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CONSUMPTION STANDARDS IN ENSURING FOOD SECURITY IN KAZAKHSTAN: ANALYSIS AND ASSESSMENT

Abstract: This study presents a macroeconomic assessment of food security in Kazakhstan for the period 2020–2024 and offers practical recommendations based on international experience and an original approach. The main hypothesis suggests that limited economic access to food and an unbalanced dietary structure - driven by inflation and income inequality - are the key barriers to food security. The research employs both quantitative and qualitative methods, including the Dietary Diversity Score (DDS), regression analysis of income-based food consumption, comparison of energy intake with WHO standards, and international benchmarking. Findings confirm the hypothesis: there is a clear gap between actual consumption and nutritional standards, evidence of hidden hunger, high food vulnerability among rural households, and a strong link between income and diet quality. Based on the results and global best practices, the study proposes innovative policy measures such as smart subsidies, digital food vouchers, support for agro-parks, development of logistics infrastructure, and public awareness campaigns. These findings may contribute to the formulation of Kazakhstan's National Food Security Strategy through 2030 and the localization of the UN Sustainable Development Goals.

Keywords: food security; consumption standards; dietary diversity score; economic access; Kazakhstan.

INTRODUCTION

Food security in the Republic of Kazakhstan is a vital component of the country's economic and national security. According to international definitions, food security is a condition in which all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and preferences for an active and healthy life [1].

At the national level, food security encompasses several key dimensions: stable agricultural production, availability of food on the domestic market, a rational structure of food consumption, and the system's resilience to internal and external risks [2, 3].

In the context of Kazakhstan, not only physical availability but also economic accessibility of food becomes particularly important. Despite the growth in agricultural production volumes, there remains a significant gap between the consumption of certain types of food and established medical standards [4]. The most critical issues are the consumption levels of vegetables, fruits, and dairy products, which on average do not reach 70–80% of the recommended levels [5, 6].

The research hypothesis posits that the key barriers to achieving food security in Kazakhstan are the insufficient economic accessibility of food for specific population groups and an imbalance in the dietary structure caused by low purchasing power and inflationary pressure.

The relevance of this research lies in the need to adapt international approaches and standards developed by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) to the realities of Kazakhstan, as well as to develop sustainable mechanisms for internal food policy [2, 7]. In the face of global challenges-such as the pandemic, inflation, and climate change-ensuring food security requires a comprehensive scientific approach and cross-sectoral coordination [8].

The aim of the study is to conduct a macroeconomic assessment of food security in the Republic of Kazakhstan for the period 2020–2024 and to develop practical recommendations for improving the accessibility and balance of food consumption. The objectives include:

• Analyzing the dynamics of actual food consumption compared to medical and international standards;

• Calculating dietary caloric intake and diversity indicators in relation to WHO recommendations;

• Examining the relationship between household income and food consumption levels;

• Comparing Kazakhstan's performance with international practices;

• Formulating macro-level policy recommendations to strengthen food security.

Thus, this article is aimed at a comprehensive evaluation of the state of food security in Kazakhstan and the justification of systemic solutions that contribute to public health and the sustainable development of the country.

LITERATURE REVIEW

The concept of food security, first formulated by the Food and Agriculture Organization of the United Nations (FAO) in 1974, has undergone significant evolution—from a narrow understanding focused on combating hunger to a comprehensive approach that includes sustainability, nutritional quality, and economic accessibility. The modern understanding of food security encompasses four interrelated components: food availability, accessibility (both physical and economic), utilization (quality and nutritional value), and resilience to crises [2, 4].

In Kazakhstan's legal and strategic framework, food security is designated as a national priority; however, there is no single law regulating all aspects of this area. The foundation is provided by the Law of the Republic of Kazakhstan «On National Security» the Law «On State Regulation of the Development of the Agro-Industrial Complex and Rural Areas» and the «National Food Security Plan for 2022–2024» [9]. However, these documents are primarily oriented toward agricultural production and do not fully address issues related to food distribution, consumption, and system resilience [10].

A number of studies [11, 10, 12, 13] highlight the necessity of combining quantitative methods with qualitative analysis of dietary habits and consumer spending levels. Methods for assessing food security—including the Dietary Diversity Score (DDS), household expenditure analysis, and the evaluation of dietary energy intake—are widely applied in international practice and have proven effective for countries with middle-income economies [14].

The experience of several countries demonstrates the high effectiveness of comprehensive approaches. For instance, Brazil has implemented the «Fome Zero» program, emphasizing school feeding programs, subsidies for low-income households, and support for local producers. In India, the Food Corporation ensures the availability of grains at fixed prices. Moreover, recent studies show that forecasting food consumption using modeling techniques [13], is becoming an important tool for mitigating food insecurity risks. In South Korea and Japan, digital platforms are actively used for consumption monitoring and targeted food assistance [15]. These examples demonstrate the potential of combining government support, market mechanisms, and modern technologies [16,17].

For Kazakhstan, the pressing challenge is to adapt such mechanisms, considering the internal economic structure and social stratification. Insufficient consumption of strategically important categories (such as vegetables, fruits, and dairy products) necessitates not only direct subsi-

dies but also the development of processing and logistics infrastructure. International experience confirms the importance of comprehensive and tailored solutions to ensure sustainable access to nutritious food.

Thus, the literature review identifies key areas for further analysis: evaluating the level of food consumption and accessibility in Kazakhstan in comparison with established norms and international practices, and formulating recommendations based on the adaptation of successful international models to national conditions.

METHODS

The study employed both quantitative and qualitative methods of analysis. The main focus was on comparing actual food consumption with established medical standards and assessing the economic accessibility of food under the conditions specific to Kazakhstan.

The methodological framework of the research includes:

1. Food consumption analysis – comparison of consumption levels of major food groups against World Health Organization (WHO) norms and national medical standards, including the assessment of surpluses and deficits across categories such as meat, fish, dairy products, vegetables, and fruits.

2. Assessment of dietary energy value – conversion of food consumption volumes into kilocalories per person per day and comparison with WHO recommendations (2,500 kcal/day).

3. Dietary Diversity Score (DDS) – determination of the number of food groups consumed during a week using the FAO scale (ranging from 0 to 10 points).

4. Regression analysis – evaluation of the relationship between median household income and food consumption volumes by category. The model accounted for inflation and price dynamics to identify the food groups most sensitive to income changes.

5. Household expenditure analysis – calculation of the share of food expenses in total household income, compared against the FAO threshold for food vulnerability (40% and above).

The data sources for the research included:

• Official statistics from the Bureau of National Statistics of the Republic of Kazakhstan for 2020–2024;

• Databases of the World Health Organization (WHO) and the Food and Agriculture Organization (FAO);

• Analytical reviews by the World Bank;

• Scientific publications on food security;

• Comparative international case studies (Brazil, India, South Korea) to adapt effective practices.

This comprehensive approach enables a thorough assessment of the current state of food security in Kazakhstan and provides a foundation for developing macro-level policy recommendations to strengthen it.

RESULTS AND DISCUSSION

The analysis of food consumption in Kazakhstan for the period 2020–2024 revealed stable trends that reflect the overall level of food security at the macroeconomic level. However, for a comprehensive understanding of the situation, it is necessary to examine the condition of the agro-industrial complex (AIC) as a key element of the national food supply system.

Kazakhstan's agro-industrial complex possesses significant resource potential. According to the Bureau of National Statistics (Figure 1), the total sown area of agricultural crops in 2024 amounted to 23.2 million hectares, representing a 3.5% increase compared to 2020.

Figure 1. Adjusted Sown Area of Agricultural Crops in Kazakhstan for 2020–2024, thousand hectares
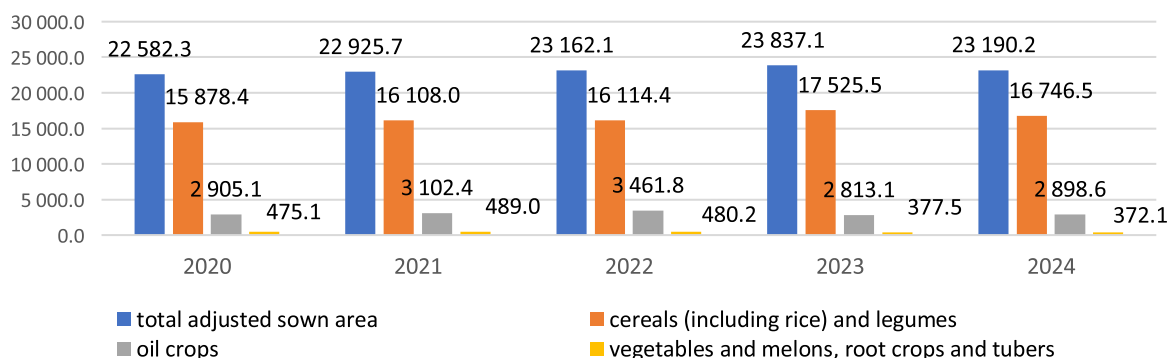
The majority of the sown area is occupied by grain crops (approximately 16.5 million hectares) and oilseeds. The gross harvest of grain crops in 2024 reached 25.2 million tons, which is 15% higher than the 2020 level. Growth was also observed in the production of oilseeds and forage crops.

The harvested area of agricultural crops is presented in Figure 2:

Figure 2. Harvested Area of Agricultural Crops in Kazakhstan for 2020–2024, thousand hectares
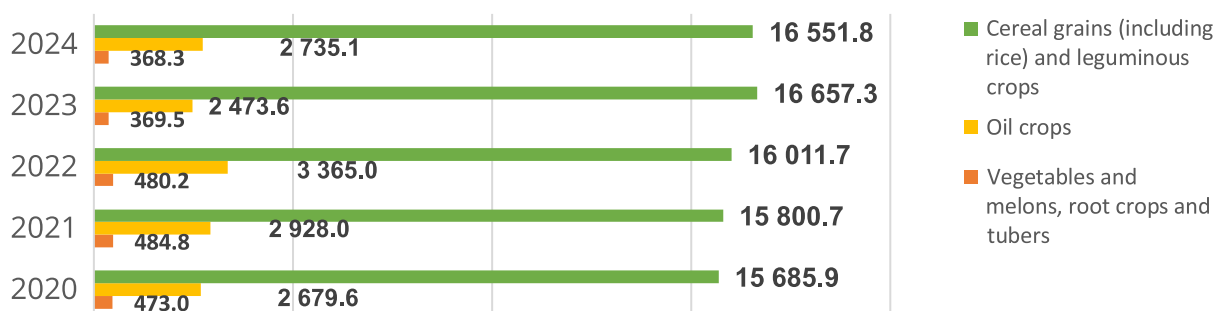
The harvested area of grain crops (including rice) and leguminous crops in 2024 amounted to 16,551.8 thousand hectares, representing 99.4% of the total sown area. For oilseeds, the harvested area reached 2,735.1 thousand hectares, or 110.6%. The harvested area for open-field vegetables was 125.6 thousand hectares (81.0%), and for potatoes – 120.2 thousand hectares (129.3%).

Next, we will examine the gross harvest of agricultural crops in the Republic of Kazakhstan, with data presented in Figure 3.

Figure 3. Gross Harvest of Agricultural Crops in the Republic of Kazakhstan for 2020–2024, thousand tons
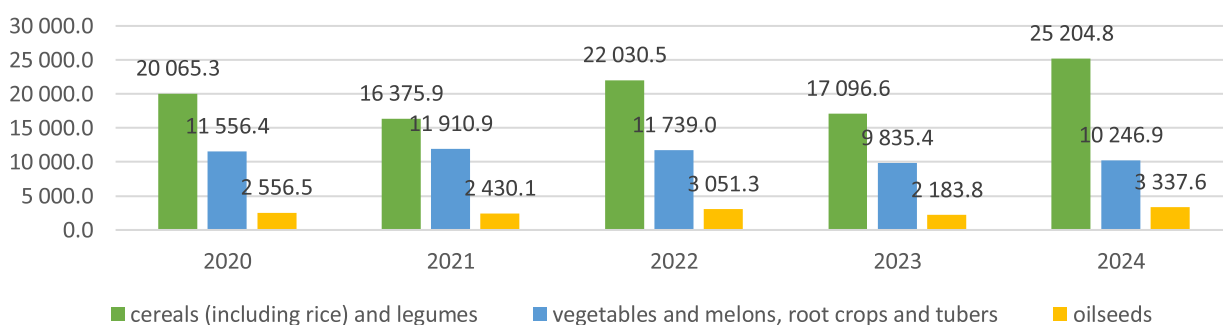
The gross harvest of grain crops (including rice) and leguminous crops (post-processing weight) increased by 47.4% compared to 2023, reaching 25,204.8 thousand tons. Production of oilseeds also grew by 52.8%, amounting to 3,337.6 thousand tons.

The gross harvest of vegetables, melons, root crops, and tubers increased by 4.2%, reaching 10,246.8 thousand tons. However, a 15.3% decline was recorded in the production of open-field vegetables (down to 3,570.1 thousand tons), while yield productivity rose by 28.7% (to 2,634.6 thousand tons), and the harvest of melons decreased by 12.1% (to 2,465.8 thousand tons).

Despite the positive dynamics in the grain and export-oriented sectors, there is noticeable lagging in areas oriented towards domestic demand, such as vegetable growing, horticulture, and dairy and meat livestock production. This limits the ability to ensure a full assortment of food products within the country, especially in terms of meeting rational dietary standards.

Additionally, the storage and processing infrastructure remains underdeveloped, leading to seasonal food losses and price volatility. The domestic market is partially supplemented by imports, particularly in categories such as fruits, dairy products, and sugar.

Thus, Kazakhstan demonstrates strong potential in securing a raw food base; however, the critical task lies in transforming this potential into balanced domestic consumption.

The next step in the analysis is to assess the structure of food consumption and its compliance with medical standards, reflecting the macro-level state of food security. According to data from the Bureau of National Statistics, the consumption of meat and fish has approached the established medical norms, while the consumption of vegetables, fruits, and dairy products continues to lag behind.

We will now conduct an analysis of the food consumption structure in the Republic of Kazakhstan for 2020–2024 (Table 1), aiming to compare actual consumption levels with established medical norms and international standards. This will allow for an assessment of the extent to which the physiological needs of the population are being met in key food categories and for drawing conclusions regarding the sustainability of the national food system.

**Table 1. Per Capita Consumption of Major Food Products in Kazakhstan,
2020–2024 (kg/person per year)**

Product	Medical Norm	2020	2021	2022	2023	2024
Meat and meat products	78.4	78.4	77.1	78.2	80.5	81.0
Fish and seafood	14.0	15.1	14.8	14.1	13.9	14.2
Dairy products	301.0	259.4	243.2	226.4	230.1	232.5
Fruits	132.0	78.7	76.9	73.0	72.5	74.0
Vegetables and melons	149.0	86.4	80.6	77.6	78.1	79.0

Note: compiled by the authors based on [9, 18].

The data show that the actual consumption of meat and fish products has remained stable and aligns with recommended levels, indicating the physical availability of these food groups. However, the consumption of vegetables, fruits, and dairy products has consistently remained below 80% of the recommended norms over the past five years, pointing to a structural vulnerability within the food system.

Comparison with international data (FAO, WHO) shows that in countries with a comparable income level (e.g., Poland, Uruguay, Turkey), vegetable and dairy consumption reaches 90–110% of the recommended norms. Thus, Kazakhstan lags behind global benchmarks in terms of dietary diversity and balance.

The Dietary Diversity Score (DDS), calculated based on the number of food groups consumed per week, averages 5.2 in Kazakhstan, corresponding to a medium level (according to the FAO scale: 4–6 points – medium diversity). Achieving a high level (7 or more points) would require improving the availability of fruits, dairy products, and fish.

In terms of caloric intake, the average daily consumption in Kazakhstan is around 2,700 kcal, which exceeds the WHO minimum standard (2,500 kcal) [19]. However, this surplus is mainly due to excessive consumption of carbohydrates and fats, coupled with deficiencies in vitamins, fiber, and proteins – a phenomenon known as «hidden hunger,» where quantitative satiety masks qualitative nutritional deficiencies.

At the macro level, the main challenges to food security in Kazakhstan remain: imbalanced diets (excessive proportions of fats and carbohydrates); economic inaccessibility of vegetables, fruits, and dairy products; increasing inflationary pressure and declining purchasing power; limited targeted support for vulnerable population groups.

To sustainably enhance food security, it is necessary to implement systemic measures, including: stimulating the production of deficient food categories through government support programs; developing processing and logistics infrastructure to reduce food losses and lower delivery costs; expanding food assistance programs based on international models (e.g., voucher schemes or food card systems); conducting public awareness campaigns on healthy nutrition.

In addition to the national analysis, a comparative Table 2 will be presented, featuring several countries with a similar level of economic development. This will allow for a visualization of Kazakhstan's relative position in terms of key food security indicators.

Table 2. Comparative Analysis of Food Consumption (Average per Capita, kg/year)

Country	Meat	Fish	Dairy Products	Vegetables	Fruits
Kazakhstan	81.0	14.2	232.5	79.0	74.0
Poland	84.6	15.9	300.2	107.5	113.4
Uruguay	98.7	16.4	275.0	95.6	96.0
Turkey	78.2	17.0	281.3	110.1	121.7
WHO/FAO Average Norms	78.4	14.0	300.0	149.0	132.0

Source: [1, 5, 10, 15]

The analysis of Table 2 shows that Kazakhstan lags behind the referenced countries in terms of fruit, vegetable, and dairy product consumption. Meanwhile, the consumption levels of meat and fish are within the recommended norms. This situation calls for a revision of national policies to stimulate the accessibility of deficient food categories and to enhance public awareness campaigns on nutrition.

Thus, Kazakhstan maintains stable positions regarding the physical availability of caloric foods but requires structural transformation of its diet, improvements in economic accessibility, and the adoption of best practices from international experience to enhance the quality and sustainability of its food system.

The analysis of compliance with medical consumption standards revealed structural imbalances. However, for a comprehensive assessment of food security, it is also necessary to examine the economic accessibility of food through the following lenses: the energy value of the diet; the diversity of the food basket.

Calculations show that the average daily caloric intake of Kazakhstan's population during the analyzed period is approximately 2,700 kcal, which meets the minimum standards of the World Health Organization (WHO) [20]. Nevertheless, the qualitative composition of these calories is not always optimal: there is an excess intake of fats and carbohydrates and a deficiency of proteins, vitamins, and fiber. This indicates the presence of a hidden nutrient deficiency, despite the formal compliance with caloric norms.

The Dietary Diversity Score (DDS), calculated using the methodology of the Food and Agriculture Organization of the United Nations (FAO), shows that, on average, 5 to 6 food groups out of 10 are consumed in Kazakhstan. This corresponds to a medium level of dietary diversity, typical for middle-income countries. At the same time, a high share of consumption comes from ener-

gy-dense foods (bread, oil, sugar), while the intake of vegetables, fruits, fish, and dairy products remains limited, restricting the biological quality of the diet.

Thus, even with sufficient caloric intake, the national food supply system faces challenges in terms of the nutritional quality and availability of healthy foods. These challenges are confirmed by the calculations presented in Table 3.

Table 3. Energy Value of the Diet and Deviations from WHO Standards (Per Capita per Day, 2024)

Indicator	Kazakhstan (Actual)	WHO Standard	Deviation
Caloric intake (kcal/day)	2700	2500	+8%
Share of proteins (%)	20	25–30	–20%
Share of fats (%)	35	≤30	+5%
Share of carbohydrates (%)	45	50–60	–

Source:[15]

The conclusions drawn from Table 3 confirm that the diet of the Kazakhstani population is excessively saturated with fats while being deficient in proteins. The surplus of energy derived from fats and simple carbohydrates, alongside a lack of protein components and vitamins, points to the problem of «hidden hunger». This issue poses a significant risk of increasing chronic diseases and deteriorating quality of life, particularly among socially vulnerable groups.

Additionally, the Dietary Diversity Score (DDS), which reflects the number of different food groups consumed during a week, was further analyzed. Comparative analysis shows that the level of dietary diversity in Kazakhstan lags behind that of countries with similar income levels.

To illustrate this, an international context is summarized in Table 4.

Table 4. Comparison of Dietary Diversity Score (DDS) Across Selected Countries

Country	DDS (Average Value)	Diversity Level	Notes
Kazakhstan	5.2	Medium	Dominated by bread, potatoes, meat, oil
Poland	7.1	High	Consistent consumption of all 10 food groups
Turkey	6.8	Medium-high	Emphasis on vegetables, dairy, and fish
Malaysia	7.4	High	Expanded basket due to tropical fruits
FAO Recommendation	≥7.0	High	All major groups should be consumed regularly

Source: [1, 9, 10, 15]

The comparison demonstrates that Kazakhstan needs to improve the accessibility and consumption of vegetables, fruits, dairy products, and fish in order to achieve the target DDS level. Similar indicators observed in countries such as Poland and Turkey are achieved through well-developed supply infrastructure, targeted support measures, and sustained nutrition education programs. The results are summarized in Table 5.

Table 5. Dietary Diversity Score (DDS) by Household Type

Household Type	DDS (Score, 0–10)	Diversity Level	Most Consumed Food Groups
Urban households	5.6	Medium	Bread, meat, oil, potatoes
Rural households	4.7	Low	Bread, potatoes, flour, sugar
FAO Recommendation	≥7.0	High	All 10 groups

Source: [9,10]

DDS indicators reflect the limited dietary diversity in rural areas and the insufficient consumption of key food groups such as dairy products, fish, and fresh vegetables. This confirms the need to strengthen targeted support and nutritional education for the population, especially in regions with low purchasing power. It requires the implementation of policies aimed at form-

ing sustainable consumption models, reducing the cost of healthy foods, and improving public awareness about nutrition.

However, for a comprehensive understanding of food security, it is necessary to analyze its relationship with household income levels and the economic accessibility of food products. The resilience of the food system cannot be ensured without considering the ability of households to purchase the required quantity and variety of food. Under high inflation conditions, particularly affecting food prices, access to a complete diet becomes increasingly difficult, especially for rural and low-income populations.

The next stage of the analysis involves studying household income indicators, their structure, the share of food expenditures, and the relationship of these factors to the consumer basket and the subsistence minimum. Food security is directly dependent on the economic accessibility of nutrition. Even with sufficient domestic production and physical availability of products, a low level of household income can limit the actual consumption of essential food categories.

According to the Bureau of National Statistics, between 2020 and 2024, the nominal incomes of the population in Kazakhstan increased; however, the growth of real incomes was constrained by inflation. The average share of food expenditures across the country stands at around 43%, which is close to the international threshold of food vulnerability (40%). In rural areas, this share reaches 48–50%, indicating a high level of vulnerability.

The share of households with incomes below the subsistence minimum has remained at 5.2% in recent years. At the same time, the depth and severity of poverty have shown a moderate increase, heightening the risks of social instability and food insecurity.

Thus, economic accessibility is a fundamental component of food security, without which it is impossible to ensure access to a balanced diet for the population. Even with the physical availability of products and stable agricultural production, low income levels and high prices can undermine efforts to ensure food access for vulnerable groups.

To expand the analysis, a comparative international table (Table 6) will be presented, demonstrating Kazakhstan's relative position based on key economic indicators of food accessibility.

Table 6. Comparison of Economic Food Accessibility Across Selected Countries

Country	Share of Food Expenditures in Income (%)	Average Income (USD/month)	DDS Index	Food Security Level
Kazakhstan	43	410	5.2	Medium
Turkey	30	750	6.8	Medium-high
Poland	26	1020	7.1	High
Malaysia	24	980	7.4	High
FAO Recommendations	≤30	–	≥7.0	Target Level

Sources: [9,10,15]

To meet international standards, Kazakhstan needs a comprehensive strategy: reducing food costs, boosting incomes, developing domestic production, improving logistics, and promoting healthy diets. The resilience of the food system depends not only on production volumes but also on equitable access to quality food. While physical availability of basic products has improved, economic accessibility and nutritional qualityremain challenges. Addressing them requires integrated policies: agro-industrial development, social support, subsidies, and institutional reforms, drawing on global best practices to ensure sustainability and dietary balance.

Next, we will examine living standard indicators in the Republic of Kazakhstan for 2020–2024 (Table 7), which are directly linked to the economic accessibility of food. These indicators form the basis for constructing regression models analyzing the relationship between income levels and the dietary structure of the population.

Table 7. Living Standards Indicators in Kazakhstan for 2020–2024

Indicator	2020	2021	2022	2023	2024
Poverty rate (%)	5.3	5.2	5.2	5.2	5.2
Depth of poverty (%)	0.8	0.8	0.8	0.9	0.9
Share of food expenditures (%)	45.0	44.0	43.5	43.0	43.0
Gini index	0.291	0.294	0.285	0.290	0.290
Median income (tenge/month)	116,126	130,616	164,438	189,953	214,050

Source:[15]

The analysis of Table 7 shows that despite a moderate increase in median income, the share of food expenditures remains high and consistently exceeds the vulnerability threshold (40%). This indicates continued pressure on household budgets and highlights the need for further development of mechanisms to offset rising food prices. The increase in income levels has not been accompanied by an improvement in the balance of food consumption, as confirmed by the results of the regression analysis in the following sections.

To quantitatively assess the impact of income on the dietary structure of the population in Kazakhstan, a regression analysis was conducted. The explanatory variable used was the average per capita household income, while the dependent variables were the average per capita consumption indicators for major food groups (meat, fish, dairy products, etc.). The analysis was based on data from sample household budget surveys, grouped by income categories. To interpret the coefficients as elasticities, a logarithmic form of the equations was applied (Engel's Law):

$$ln(C_i) = \alpha + \beta ln(Y) + \varepsilon$$

where C_i is the per capita consumption of product i, and Y is income. The coefficient β represents the income elasticity of consumption, indicating the percentage change in consumption resulting from a 1% increase in income.

Table 8 presents the estimated β coefficients for each product category, along with the determination coefficients (R^2) and significance levels.

Table 8. Regression Results: Dependence of Food Consumption on Income (Kazakhstan)

Food Category	Income Elasticity (β)	R²
Meat and meat products	0.85***	0.72
Fish and seafood	1.15***	0.60
Dairy products	0.65***	0.50
Eggs	0.40**	0.30
Fruits	1.05***	0.68
Vegetables	0.10 (n.s.)	0.05
Potatoes	–0.25**	0.40
Fats and sugar	0.10 (n.s.)	0.10

Notes: *** significant at 1% level ,** significant at 5% level, n.s. – not statistically significant

Source: [9,10,15]

The results demonstrate a clear link between dietary structure and income in Kazakhstan, confirming Engel's Law. Most food categories show positive, significant income elasticities. Fish (β ≈ 1.15) and fruits (β ≈ 1.05) consumption rises faster than income, making them near-luxury goods. A 10% income increase leads to about an 11.5% rise in fish and 10.5% in fruit consumption. Similarly, in poorer countries like Tanzania, elasticities for meat and fish exceed 1, while in wealthier countries like the U.S. they are much lower (0.05–0.13), showing demand saturation at higher incomes.

Meat (β ≈ 0.85) and dairy (β ≈ 0.65) are normal goods: consumption increases with income, though more slowly. Higher incomes allow for diversification of dairy products (e.g., cheese, yo-

gurt). Eggs show lower elasticity (β ≈ 0.4), indicating they are close to essential goods, with minimal variation in consumption across income levels. This reflects international patterns where staple foods have low elasticities.

Vegetables showed a small, statistically insignificant elasticity. This suggests basic vegetable consumption has plateaued, with low-income families maintaining minimum intake and higher incomes not driving significant increases.

Indirectly, this result may also point to structural features of the diet: as income rises, people may increase their spending on animal-based and ready-made products, while vegetable consumption stagnates or shifts toward more expensive types, without significantly affecting the overall quantity consumed. A similar pattern was observed in a study of food consumption in Kazakhstan from 2001 to 2018: as income grew, consumption of meat, fish, fruits, and oils increased, while vegetable consumption remained nearly flat or even declined on a per capita basis [21]. Thus, the low elasticity of demand for vegetables indicates a weak response of this category to income and, possibly, an insufficient increase in vegetable share in the diets of even higher-income population groups.

In contrast, for a traditional starchy product such as potatoes, a negative income elasticity (β ≈ –0.25, p < 0.05) was observed. A negative coefficient indicates that potato consumption decreases as income rises. This trend is characteristic of so-called **inferior goods**, where wealthier households reduce their consumption of cheap, high-calorie foods in favor of higher-quality and more diverse alternatives [22].

In Kazakhstan, potatoes are a key calorie source for low-income households, but their role decreases as incomes rise, replaced by meat and vegetables. Cross-country data confirm this pattern: in Poland [23] and Turkey, rising incomes led to reduced consumption of potatoes and grains, with a shift to animal products [1]. Potatoes act as an inferior good, inversely related to income. For fats and sugar, no strong link with income was found—consumption stays stable, with higher-income families opting for better quality rather than quantity.

Comparison with international practice. The quantitative dependencies identified in Kazakhstan generally align with global trends in dietary changes influenced by income. According to **Engel's Law,** as prosperity increases, the share of income spent on food decreases, while the consumption structure shifts from inexpensive starchy foods toward more expensive types of food [17]. In our analysis, this was reflected in the high elasticities of demand for "quality" foods (animal proteins, fruits) and a negative elasticity for potatoes.

Similar processes are observed in other countries with transitional economies. For example, in **Turkey**, the overall income elasticity of food expenditures declined from 1.48 in 1970 to 0.64 by 2000 [24, 25], as incomes rose and diets approached saturation. At the same time, the elasticity of demand for animal-based products remained higher than the average for food overall, which is consistent with the situation in Kazakhstan—meat, fish, and dairy consumption grows faster than basic calorie intake.

Poland demonstrates that at higher income levels, food consumption becomes less sensitive to income: by the late 2010s, many basic foods had elasticity below 0.5, indicating dietary saturation [23]. In Malaysia, all major food elasticities are below one; rice demand elasticity is about 0.7–0.8, confirming its status as a necessity [17]. As incomes rise, diets shift gradually from carbohydrates to proteins. International experience (Poland, Malaysia, Turkey) shows that as income grows, food consumption increases less, while dietary quality improves.

The analysis shows that economic accessibility plays a key role in forming a sustainable diet. Low-income families focus on cheap, high-calorie foods (starches, sugar), reducing dietary diversity and quality. As incomes rise, consumption of protein-rich foods, fruits, and dairy increases. International comparisons confirm this: in low-income countries, diets are monotonous despite high food spending; higher incomes enable more balanced nutrition. However, beyond a certain income level, other factors—culture, knowledge, lifestyle—shape consumption. For Kazakhstan,

improving economic accessibility through higher household incomes, targeted food support, and price controls is essential for better diets and food security. Expanding access to healthy foods will help promote national health and long-term sustainability.

Main findings of the analysis

The conducted study led to the following generalized conclusions:

1. Mismatch between actual consumption and rational standards. Despite high physical availability of food (meat, fish), Kazakhstan continues to experience deficits in such categories as dairy products, vegetables, and fruits. These categories are consistently consumed at less than 80% of the established medical standards.

2. Presence of "hidden hunger." Although the calorie intake (about 2700 kcal/day) meets the minimum requirements, there is a nutrient imbalance—excessive consumption of fats and carbohydrates combined with a deficiency of proteins and vitamins, especially among rural and vulnerable social groups.

3. Average level of dietary diversity (DDS). Kazakhstan shows an average DDS index (5.2–5.6), whereas the international target set by the FAO is ≥7. This indicates a limited food choice for part of the households.

4. Economic vulnerability and high share of food expenditures. On average, food expenditures in Kazakhstan account for 43% of household income, while in rural areas they exceed 48%. These values surpass the international threshold for food vulnerability (≤30%).

5. Regression analysis confirmed the dependence of consumption on income. Categories such as meat, dairy products, eggs, and fruits demonstrated a positive and statistically significant relationship with income levels. Meanwhile, potato consumption showed an inverse relationship, consistent with the model of shifting from inferior to higher-quality products as income rises.

6. Comparison with international practice revealed a lag. Kazakhstan lags behind countries with comparable income levels (such as Poland, Turkey, Malaysia) in terms of DDS, consumption of fruits, vegetables, and dairy products, as well as the share of food expenditures. This underscores the need for systematic and adapted solutions.

CONCLUSION

Ensuring food security is vital for Kazakhstan's sustainable socio-economic development. Despite resource potential, systemic challenges—dietary imbalance, economic inaccessibility of quality food, and poor policy coordination—hinder progress. The country lags in dietary diversity and consumption of key products. The authors propose innovative measures: "smart" subsidies, digital vouchers, support for agro-parks, legal reforms, and awareness campaigns, shifting the focus from production volume to nutritional quality, sustainability, and equitable access (Table 9).

Table 9. Innovative Recommendations and Mechanisms for Ensuring Food Security in Kazakhstan

№	Problem / Barrier	Recommended Measures	Expected Outcome	Implementation Mechanism
1	Low consumption of vegetables, fruits, and dairy products	Expansion of government support for producers (subsidies, incentives, logistics)	Increased domestic production, lower prices, improved dietary structure	Introduction of "smart" subsidies (similar to SNAP-Ed, USA), support for agro-parks, tax incentives
2	Dependence on imports	Development of agro-industrial clusters and logistics hubs	Enhanced food independence, reduced losses	Creation of regional hubs based on the EU and Uzbekistan models, infrastructure subsidies
3	Inaccessibility of food for vulnerable groups	Introduction of a voucher system for essential goods	Improved food accessibility for low-income groups	Electronic vouchers (WFP Turkey model), Big Data targeting

№	Problem / Barrier	Recommended Measures	Expected Outcome	Implementation Mechanism
4	Inflation and declining purchasing power	Indexation of household incomes	Stabilization of consumption under inflationary pressure	Annual adjustment based on the Consumer Price Index (as practiced in Norway)
5	Urban-rural disparities	Targeted support for rural areas, promotion of cooperatives	Reduction of regional inequality and poverty levels	Cooperative schemes (Peru, Colombia), microcredit programs
6	Low level of nutritional literacy	Mass educational campaigns on healthy eating	Reduction of "hidden hunger" risks, development of sustainable habits	School programs (Japan, Korea), e-learning platforms
7	Lack of legal framework	Adoption of a Food Security Law	Comprehensive sector regulation, coordination of actions	Integration with FAO indicators, establishment of a National Coordination Center
8	High household food expenditures	Development of direct markets and support for smallholder farms	Reduction in food expenditure share, increased self-sufficiency	Farmers' markets and smallholder support programs (Indonesia), subsidies for agricultural equipment

Note: developed by the authors.

These proposals align with the UN concept of «Sustainable Diets for Sustainable Development» and could form the basis for a new phase of the National Food Security Strategy up to 2030. Their implementation would improve nutritional security, reduce disparities in the consumption structure, and strengthen the resilience of Kazakhstan's national food system to external shocks.

Implementing these recommendations could become the foundation for developing a new model of food policy, synchronized with the UN Sustainable Development Goals in the areas of health, well-being, and inequality reduction. This would enhance the population's nutritional security, decrease food consumption disparities, and ensure the resilience of Kazakhstan's food system amid global instability.

Thus, the results of this study not only reflect the current state of food security in Kazakhstan but also fit into the broader context of global sustainable development challenges. The practical significance of the proposed recommendations lies in their potential adaptation within the national strategy, incorporating successful international practices.

Future research prospects include conducting a more detailed analysis of regional differences within the country, modeling the impact of external economic and climatic factors on food vulnerability, and exploring the interconnections between food policy and other sectors – such as healthcare, education, and social protection.

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• THEORY AND METHODOLOGY

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ҚАЗАҚСТАНДА АЗЫҚ-ТҮЛІК ҚАУІПСІЗДІГІН ҚАМТАМАСЫЗ ЕТУДЕГІ ТҰТЫНУ СТАНДАРТТАРЫ: ТАЛДАУ ЖӘНЕ БАҒАЛАУ

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Аңдатпа. Бұл зерттеу Қазақстанның 2020-2024 жылдарға арналған азық-түлік қауіпсіздігінің макроэкономикалық бағасын ұсынады және халықаралық тәжірибе мен өзіндік көзқарасқа негізделген практикалық ұсынымдардан тұрады. Негізгі гипотеза азық-түлікке экономикалық қолжетімділіктің шектелуі және инфляция мен кірістердің теңсіздігінен туындаған теңгерімсіз диета құрылымы –азық-түлік қауіпсіздігінің негізгі кедергілері екенін көрсетеді. Зерттеуде сандық және сапалық әдістер қолданылады, соның ішінде диеталық әртүрлілік баллы (DDS), табысқа негізделген азық-түлік тұтынуының регрессиялық талдауы, энергия тұтынуды ДДҰ стандарттарымен салыстыру және халықаралық тұрғыда салыстыру. Нәтижелер гипотезаны растайды: нақты тұтыну мен тамақтану стандарттары арасында айқын алшақтық, жасырын аштықтың дәлелі, ауылдағы үй шаруашылықтары арасында азық-түліктің жоғары осалдығы және табыс пен диета сапасы арасындағы күшті байланыс. Нәтижелер мен әлемдік озық тәжірибелерге сүйене отырып, зерттеу ақылды субсидиялар, цифрлық азық-түлік ваучерлері, агропарктерді қолдау, логистикалық инфрақұрылымды дамыту және халықты ақпараттандыру науқандары сияқты инновациялық саясат шараларын ұсынады. Бұл тұжырымдар Қазақстанның 2030 жылға дейінгі азық-түлік қауіпсіздігінің ұлттық стратегиясын қалыптастыруға және БҰҰ Тұрақты даму мақсаттарын оқшаулауға ықпал етуі мүмкін.
Түйін сөздер: азық-түлік қауіпсіздігі; тұтыну стандарттары; диеталық әртүрлілік баллы; экономикалық қолжетімділік; Қазақстан.

СТАНДАРТЫ ПОТРЕБЛЕНИЯ ДЛЯ ОБЕСПЕЧЕНИЯ ПРОДОВОЛЬСТВЕННОЙ БЕЗОПАСНОСТИ В КАЗАХСТАНЕ: АНАЛИЗ И ОЦЕНКА

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Аннотация. В данном исследовании представлена макроэкономическая оценка продовольственной безопасности в Казахстане на период 2020–2024 годов и предложены практические рекомендации, основанные на международном опыте и оригинальном подходе. Основная гипотеза предполагает, что ограниченный экономический доступ к продовольствию и несбалансированная структура питания, обусловленная инфляцией и неравенством доходов, являются ключевыми барьерами на пути к продовольственной безопасности. В исследовании используются как количественные, так и качественные методы, включая индекс разнообразия питания (DDS), регрессионный анализ потребления продуктов питания на основе доходов, сравнение потребления энергии со стандартами ВОЗ и международный бенчмаркинг. Результаты подтверждают гипотезу: существует явный разрыв между фактическим потреблением и стандартами питания, имеются свидетельства скрытого голода, высокая продовольственная уязвимость сельских домохозяйств и тесная связь между доходом и качеством питания. Основываясь на результатах и передовом мировом опыте, в исследовании предлагаются инновационные меры политики, такие как «умные» субсидии, цифровые продовольственные ваучеры, поддержка агропарков, развитие логистической инфраструктуры и кампании по повышению осведомленности общественности. Эти результаты могут быть полезны для разработки Национальной стратегии продовольственной безопасности Казахстана до 2030 года и локализации Целей устойчивого развития ООН.

Ключевые слова: продовольственная безопасность, стандарты потребления, показатель разнообразия рациона питания, экономический доступ, Казахстан.