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# Regional food security: a concept and an assessment

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**Abstract.** The article analyzes the approaches to the definition, criteria, and threshold values of regional food security. Based on the analysis of indicators of food security of the Altai region, the main directions of the regional food policy are justified. The research shows that regional food security determines the level of security and sustainability of both the region as a whole and individual households. The main criteria for assessing food security are food independence, physical and economic accessibility of food in the region

## 1. Introduction

In the conditions of the modern dynamically developing world, the problem of providing food products is quite acute. According to the Western experts, food production should increase substantially by the middle of the century in order to feed a more populous and rich world [1]. A similar problem occurred in previous years, when food supply has more than tripled since the 1960s. However, given the expected adverse effects of climate change and the degradation of natural resources, concerns about the possibility of maintaining this trend exist [2].

The development of food safety strategies is the subject of scientific research and research by many scientists and government organizations. The Food and Agriculture Organization of the United Nations (FAO) considers food security as a guarantee of the constant access of the population of the planet, country, region to food in the amounts necessary to maintain an active and healthy lifestyle [3].

## 2. Materials and Methods

Thus, in international practice, three levels of food security are recognized: global, national, and regional. An assessment of global food security is alarming. For the third year in a row, world hunger has been rising. The absolute number of undernourished people, those facing chronic food shortages, increased to almost 821 million in 2017 from about 804 million in 2016. According to FAO [3], the food security situation has deteriorated from 45% of the population to 50% in 2018 compared with 2017: about 2.1 million people lack food; more than 320 thousand people have acute food shortages.

The problem of ensuring national food security is very relevant in the Russian Federation. Of the estimated 113 countries in the world, Russia ranks only 42nd in the global food security index. The strategy for ensuring national food security is developed by the Doctrine of Food Security of the Russian Federation [4] and consists in ensuring the population of the country with safe agricultural, fishery products, and food to the extent necessary for an active and healthy life.



### 3. Results

This study is devoted to the development of approaches to the assessment of regional food security on the example of the Altai region. The effectiveness of managing and addressing food safety issues can be studied using a comprehensive index of regional food security. This indicator is based on the ratio between the levels of the gross regional product, the volume of agricultural production, the consumer price index for food, and the price index of agricultural producers.

**Table 1.** Assessment of the level of food security of the Altai region.

Indicators	2013	2014	2015	2016
Consumer Price Index For Food Products	107.4	115.4	112.4	104.3
Volume Index of Gross Regional Product	104.9	100.4	100.5	99.0
Agricultural Production Index	122.7	88.7	107.1	112.5
Producer Price Index of Agricultural Products	102.7	114.1	108.5	101.8
Food Security Level	0.852	0.866	0.777	0.812

The data in Table 1 indicate a decrease in the level of food security in the Altai region to 0.812 in 2016. This is mainly due to the outpacing rate of prices compared to the change in the physical volume of the gross regional product.

At the next stage, we evaluate the indicators of the socio-economic development of the region that could affect the level of food security in the Altai region.

**Table 2.** Population dynamics of the Altai Region in 2010-2016, thousand people.

Year	Total population, thousand people	Population of rural areas, thousand people	Growth rate, %	
			Total number	Rural population
2010	2,430.8	1,110.7	100	100
2011	2,417.4	1,093.4	99.4	98.44
2012	2,407.2	1,079.6	99.6	98.74
2013	2,398.7	1,067.7	99.6	98.89
2014	2,390.6	1,057.5	99.7	99.04
2015	2,384.8	1,049.2	99.8	99.21
2016	2,371.2	1,041.5	99.4	99.27

Over the entire period under review, a clear downward trend in the population has been observed. So, 2 371.2 thousand people inhabited the Altai region, in 2016, which was 59.6 thousand people (2.5%) less than in 2010. Together with the total population, we must consider the dynamics of the rural population of the Altai region (Table 2), since this indicator has a strictly negative direction. That is, the number of rural residents is falling on a federal scale. As a result, agricultural enterprises are declining.

This situation indicates a decrease in prospects for citizens in the rural areas. Since there is the decrease in the number of the rural population in the period under review by 6.23%, the decrease in the availability of social infrastructure occurs at a higher rate. The number of hospitals has decreased by 97.1 % since 2000, while the number schools has lowered by 42.6%.

Simultaneously with the reduction in the total number of people inhabiting the Altai region, the economically active population also decreases. 1,059.6 thousand people were employed in the economy in 2016, which was 86.1 thousand people (7.5%) less than 2010 [5].

For a complete picture of the standard of living in the Altai region, we need to pay attention to the indicators given in Table 3.

**Table 3.** Indicators characterizing the living standard of the population of the Altai region in 2010-2016.

Years	Per capita cash income of the population		Real money incomes of the population, in % to the previous year	The subsistence minimum (average per capita)		Population with money incomes below the subsistence minimum, in % of the total
	Rub. per month	Growth rate, %		Rub. per month	Growth rate, %	
2012	13,617.2	108.94	103.6	5,147	107.9	20.6
2013	15,979.1	117.34	109.0	5,672	110.2	17.6
2014	18,434	115.36	106.4	5,877	103.61	17.0
2015	20,985	113.84	98.9	6,647	113.1	17.9
2016	21,485	102.38	95.2	8,363	125.81	17.6

The data in Table 3 confirm the main trend prevailing in the economy of the Altai Territory. The growth rate of average per capita incomes of the population does not change much, and so does the minimum subsistence level. We should note the positive dynamics of indicators associated with a decrease in the proportion of the population with incomes below the subsistence minimum. However, it is also worth paying attention to the fact that along with a gradual increase in per capita incomes, the indicator of real incomes of the population has a negative tendency.

Therefore, taking into account the aforementioned trends in 2017 than in 2014, in the agricultural products market, residents of the Altai region will be able to afford much less products or lower quality products.

**Table 4.** Analysis of the availability of food for the population of the Altai region.

Product Categories	Food consumption per capita per year, kg						
	WHO standards	RF norms	2012	2013	2014	2015	2016
Meat and meat products	78	73	73	74	73	69	70
Milk and dairy products	405	325	335	335	335	330	326
Potatoes	117	90	145	145	145	142	145
Vegetables and melons food	139	140	103	102	102	101	103
Sugar	47	24	38	39	39	37	37
Vegetable oil	9.1	12	13.5	13.8	14.3	15.0	14.5
Eggs	291	260	335	335	336	338	340
Bread products	117	96	167	166	165	160	158

The data in Table 4 confirm the previously made conclusions. For the population of the Altai region, protein and the most expensive products (meat products), vegetables are less affordable. The consumption of the listed food products is below the rational consumption norms established by the order of the Ministry of Health of the Russian Federation dated August 19, 2016 No. 614 and the consumption standards recommended by the World Health Organization (WHO). Thus, in terms of the consumption of meat and meat products, the region occupies only 45<sup>th</sup> place among the subjects of the Russian Federation.

The level of food independence in the region is an important characteristic. The Altai region belongs to the agro-oriented regions. The studied region ranked 8<sup>th</sup> in terms of the volume of agricultural production among all the subjects of the Russian Federation in 2016. 57% of the total agricultural products accounted for crop production. The rest is produced by livestock organizations.

The agro-industrial complex of the Altai region in all the main categories of food products with a significant supply meets the needs of the population. The Altai region is a surplus region in terms of food security. The region produces a significant share of industrial products in Russia and the Siberian Federal District. Altai enterprises occupy the 1<sup>st</sup> place in the country for the production of flour, cheese and cheese products, dry whey, butter, breakfast cereal, dietary supplements to food, according to the

results of 2016. In the production of cereals, the Altai region is in 2<sup>nd</sup> place in Russia (in the production of buckwheat and oatmeal holds the 1<sup>st</sup> place), is in 3<sup>rd</sup> place pasta. It is the only region of Siberia and the Far East that produces sugar from sugar beet.

The index of industrial production in agriculture was 112.5% in total and 105.3% for food products in particular by the end of 2016 to the level of 2015. The regional growth rate of production of agricultural and food products exceeded the Russian level by more than 2 times.

#### 4. Discussion

The issue of regional food security is not so straightforward, and it is even considered controversial by some authors. Although at present, many economists do agree that the emphasis on regional food security is necessary [6]. And this is due to fundamental differences in the territorial situation, the climatic situation, and the economic potential of the regions of the Russian Federation. From our point of view, the allocation of food security at the regional level is fully justified and advisable to ensure food independence, accessibility and food safety in certain administrative-territorial associations. We believe that it is at the regional level that the conditions and prerequisites for ensuring national food security are laid.

In the economic literature, there are different approaches to the definition of food security in the region [7, 8]. We understand regional food security as a level of organization and economic development of a separate regional space that ensures the physical and economic accessibility of food products necessary for an active and healthy lifestyle of the population of the region.

The concept of regional security is complex from different perspectives. From the point of view of the organizational approach, the assessment of food security should take into account the need to consolidate the efforts of various sectoral, organizational, and legal entities in order to meet the food needs of the population of the region.

On the other hand, it is necessary to understand that the main guarantee of an acceptable level of regional food security lies in the effective development of the key industry, which is agriculture. Covering food needs with own production of the agricultural and food industry ensures food independence of the region, including from external factors.

Socio-economic development of the region, the increase in incomes of the population, providing the possibility of acquiring food necessary for life, have a decisive influence on the indicator of the economic availability of food products.

Thus, we can relate to the components of regional food security: food self-sufficiency; food availability for the population; effective management of agricultural and processing industries; compliance with environmental and quality standards of food produced.

#### 5. Conclusion

Regional food security determines the level of security and sustainability of both the region as a whole and individual households. The main criteria for assessing food security are food independence, physical and economic accessibility of food in the region. Despite the fact that these indicators and their criteria are developed at the national level, they require rethinking from the point of view of a particular region.

The main directions of the food policy of the Altai region is the balance of production and processing of agro-industrial complex, the introduction of innovative agricultural technologies and the modernization of agricultural equipment, improving the standard of living of the population of the region.

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