible foreign policy restrictions. One of the directions that helps to master new technologies and techniques in the shortest possible time may be free consulting from suppliers. This practice is already used in some agricultural machinery manufacturing companies. In particular, Rostselmash Group contracts provide for the conditions for briefing the buyer's employees. The dissemination of such experience will allow agricultural enterprises to decrease the time required for the development of new equipment and reduce the risks of losses from unprofessional operation of expensive equipment. So, in particular, prices for tractors in February 2022 ranged from 1 to 12 million rubles, for combines – from 1.5 to 6 million rubles (Shchetinina, Derevyanko, 2022).

In this regard, ensuring food security should be based on relevant strategic documents that take into account the increasing importance of the role of agriculture, the spatial organization of the country, and provide for the *improvement of regulatory legal regulation* in this area, which will guarantee the availability of food products for the population, sustainable rural development. In particular, as R.R. Gumerov noted, the current legislation, as well as relevant regulatory legal acts, do not provide for the use of urgent regulatory measures in extreme situations (Gumerov, 2022). As the author mentions, in modern conditions of external challenges, a special law is necessary that would combine all available norms and mechanisms for regulating the food market, but at the same

time take into account the conditions of external sanctions pressure. A.V. Kolesnikov adheres to a similar position: “the implementation of food security policy should not be carried out within the framework of fragmentary regulatory acts, but a comprehensive package of direct-acting documents regulating the implementation of state agrarian policy in the EAEU countries” (Kolesnikov, 2024). The EAEU Food Security Doctrine can serve as such strategic documents, for the implementation and realization of which it is advisable to form a strategy and program for the development of the agro-industrial complex.

Therefore, an important task of the authorities and management is to *carry out monitoring, control and forecasting* in the field of food security, and support the spatial development of rural areas. This also requires *increasing the transport accessibility* of remote regions and their rural territories to ensure a guaranteed and uniform food supply to the population with sufficient food.

Based on this, the *implementation of state support for agriculture* is of no small importance. Despite the limits of financial incentives set by the federal budget, their level is often insufficient for expanded reproduction; and the cost of credit resources is higher than the profitability of these organizations.

According to E.R. Kokova, the Russian agro-industrial complex has a very low level of use and readiness to implement promising technological solutions (Kokova, 2019). The introduction of almost all known *advanced innovative technologies*, including smart and precision farming, artificial intelligence, nanotechnology, biotechnology, off-ground plant cultivation (hydroponics) and vertical farming, satellite navigation systems for harvesters and other equipment, autonomous robots, unmanned aerial vehicles, the Internet of Things, and blockchain technologies is impossible without the use of modern digital information

technologies, as well as other high technologies, including electrical engineering, electronics and robotics (Shutkov, Anishchenko, 2019; Podder et al., 2021; Osei et al., 2018; Digital platforms for agricultural consulting and business services ..., 2018). In addition, a strategically important task in the development of this area is to use a cluster approach to the process based on the long-term collaboration of all stakeholders (Sallet, 2011; Sallet, Paisley, 2009). According to foreign studies, the efficiency of agricultural production using digital technologies increases by at least 20–30% (Krylatykh et al., 2020).

We can single out the following as an example of the most relevant and promising technological solutions for implementation in the agricultural sector:

- intelligent monitoring of fields and seedlings using unmanned aerial vehicles using computer and satellite vision algorithms for data analysis and processing;
- smart (intelligent) analytics using machine learning models for the purpose of agricultural research and development, seasonal analysis, modeling of various market scenarios and optimization of business expenses;
- study and analysis of satellite images using machine learning and computer vision algorithms, etc. (Krylatykh et al., 2020).

It is worth agreeing with the opinion of scientists (Bogoviz et al., 2017) that an unconditional condition for sustainable food security is the availability of appropriate scientific support. Scientific support of the agro-industrial complex and its main sub-sectors makes it possible to develop such technologies and, accordingly, such personnel and logistical support, as a result of which the subjects of agro-industrial production are able to function more effectively in its various sections. This will contribute to improving the financial and

economic indicators of agricultural producers, the state of labor productivity, the volume and quality of products, minimizing the impact of negative climatic conditions, etc. At the same time, as N.K. Dolgushkin notes, close attention should be paid to the coordination of actions of authorities at all levels, scientific organizations and business representatives, as well as the formation of a unified innovation process from planning and conducting scientific research, creating developments to their commercialization based on the requests of commodity producers and subsequent replication (Dolgushkin, 2025).

It is *necessary to activate non-economic factors* for increasing the efficiency of production activities. In particular, the *competent motivation of the working-age population* to work in rural areas is relevant. Currently, the situation in this area continues to be extremely disappointing. For example, the population working in rural areas has a low average monthly salary (53.2% of the national level; in 1990 – 95%) (Anishchenko, 2021). In addition, significant rates of depopulation and migration outflow remain for rural areas of the North; the predominance of sparsely populated rural settlements in the total number (Patrakova, 2023). Therefore, an important task is to train personnel, increase the prestige of rural labor, and encourage the recruitment and retention of specialists in rural areas. I.V. Shchetinina and Yu.O. Derevyanko suggest starting with the education system to solve these problems (Shchetinina, Derevyanko, 2022). In particular, it is necessary to form a system of end-to-end agricultural education, starting from an early age to instill the interest of preschoolers and schoolchildren in rural labor; motivate applicants to study in agricultural fields; improve incentives for attracting personnel in agriculture. Given the increasing problems of rural settlements, the Strategy for the Development of the Agro-industrial and Fisheries Complexes of the

Russian Federation for the period up to 2030²⁰ sets an ambitious goal of maintaining the share of the population of rural areas and rural agglomerations in the total population of the country. In addition, the state program “Integrated Rural Development”, approved by Government Decree No. 696 dated May 31, 2019, is aimed at solving these and other problems of these territories, among other things, creating conditions for providing housing for young families and young professionals working in rural areas; stimulating the development of social and engineering infrastructure, creation of modern rural settlements.

It is worth noting that small-scale agricultural production plays an important role in equalizing the living conditions of the rural population, ensuring rural employment and, in general, food security of the country, which is reflected in the Strategy for the Sustainable Development of Rural Areas of the Russian Federation. In particular, this sector provides more than 60% of agricultural production (50.5% of cereals and legumes, 57.9% of sunflowers, 94% of potatoes, 88.7% of vegetables and 65.4% of milk are produced)²¹.

It is worth noting that animal husbandry, namely dairy cattle breeding (cattle breeding, production of dairy products), plays an important role in ensuring food security in the agricultural sector. As noted in the Federal Scientific and Technical Program for the Development of Agriculture for 2017–2030, one of the main factors in increasing milk production is the technical modernization carried

²⁰ Strategy for the development of the agro-industrial and fisheries complexes of the Russian Federation for the period up to 2030, approved by RF Government Resolution 2567-r, dated September 8, 2022 (as amended on February 7, 2025). Available at: <https://www.garant.ru/products/ipo/prime/doc/405172287> (accessed: 01.11.2024).

²¹ Strategy for the Sustainable Development of Rural Areas of the Russian Federation for the period up to 2030, approved by RF Government Resolution 151-r, dated February 2, 2015 (as amended on January 13, 2017). Available at: <https://www.garant.ru/products/ipo/prime/doc/70761426> (accessed: 01.11.2024).

out in dairy farming and the construction of new high-tech dairy farms²². At the same time, the introduction of technologies into this sub-sector is particularly difficult, since it is influenced by various factors, related to the biological characteristics of cattle, the number of care operations, the need to ensure an appropriate level of feeding for production, etc. In this regard, when using modern technologies in agriculture and especially in dairy farming, it is advisable to pay attention to *biotechnological developments* that can increase the productivity of dairy cattle by improving feeding methods and diets; introducing new feed additives, premixes, biostimulants, veterinary drugs; using new diagnostic methods and timely treatment of animals, etc.

To achieve these goals, the national project “Technological Food Security”²³ was launched in 2025, which includes federal programs on veterinary drugs, biotechnologies, breeding and genetics, as well as personnel support for agro-industrial complex. Technologies ensure efficient use of resources, increase productivity and reduce negative environmental impacts, and contribute to the sustainable development of agriculture. They provide efficient use of resources, increase productivity and reduce the negative impact on the environment, and contribute to the sustainable development of the agricultural sector.

Special attention should be paid to increasing the availability of products from those main food groups that are traditional for the regions.

For example, for the Vologda Region, these are milk and dairy products, since dairy farming has been and remains one of the subsectors of the region’s agricultural specialization (its products have historically been produced for domestic consumption, export to other regions of Russia, and export). The region has an appropriate production and resource base for its development, appropriate institutional conditions have been created (for example, the Vologda Region Dairy Cluster operates), there are specialized educational institutions (in particular, the Vologda State Dairy Farming Academy named after N.V. Vereshchagin).

The prospects for the research development are related to the working out of special mechanisms for ensuring food security for regions with a low level of economic accessibility of food and for regions with a low level of physical accessibility.

The novelty of the study lies in establishing the relationship between the economic and physical accessibility of food in the context of ensuring food security at the regional level; at the same time, for the northern territories of Russia, high economic availability of food is a mechanism that, to a certain extent, compensates for the low level of its physical availability due to unfavorable natural and climatic conditions for economic activity.

The theoretical significance of the work is to substantiate a methodological approach to assessing food security at the regional level, based on the calculation of well-established and proven indicators of economic and physical accessibility of food as its key components, as well as allowing for the ranking of regions. The practical significance lies in the possibility of using the results by state authorities at the federal and regional levels in improving policies in the areas of food security, agricultural and agro-industrial complex, and socio-economic development of territories.

²² Federal Scientific and Technical Program for the Development of Agriculture for 2017–2030, approved by RF Government Resolution 996, dated August 25, 2017 (as amended on March 27, 2025). Available at: <https://base.garant.ru/71755402> (accessed: 01.11.2024).

²³ Information resource “National Projects”. Available at: <https://xn--80aapampemcchfmo7a3c9ehj.xn--p1ai/new-projects/tekhnologicheskoe-obespechenie-prodovolstvennoy-bezopasnosti/> (accessed: 01.11.2024).

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Information about the Authors

Svetlana S. Patrakova – Candidate of Sciences (Economics), Researcher, Vologda Research Center, Russian Academy of Sciences (56A, Gorky Street, Vologda, 160014, Russian Federation; e-mail: sspatrakova@bk.ru)

Ekaterina D. Kopytova – Candidate of Sciences (Economics), Senior Researcher, Vologda Research Center, Russian Academy of Sciences (56A, Gorky Street, Vologda, 160014, Russian Federation; e-mail: ekaterina-razgylina@yandex.ru)

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