

## **TYOLOGY OF REGIONS ACCORDING TO THE LEVEL OF FOOD SECURITY: METHODOLOGICAL APPROACHES AND SOLUTIONS**

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### **Abstract**

*The article deals with the problems of significant differentiation of the regions of Russia in terms of food security, which poses a threat to sustainable regional development and can lead to serious socio-political risks in the functioning of the national food system. Methodological approaches to the typology of regional agri-food systems based on a set of various criteria and indicators of food security, including independence, physical and economic accessibility of food, as well as stability of development, are proposed. It is proved that the use of criterion of food independence in the model of food security is appropriate only for development of the national food system. However, for regional agri-food systems, physical and economic accessibility of food for all population groups and stability of functioning of agri-food systems are of paramount importance. The degree of differentiation of individual RF subjects in terms of non-compliance with food safety criteria was evaluated, which made it possible to identify regions vulnerable to food security. The developed methodological and methodical provisions can serve as a basis for making management decisions in the field of food safety at the federal and regional levels.*

**Key words:** food security, agri-food system, physical and economic accessibility, import substitution, region

### **INTRODUCTION**

The fundamental vector of modern civilization development is the achievement of food security, stable food supply of the population. Food security is a priority of the agri-food policy of any state, since it means solving a whole complex of economic, social, demographic and environmental problems. The vast experience of international organizations in the field of sustainable agriculture, food security and nutrition in the world has already been accumulated. Thus, among the main provisions of the Food Security Concept, developed by the Food and Agriculture Organization of the United Nations (FAO), we can highlight the main: food security is interpreted not only as self-sufficiency in food; a country producing enough products for its needs has a comparative competitive advantage; a country must be able to import the necessary amount of food and meet the needs of its citizens for

it; governments must ensure physical and economic accessibility of safe food [17]. Food security is a multi-aspect problem. The Declaration of 2009 World Food Security Summit defines the following: "Food security exists when all people at all times have physical, social and economic access to adequate, safe and nutritious food appropriate to their diet and culinary preferences for an active and healthy lifestyle"[4]. For Russia, the problem of food security became particularly acute in the early 1990s due to the socio-economic transformation of agricultural sector, liberalization of the food market and growth of imports of agricultural products and food. Protectionist measures taken by the Government of the Russian Federation in relation to the domestic agrarian sector partially solved this problem [11]. However, given the deep territorial and social differentiation of food production and consumption, a more in-depth study of the characteristics, level, trends [12], and mechanisms to achieve food security in the

regional context is required [6].

The relevance of the research of regional problems of food security in Russia is caused, besides solving the traditional task of reducing the share of imports in food commodities, also by the following points: first, the functioning of the country's agri-food system under the sanctions regime, which necessitates the early realization of the import substitution potential by stimulating the development of leading regions [21]; second, significant regional differentiation of the subjects of the Russian Federation in the field of food supply and, therefore, heterogeneity and imbalance of the national food market; and third, the need to substantiate the priorities for improving agricultural food policy aimed at ensuring physical and economic access to food of adequate quantity and quality for all social groups in all regions of the country [13]. In this regard, the development of methodological approaches to the typology of regions on the basis of comprehensive assessment of their food security in order to justify measures to achieve it is highly actual.

International organizations constantly monitor the state of food security in all its aspects, improve the assessment methodology, and set new tasks [5]. Thus, the Report "The State of Food Safety and Nutrition in the World - 2017" marks the beginning of a new era in monitoring progress towards the world free from hunger. The designated "Goal 2" in the field of sustainable development (SDG 2) calls on countries to "eliminate hunger, ensure food security, improve nutrition and promote sustainable agricultural development" by 2030 [8]. As part of achieving SDG 2, the tasks have been identified in a number of areas - hunger, food security, nutrition, sustainable agriculture [14]. In the report two indicators of food security are given for the first time. Along with traditional for FAO indicator of hunger scale - the prevalence of malnutrition (PoU) - the report reflects the prevalence of severe food insecurity [10].

The latter was calculated on a scale of perception of lack of food security (FIES) based on data from the adult population of the whole world. FIES is a new tool to measure

people's ability to access food. The source data for FIES is collected by direct survey of the population [19].

The formation of theoretical provisions of import substitution is studied in the works of F. Liszt, who claimed that all countries embarked on the path of industrialization have passed through this stage of development. The conceptual provisions of the import substitution policy were considered in the 60-70s of the XX century by well-known representatives of neo-Keynesianism: H. Chenery, M. Bruno, A. Straug, N. Carter. Many foreign countries have put into practice their policies aimed at achieving food independence [20], primarily Latin American countries. The Argentinian economist R. Prebisch [16] contributed to the development of the theory and implementation of applied research in the field of food security.

The works of following domestic and foreign scientists are devoted to the problems of food security: A. Altukhov, A. Anfinogentova, A. Golubev, E. Krylatykh, E. Serova, N. Shagaidy, V. Uzun, I. Ushachev, P.J. Ericksen, J.S.I.Ingram, D.M.Liverman, [7], Godfray H.C., Crute I.R., Haddad L. [9], Bauer W. [1] and others.

Scientific teams of leading scientific institutions are engaged in monitoring, assessing the state of food security in Russia (ARIAPI named after Nikonov, ARSRIACE, Institute of Agrarian problems RAS, etc.).

Features of the development of food problems are highlighted in the works of Reilly M., Willenbockel D. (2010), Belaya V. [2], Hanf, J.H. (2016), Pall Z., Perekhozhuk O., Glauben T., Prehn S., Teuber R. [15].

## MATERIALS AND METHODS

Food security is considered by the authors as a complex multi-level category, which requires solving priorities at every level - the world, the country, the region. The theoretical basis of the research is the basic theories of foreign trade, including the theory of protectionism and the theory of free trade, the theory and concepts of economic growth [3] and regional policy.

At present, threats to Russia's food security are being formed both within the country and abroad. Therefore, the most important methodological approach to the research is taking into account the complex of internal and external determinants of the development of regional agri-food systems. The typology of regional agri-food systems is carried out with consideration of a number of interrelated aspects, which are characterized by a system of relevant basic quantitative and qualitative indicators (Table 1):

- food independence of the national agri-food system;
- physical availability of safe and nutritious food in sufficient quantities;
- economic accessibility of food for all social groups of population;
- stability of the functioning of the national agri-food system in a mode that is not inferior to the rate of change in the population of the country.

Table 1. Criteria and indicators of food security of the agri-food system

Aspect	Description	Indicators
Food independence	It characterizes the sufficiency of its own resources to provide the population with food in volumes that guarantee physical and economic availability of quality food products necessary for an active and healthy lifestyle.	- production of basic food per capita; - share of own production in food resources; - level of self-sufficiency of the population with basic food.
Physical access to food	It reflects the ability of the population to purchase food in volume and assortment in accordance with established rational norms of food consumption.	- per capita consumption of basic foodstuffs; - balance of the food basket (calorie content, ratio of proteins, fats and carbohydrates, compliance with recommended consumption rates).
Economic access to food	It characterizes the possibility of acquiring food products at prevailing prices in sufficient volume and assortment, provided with an appropriate level of income of the population.	- share of food expenditures in the structure of consumer spending; - proportion of the population with incomes below the subsistence minimum; - differentiation of food consumption by the population with different income levels.
Stability of functioning	It reflects the sustainability of the growth rate of the main types of food in relation to the rate of change in the population of the country.	- population growth rates; - growth rates of production of basic foodstuffs; - growth rates of consumption of basic foodstuffs.

Source: Own determination.

When typologizing the regional agri-food systems, the indicators of their development are substantiated, which allowed grouping the subjects of the Russian Federation according to the key criteria of food security and identifying the most vulnerable regions. The following analytical tools were used: the method of generalizing of statistical indicators, the method of statistical groupings, cluster analysis, correlation and regression analysis, and other methods of multivariate statistical analysis. A comparative analysis of the subjects of the Russian Federation in terms of their potential for import substitution in food markets has been carried out.

The author's method provides for an assessment of the basic conditions for the functioning of regional agri-food systems, taking into account the special features of natural climatic factors, resource endowment, development of the material and technical base, traditionally established specialization of agricultural production, established trends in the growth of

food production, volume of domestic demand with a glance to dynamics of real incomes of the population and the ability to use interchangeable products.

The typology of regional agri-food systems according to the level of food security contributes to the substantiation of the directions of agri-food policy. From the methodological point of view, the balance of interests in the development of regional and national agro-food systems implies the realization of selective state support, which involves a change in the priorities of agri-food policy from the implementation of the potential of import substitution to the formation of export potential.

## RESULTS AND DISCUSSIONS

The most important role in ensuring food security belongs to the Russian regions. It is in the regions that the zones of marketable agricultural products are formed; the reserves and stocks are created that are necessary to

achieve the strategic goal of food security. It is in many Russian regions that agriculture is one of the leading branches of the territorial economy, ensuring the sustainability of regional development. Sustainable development of the regions is impossible without reliable, uninterrupted provision of the population with food, without physical and economic access to food. It is the regions that participate in interregional exchange, form the national food market, and also act as exporters of agricultural raw materials and foodstuffs, ensuring integration into the world food economy. The summarized indicators characterizing the change

in the food security of the Russian Federation are shown in Table 2.

The analysis of the achieved level of food self-sufficiency in comparison with the target parameters provided by the Doctrine on food security in Russia as a whole has showed that this indicator in Russia is close to 100% for the most important food products. However, the share of domestic production in the total resources of meat and meat products, milk and dairy products, fish and fish products, vegetables and fruits does not meet the targets of the Doctrine.

Table 2. Indicators of food security of the Russian Federation

Indicator	2000	2005	2010	2013	2014	2015	2016	2017
Population index,%	99.6	99.5	100.02	100.2	100.2	100.2	100.2	100.2
Indices of agricultural production,%	106.2	101.6	88.7	105.8	103.5	102.6	104.8	102.4
Agricultural production per capita, thousand rubles / person	5.29	9.67	18.11	25.66	29.53	35.24	37.50	34.80
Production of meat and meat products per capita, kg	30.29	34.95	50.16	59.47	62.01	65.27	67.43	70.28
Production of milk and dairy products per capita, kg	220.61	217.65	222.92	212.50	210.51	210.15	209.52	205.37
Potato production per capita, kg	232.39	196.84	147.69	210.21	215.36	229.28	211.85	148.21
Production of vegetables per capita, kg	85.44	79.16	84.70	102.32	105.97	109.86	111.03	105.05
Consumption of meat and meat products per capita, kg	45	55	69	75	74	73	74	75
Consumption of milk and dairy products per capita, kg	215	234	247	248	244	239	236	231
Potato consumption per capita, kg	118	109	104	111	111	112	113	96
Consumption of vegetables per capita, kg	86	87	101	109	111	111	112	107
Expenditures on food in the structure of consumer spending, %	48.3	36.1	32.9	31.2	31.9	35.4	35.5	34.3
Proportion of the population with incomes below the subsistence minimum,%	29	17.8	12.5	10.8	11.2	13.3	13.4	13.2
Energy value of food per capita per day, kcal	2394	2630	2662	2626	2603	2575	2675	2980
including animal products, kcal	634	729.6	827.9	866.6	860	855	887.3	882.5
Level of self-sufficiency in meat and meat products,%	67.32	63.55	72.70	79.30	83.80	89.41	91.12	93.71
Level of self-sufficiency in milk and dairy products,%	102.61	93.01	90.25	85.68	86.28	87.93	88.78	88.90
Level of potato self-sufficiency,%	196.94	180.59	142.01	189.38	194.02	204.72	187.48	154.38
Level of self-sufficiency in vegetables,%	99.35	90.99	83.86	93.87	95.47	98.98	99.14	98.18

Source: Rosstat data.

The complexity of the problem of ensuring food security in a regional context is aggravated by the enormous size and

extremely uneven territorial development of Russia. Regions of the Russian Federation differ significantly in size and population

density, structure and level of economic development, investment and innovation potential, etc. Despite a slight decrease in differentiation of the levels of regional socio-economic development as compared with 1990s, the gap in the GRP per capita in the RF subjects is almost 20 times, which certainly affects the stability and balance of the national economy.

Such differentiation is a natural process associated with peculiarities of the natural and climatic conditions of the RF subjects, but this does not remove the requirement of ensuring the physical and economic accessibility of food in a regional context. Therefore, regional aspects of ensuring food security of Russia are ones of the essential characteristics of this category.

Table 3. Results of typology of RF subjects in terms of food security

Aspect	The level of regional development		
	High	Medium	Low
Food independence	Republic of Mordovia; Regions of Belgorod, Bryansk, Astrakhan, Kursk, Tambov	Republics of Kabardino-Balkaria, Karachai-Cherkess, Chuvash, Udmurtia; Altai Republic, Mari El Republic; Dagestan, Tatarstan, Kalmykia, Bashkortostan, Adygea; Territories of Altai, Krasnodar, Stavropol; Regions of Lipetsk, Voronezh, Penza, Pskov, Novgorod, Volgograd, Orenburg, Orel, Ryazan, Tula, Leningrad, Kurgan, Rostov, Saratov, Ulyanovsk, Omsk, Kaluga, Kirov, Nizhny Novgorod, Chelyabinsk, Tver, Vologda, Smolensk	Republics of Khakassia, Crimea, Buryatia, Tuva, North Ossetia-Alania, Sakha (Yakutiya), Ingushetia, Komi, Karelia; Jewish Autonomous region; Chechen Republic, Chukchi Autonomous district; Territories of Krasnoyarsk, Transbaikalia, Perm, Primorye, Kamchatka, Khabarovsk; Regions of Amur, Tomsk, Vladimir, Irkutsk, Tyumen, Yaroslavl, Kostroma, Kaliningrad, Novosibirsk, Sverdlovsk, Kemerovo, Samara, Ivanovo, Sakhalin, Moscow, Magadan, Arkhangelsk, Murmansk
Physical access to food	Republics of Mari El, Bashkortostan, Udmurtia, Chechen Republic; Territories of Krasnodar, Altai, Krasnoyarsk; Regions of Voronezh, Rostov-on-Don, Moscow, Astrakhan, Volgograd, Lipetsk, Kaliningrad, Tver, Novosibirsk, Omsk, Sverdlovsk, Kaluga, Novgorod, Vologda, Orel, Penza, Amur, Leningrad, Yaroslavl, Samara, Kursk, Pskov	Republics of Altai, Khakassia, Mordovia, North Ossetia-Alania, Ingushetia, Karelia, Crimea, Adygea, Komi, Chuvash; Territories of Primorye, Khabarovsk, Transbaikalia, Stavropol, Kamchatka, Perm; Regions of Kurgan, Orenburg, Bryansk, Smolensk, Tula, Kirov, Magadan, Murmansk, Vladimir, Nizhny Novgorod, Ulyanovsk, Tambov, Sakhalin, Saratov, Kemerovo, Chelyabinsk, Ryazan, Tomsk, Tyumen, Kostroma, Arkhangelsk, Ivanovo, Irkutsk	Karachai-Cherkess Republic, Republics of Kalmykia, Buryatia, Sakha (Yakutiya), Tuva; Chukchi Autonomous district, Jewish Autonomous Region
Economic access to food	Republics of Tatarstan, Khakassia, Bashkortostan, North Ossetia-Alania, Karelia, Udmurtia; Territories of Khabarovsk, Primorye, Krasnodar, Perm, Stavropol, Krasnoyarsk, Kamchatka; Chukchi Autonomous district; Regions of Belgorod, Moscow, Tambov, Nizhny Novgorod, Sakhalin, Murmansk, Sverdlovsk, Volgograd, Chelyabinsk, Voronezh, Yaroslavl, Tomsk, Tula, Novgorod, Orel, Kursk, Leningrad, Tyumen, Lipetsk, Amur, Ivanovo, Novosibirsk, Arkhangelsk, Kirov, Orenburg, Samara, Kaluga, Rostov, Kostroma	Republics of Mordovia, Mari El, Altai, Buryatia, Adygea, Komi, Sakha (Yakutiya), Chechen, Chuvash, Kabardino-Balkaria, Karachai-Cherkess; Territory of Transbaikalia; Jewish Autonomous district; Regions of Ulyanovsk, Kaliningrad, Astrakhan, Magadan, Pskov, Ryazan, Penza, Smolensk, Saratov, Bryansk, Kemerovo, Irkutsk, Omsk, Kurgan, Vologda, Vladimir, Tver	Republics of Kalmykia, Crimea, Dagestan, Tuva, Ingushetia
Stability of functioning	Republics of Tatarstan, Bashkortostan, Mordo-viya; Primorye territory, Jewish Autonomous district; Regions of Amur, Tambov, Tomsk, Pskov, Magadan, Kaluga, Tula, Orenburg, Astrakhan, Sakhalin, Novosibirsk, Kursk, Kurgan, Rostov, Ulyanovsk, Ryazan	Republics of Dagestan, Tuva, Sakha (Yakutiya), Kalmykia, Khakassia, Crimea, Adygea, Mari El, Kabardino-Balkaria, Chuvash, Udmurtia, Karachai-Cherkess, Chechen Republic; Territories of Altai, Kamchatka, Khabarovsk, Perm, Krasnodar, Stavropol; Regions of Bryansk, Lipetsk, Omsk, Saratov, Tyumen, Murmansk, Volgograd, Voronezh, Smolensk, Sverdlovsk, Samara, Chelyabinsk, Kemerovo, Orel, Tver, Irkutsk, Nizhny Novgorod, Belgorod, Ivanovo, Leningrad, Kaliningrad, Yaroslavl, Kirov, Penza; Chukchi Autonomous District	Republics of Altai, Komi, Buryatia, Karelia, North Ossetia-Alania, Ingushetia; Krasnoyarsk Territory; Regions of Moscow, Kostroma, Novgorod, Vladimir, Vologda, Arkhangelsk

Source: Own determination.

We have carried out a cluster analysis of regional agri-food systems in terms of food

security, including all of its above-mentioned aspects (Table 3).

The key indicator of food independence is the level of self-sufficiency of the population with strategically important types of foodstuffs, established as target parameters by the Doctrine of Food Security of the Russian Federation (meat, milk, vegetables, etc.). The indicator characterizing the level of self-sufficiency in

the region with basic foodstuffs is the ratio of domestic production and consumption of basic foodstuffs.

The analysis revealed a significant gap in the levels of self-sufficiency with basic foodstuffs. Figure 1 shows the subjects with minimum and maximum values of indicators.

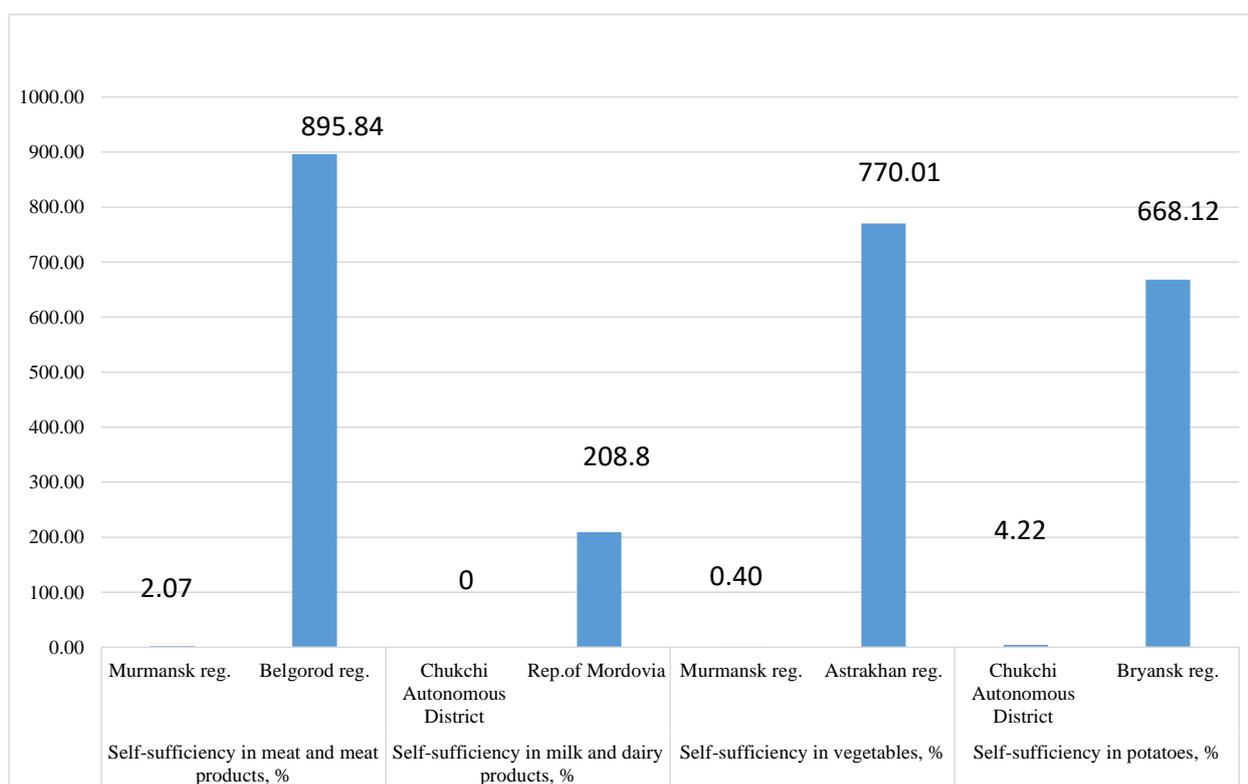


Fig.1. Minimum and maximum indicators of the level of food self-sufficiency in the regions of the Russian Federation (according to 2017 data)

Source: Own determination.

The best indicators of food self-sufficiency are demonstrated by six subjects of RF: Republic of Mordovia, regions of Belgorod, Bryansk, Astrakhan, Kursk, and Tambov. For example, the level of self-sufficiency in meat in Belgorod region is 895%, milk - 148%, vegetables - 150%, potatoes - 244%. The Republic of Mordovia is leading in self-sufficiency in milk and dairy products (208%). Astrakhan region leads in the level of self-sufficiency in vegetables - 770%, potatoes - 277%. These regions are actively involved in the interregional exchange of products of specialization, and the strategy for the development of their regional agri-food systems consists in increasing export potential

and integrating into global food chains with world-competitive products.

Low potential of self-sufficiency is typical for 36 subjects of RF, and there is a very "motley" picture - it is possible to distinguish regions with unfavorable conditions for agricultural production (Republics of Khakassia, Buryatia, Tuva, Tyumen region, Chukchi Autonomous district, etc.). According to their natural and climatic conditions and availability of land suitable for agricultural production, these subjects of RF cannot ensure the balance of the regional food market at the expense of their own resources. Another subgroup consists of industrially developed regions (Sverdlovsk, Kemerovo, Samara, Novosibirsk, etc.). A special subgroup is made

up of densely populated regions with a fairly high level of development of the food industry (Moscow region).

The remaining subjects of the Russian Federation are characterized by an average potential of self-sufficiency (regions of the North Caucasus, the Volga region, the Urals). Many of them participate in interregional exchange, for example, Tatarstan, Bashkortostan, Saratov, Volgograd, and Rostov Regions. The development strategy of regional agri-systems of this type should be aimed at further building up the capacity of import substitution, based on the growth of agricultural production, diversification of the processing industry, and they also have the opportunity to strengthen export potential. Here, of course, government support is of great importance, stimulating the development of these regional agri-food systems. Some regions included in the group with an average level of potential do not have the opportunity to fully meet the needs for food resources, as they are characterized by a high concentration of urban population (Nizhny Novgorod, Leningrad regions).

For large megacities, including Moscow and Leningrad regions, the development strategy should be based on formation of so-called "food belt", including the creation of guaranteed raw zones and organized wholesale supplies, as well as reserve fund of food, and operation of agricultural holdings with a closed production cycle etc.

The analysis showed that for many subjects of RF self-sufficiency in food is really important. Therefore, many regions consider independence as the main criterion for food security. This is reflected in regional legislation. A number of regions of the Russian Federation, along with regional programs for the development of agriculture and food market, have adopted special laws on food security. For example, such laws were adopted in the republics of Tatarstan, Bashkortostan, and the regions of Nizhny Novgorod, Samara, Saratov, and Ulyanovsk.

If the task of achieving food independence is to a certain extent solved both at the national and regional levels, then the problem of physical and economic access to food is far from being solved. The import substitution policy recently proclaimed and imposition of a food embargo did not lead to an increase in the physical and economic access to food, as evidenced by the increased differentiation in the level of consumption of basic foodstuffs.

To assess the level of physical access to food, per capita consumption of the most important types of food products, the degree of achievement of rational consumption standards and balance of the food basket (calorie ratio, the ratio of proteins, fats and carbohydrates, compliance with recommended consumption standards) were analyzed. As a result, it was revealed that most regions of the Russian Federation fell into groups with relatively high and medium levels of physical accessibility. The low level of physical availability of food is determined in Karachai-Cherkess Republic, Republics of Buryatia, Sakha (Yakutia), Tuva, Chukchi Autonomous district, Jewish Autonomous Region. However, if we consider the consumption of certain kinds of food (meat, milk, vegetables, fruits), then there remains a significant differentiation in the context of the subjects of the Russian Federation. There should be noted a significant gap in the regions of Russia in the consumption of various foods: for meat and meat products - 2.61 times, for milk and dairy products - 3.38 times, for potatoes - 4.2 times, for vegetables - 7.69 times (Fig.2).

Thus, the problem of differentiation in the level of consumption of the main products has not yet been resolved. Even taking into account national and regional features of existing consumption patterns in RF subjects, the existing gap in consumption illustrates the instability of food supply in the regions and violation of the postulates of the country's food security concept.

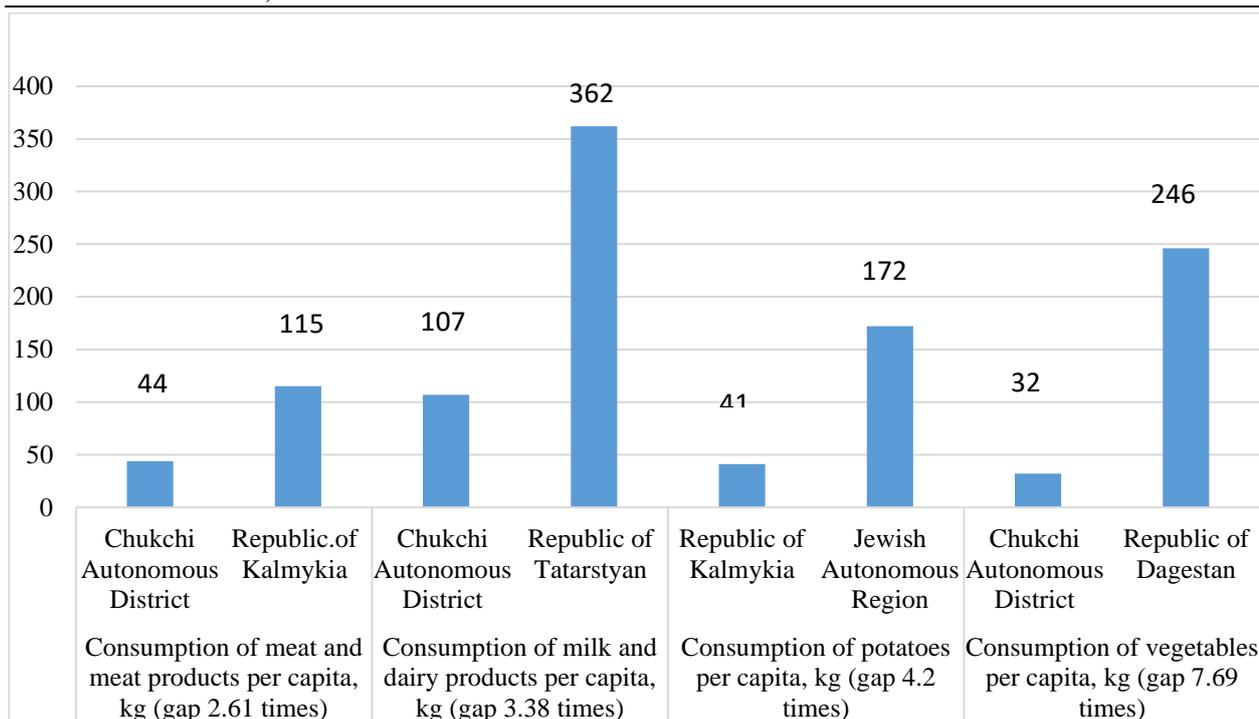


Fig. 2. Minimum and maximum values of consumption of the main types of food in the regions of the Russian Federation (according to 2017 data)  
 Source: Own determination.

To solve the problem of physical access to food, it is necessary to stimulate and support the development of regional food production, taking into account specialization and comparative competitive advantages in the territorial division of labor, development of logistics, infrastructure, and interregional exchange. An important role is played by government support of campaigns on formation of a healthy eating model. There should be noted the importance of realization of the priority project “Forming a Healthy Lifestyle”, which provides for the development and implementation of grant programs from the federal budget and extra budgetary sources to non-profit and other public organizations implementing projects in the field of promoting healthy lifestyles, proper nutrition and saving health. As well as actions with participation of food producers to inform citizens about healthy nutrition through the voluntary placement of additional marks of distinction and information on food product packaging, conducting large-scale information and communication campaigns on the formation of health-saving behavior, etc. The most important aspect of food security is ensuring the quality of nutrition, which

implies a structural balance of the “food basket”, and food safety for human health. However, this problem is far from being resolved, since the average ration of the country's population differs significantly from the rational consumption rates recommended by doctors. The energy value of food per capita per day on average in Russia is 2,980 kcal. The minimum value of this indicator was noted in the Khabarovsk Territory (2,146 kcal), and the maximum - in the Republic of Ingushetia (3,556 kcal). The proportion of animal products in the diet is of key importance in assessing the physical access to food. On average in Russia this figure was 883 kcal (29.6% of the energy value of the daily diet). Meanwhile the minimum share of products of animal origin was recorded in the Kamchatka Territory (19.9%), and the maximum - in the Republic of Ingushetia (40.1%).

The most important component of food security is the economic access to food products, which depends on the level of income of the population and prices. Consumer demand was the engine of economic growth for quite a long time, but as the macroeconomic situation deteriorated in 2014–2017 it began to

act as a limiting factor. As the analysis has shown, in the last two years consumer prices for foodstuffs continue to grow in all regions. Expenditures on food in the structure of consumer spending up to 2014 were steadily declining. However, starting from 2015, there

is a growth trend from 31.2% in 2013 to 34.3% in 2017. This indicator differs more than twice by the regions of the Russian Federation: from 29.3% in the Khabarovsk Territory to 61.8% in the Republic of Ingushetia (Fig. 3).

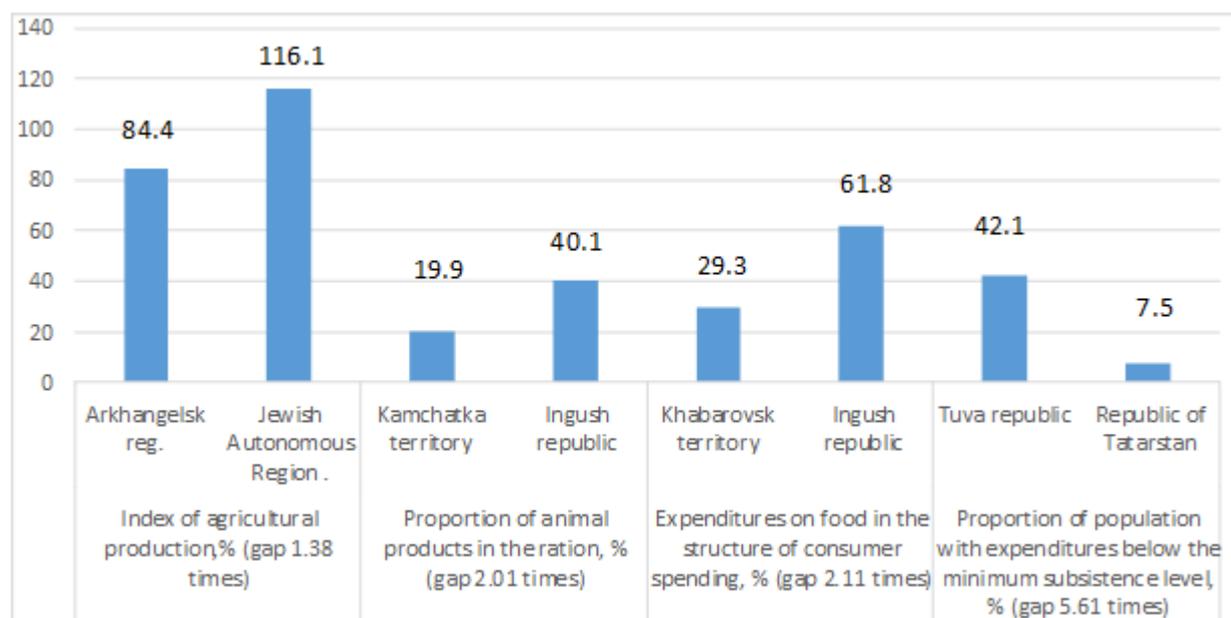


Fig.3. Maximum and minimum values of indicators characterizing physical and economic access to food in the regions of Russia (according to 2017 data)  
 Source: Own determination.

In the regions with higher income of the population, a more balanced food basket is also noted. For example, in the Republic of Bashkortostan, Nizhny Novgorod Region, there is a higher supply of food due to products of animal origin, a more rational energy value of food. In relatively poor regions, for example, in the Republic of Mari El, bread products predominate in the structure of the energy value of daily ration, while the share of valuable food products, i.e. milk and meat, is lower. Meanwhile there should be noted a significant differentiation of the quality of food: the caloric content of food in the Republic of Bashkortostan is 1.3 times higher than that in the Udmurt Republic. Thus, we can conclude: food security is not only the independence of the region from external supplies, but also the physical and economic access to food of the appropriate quantity and quality, which in turn depends on household income, logistics development,

infrastructure, and mutually beneficial regional food exchange. One of the tools to solve the problem of the economic affordability of food is the use of direct food aid to low-income groups of the population. Back in 2014, the Government of the Russian Federation adopted the Concept for the Development of Domestic Food Aid [18]. However, in spite of the fact that in a number of regions, domestic food aid is provided through the social nutrition sector, nevertheless, this mechanism has not yet worked throughout the country. In addition, the already realized food aid in the subjects of RF does not solve the problem of economic access to food, its volume is too small, there is no consistency in the actions of the main managers of financial resources - the ministries of the social block: education, health care and social protection.

## CONCLUSIONS

The research showed that the problem of food security is complex. It must be considered at different levels of the agri-food system, which are characterized by different priorities and urgency of tasks. To achieve food security in the world, the physical and economic accessibility of food is of paramount importance due to the huge number of hungry people in the poorest countries. At the national level, taking into account various institutional conditions and political risks, the importance of achieving food independence as an important condition for ensuring sovereignty and economic security of the state should be recognized. Regional aspects of achieving food security should be considered in the context of not only food self-sufficiency, given the different specializations, natural and climatic conditions for the functioning of regional agri-food systems. The priority task is to solve the problems of economic, physical availability of food in accordance with recommended consumption norms for all social groups of the population.

The trends of regions' polarization in terms of the level of food supply have already been considered by many researchers; however, this study has revealed a number of new patterns. Thus, implementation of the import substitution policy did little to improve the physical and economic accessibility of food. The increase in the share of own food resources in value terms was largely determined not by the growth of agricultural production, an increase in sustainability and efficiency of its development, but by depreciation of the ruble. This contributed to the slowdown of processes of interregional exchange, and deformation of processes of regional specialization of the agri-food system.

A large number of the subjects under consideration provided a reliable analysis of the results obtained. This makes it possible to estimate the correctness of implemented methodical approach to identification of homogeneous types of regional agri-food

systems and justification of strategic directions of agri-food policy.

The analysis has revealed that, to a greater extent, only seven subjects of the Russian Federation meet the criteria for food security: Belgorod, Bryansk, Kaluga, Kursk, Rostov, Orenburg and Kurgan regions. The outsider regions were the republics of Kalmykia, Ingushetia, Buryatia and Tuva. Many of the remaining regions are characterized by uneven formation of all aspects of food security, which is manifested, on the one hand, in strengthening the productive capacity and activating socio-economic processes in a relatively small number of subjects, and on the other, in strengthening the destructive processes in regional agri-food systems against the background of stabilization of depressive phenomena in the regional economy.

This research on the status of food security in Russia in the context of import substitution has showed that currently one of the tasks is being solved mainly — autonomy and food independence, and the orientation towards implementation of the autarkic model of food security is predominant. It is not yet possible to state the transition of the Russian agricultural sector to an innovative model of development ensuring its sustainable development.

Summing up the research on regional differentiation of the levels of food security, it should be noted that the typology of regions determines a scientifically based approach to the formation of directions of the state agri-food policy:

development of “growth poles” on the basis of leading regions promoting the development of agriculture, diversification of the food industry;

development of logistics, infrastructure of food market, establishment of interregional exchange in order to increase the level of physical access to food for population of recipient regions;

increasing real income of population, taking measures of social support for low-income strata of the population, protecting the interests of consumers on the basis of standardization and state control measures.

Implementation of these measures of agri-food policy will contribute to development of agrarian sector, based on the rational use of existing resource potential. This will allow solving the problem of sustainable provision of the population with economically available domestic food products, will improve the standard of living of population of the country, and strengthen the economic and geopolitical position of Russia in the world.

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