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A.A. DUISENBEKOVA,*[1]
PhD student.
*e-mail: aigerim.duisenbekova95@gmail.com
ORCID ID: 0000-0001-9167-8076
[1]L.N. Gumilyov Eurasian National University,
Astana, Kazakhstan

ASSESSMENT OF FOOD SECURITY UNDER POST-PANDEMIC: CASE OF THE REPUBLIC OF KAZAKHSTAN

Abstract

This research article examines the impact of the COVID-19 pandemic on food security in Kazakhstan. The purpose of the study is to identify the main factors influencing the level of food security during the pandemic and to propose directions for improving it. The research methodology includes a literature review, analysis of statistical data using various logical methods of scientific knowledge such as analysis, synthesis, abstraction, generalization, induction, deduction, and analogy. The study is comprehensive and covers a wide range of aspects influencing food security, providing valuable insights into the underlying causes of food security issues and suggesting practical solutions to enhance food security in the country. The main results of the study show that the pandemic has had a negative impact on the level of food security in Kazakhstan due to disruptions in food supply chains and the economic downturn caused by the pandemic. The analysis of statistical data highlights the need to focus on improving local food production and reducing dependence on imported food products. The study contributes to the field of food security by providing empirical evidence of the impact of the COVID-19 pandemic on food security in Kazakhstan and proposing specific directions for improving it. The practical significance of this research is that it can inform policymakers and stakeholders in the food industry about the measures that need to be taken to ensure food security in Kazakhstan during and after the pandemic.

Key words: food security, agriculture, production, food supply, indicators, food industry, food products, pandemic.

Introduction

Food security is a global issue and the COVID-19 pandemic has only exacerbated the challenges that many countries face in ensuring that their populations have access to adequate and nutritious food.

Globally, there are still large numbers of people who are experiencing hunger and malnutrition, and the pandemic has made it more difficult for many people to access adequate and nutritious food [1]. The supply chain disruptions, price inflation, and job losses that have resulted from the pandemic have all contributed to this trend [2].

In addition, the pandemic has also impacted agricultural production in many countries, leading to lower yields and reduced availability of certain food products. This has further compounded the challenges that many countries face in ensuring food security for their populations [3].

However, there are also positive developments taking place in many countries, with governments and organizations working to improve food security through measures such as supporting local agriculture, expanding food assistance programs, and investing in sustainable food systems [4].

While food security remains a global challenge, there are also efforts underway to address these issues and ensure that people have access to adequate and nutritious food.

Food security is a deeply researched and well-documented problem in the world. It is a complex issue that encompasses many different aspects, including food production, distribution, access, and consumption. As such, there is a large body of research that has been conducted on food security and its various dimensions.

Research on food security covers a wide range of topics, including food production and distribution systems, food prices, food consumption patterns, food waste, food assistance programs, and the impact

of climate change on food security. There is also a growing body of research on the intersections between food security and other issues, such as health, nutrition, and economic development.

Many international organizations, including the United Nations Food and Agricultural Organization (FAO), the World Food Programme (WFP), and the International Fund for Agricultural Development (IFAD), are actively involved in research on food security. They collaborate with governments, academic institutions, and other stakeholders to understand the complex drivers of food insecurity and to develop evidence-based solutions to address it.

Assessing the level of food security on an annual basis is important for several reasons:

- to monitor progress: regular assessments of food security allow countries to monitor their progress towards achieving food security for their populations and to identify areas where additional effort is needed.
- to identify emerging challenges: assessments can also help to identify emerging challenges and trends in food security, such as changes in food prices, changes in the availability of certain food products, or increases in the number of people who are experiencing hunger or malnutrition.
- to inform policy and decision-making: the results of food security assessments can inform policy and decision-making by providing data and evidence on the state of food security in a country. This can help governments to make informed decisions about how best to address food security challenges and to allocate resources to the areas that need them most.
- to mobilize action: assessments can also help to mobilize action by raising awareness about food security issues and highlighting the need for action at both the national and international levels.
- to ensure accountability: regular assessments of food security also help to ensure accountability, as countries are able to demonstrate the progress, they are making towards achieving food security for their populations and to identify areas where additional effort is needed.

Food security refers to the availability, accessibility, and adequacy of food to meet the nutritional needs of a population [5]. The COVID-19 pandemic has had a profound impact on food security globally, and Kazakhstan is no exception [6]. Here are some of the ways in which the pandemic has affected food security in Kazakhstan:

- supply chain disruptions: the pandemic led to lockdowns and restrictions on movement, which impacted the transportation of food products and led to shortages in certain areas.
- price inflation: the pandemic also led to increased demand for food items, which in turn led to price inflation and made it more difficult for some people to access adequate and nutritious food.
- agricultural production: the pandemic also disrupted agricultural production in Kazakhstan, leading to lower yields and reduced availability of certain products.
- job losses and economic hardship: the pandemic led to widespread job losses and economic hardship, making it more difficult for some people to afford adequate and nutritious food.
- increased reliance on food assistance: the pandemic has led to an increase in the number of people who are relying on food assistance programs to meet their nutritional needs.

During the period of escalating coronavirus infection in 2020–2022, almost all countries in the world faced the challenge of making their economies fragile in the face of a pandemic, and particularly one of the most important sectors of the economy that provides economic and physical access to food, as food security, was affected. A number of Central Asian countries, including Kazakhstan, have approved a package of measures to strengthen the food sector and support agriculture [7]. It is worth noting that the leaders of these countries have made use of state food reserves, reduced the value of food products by restricting exports, and implemented a reduced tariff policy on imported food products.

The problem of food security is deeply investigated by scientists in Kazakhstan, reflecting the importance of this issue for the country and the recognition of the need for effective solutions to ensure food security for all. The research being conducted in Kazakhstan is contributing to a better understanding of the nature and extent of food insecurity in the country and to the development of evidence-based solutions to address it.

In conclusion, food security is a deeply researched and well-documented issue that is attracting attention from a wide range of actors in the global community. The depth and breadth of research on food security reflects the importance of this issue and the recognition of the need for effective solutions to ensure food security for all.

The COVID-19 pandemic has had a significant impact on food security in Kazakhstan, but the government is taking steps to mitigate the effects and ensure that the country's population has access to adequate and nutritious food.

Materials and methods

The scientific paper was grounded in policy documents and scientific literature, both local and international, found in the Scopus database. The research aimed to study the food systems and their sustainable development, security, and regulation, using various logical methods of scientific knowledge like analysis, synthesis, abstraction, generalization, induction, deduction, and analogy. The study started by analyzing the concept of food security and its recent challenges, followed by a theoretical examination of the food supply systems. The characteristics of the food sector were scrutinized and the factors affecting food security were analyzed to establish the current level of sustainability of the system. The research was conducted using a range of methods, including the general-logical method of scientific knowledge, systematic approach, cause-effect analysis, observation, comparison, grouping, inductive and deductive methods.

The study was comprehensive and covered a wide range of aspects that influence food security in the Republic of Kazakhstan. The analysis of policy documents provided a deep understanding of the current state of food security and the measures taken by the government to address the issues. The use of scientific articles allowed the researchers to have access to the latest findings and best practices in the field. The application of various logical methods of scientific knowledge ensured that the results of the research were thorough and well-supported.

Furthermore, the systematic approach used in the research allowed for a systematic evaluation of the food sector, including the food supply systems and the factors affecting food security. This approach helped to identify areas for improvement and to suggest practical solutions to enhance food security in the Republic of Kazakhstan. The cause-effect analysis and observation methods provided valuable insights into the underlying causes of food security issues, while the comparison and grouping methods allowed for the comparison of different food systems and the identification of common patterns.

Overall, this scientific paper is a valuable contribution to the understanding of food security in the country and provides a solid foundation for future research in this field. The study highlights the importance of food security in the context of sustainable development and the need for continued efforts to enhance food security in the Republic of Kazakhstan.

Main provisions

Food security is a pressing issue in Kazakhstan, and there has been a significant amount of research conducted by scientists and academic institutions in the country to understand the nature and extent of food insecurity and to develop solutions to address it [8].

Scientists in Kazakhstan are investigating various aspects of food security, including food production systems, food distribution networks, food prices, and food consumption patterns. They are also studying the impact of climate change on food security [9], as well as the effectiveness of food assistance programs and other interventions aimed at addressing food insecurity [10]. In addition, academic institutions and research institutions in Kazakhstan are working closely with government agencies, such as the Ministry of Agriculture, to better understand the needs of the country's rural population and to develop policies and programs that support food security.

Assessing food security in Kazakhstan after COVID-19 is important because the pandemic has had significant impacts on the global food system, including disruptions to food supply chains, decreases in food access and affordability, and negative impacts on agricultural production and employment. In addition, the pandemic has highlighted pre-existing vulnerabilities and inequalities in food systems [11], and it is crucial to understand how these have been exacerbated or mitigated in the context of COVID-19 in Kazakhstan. By assessing food security in Kazakhstan post-COVID-19, policymakers and stakeholders can identify and address any food security challenges and ensure that the population has access to safe, nutritious, and affordable food.

The research hypothesis is that the COVID-19 pandemic has had a negative impact on food security in the country, and there is a need to assess the current state of food security and identify strategies to address the challenges facing the population.

This research would have important scientific and practical implications, contributing to our understanding of the impact of the COVID-19 pandemic on food security, informing food security policies and programs, enhancing our understanding of the drivers of food insecurity, and providing a case study of food security in a Central Asian country.

The statement of the problem. The COVID-19 pandemic has had a significant impact on global food security, with disruptions to food supply chains and economic downturns leading to increased food insecurity in many countries, including Kazakhstan. As a country heavily dependent on agriculture and food production, it is crucial to assess the current state of food security in Kazakhstan and identify the key factors that are affecting it. The purpose of this study is to analyze the indicators of agricultural production, gross domestic product, and final consumption expenditure in Kazakhstan in order to assess the level of food security in the country after the COVID-19 pandemic. This study aims to identify the main challenges and opportunities in the agricultural sector and to propose strategies for improving the country's food security.

Kazakhstan has been facing several challenges in the agrarian sector, which have been hindering the progress of food security in the country [12]. One of the key problems is the inefficient use of land, water, and other natural resources. The country has vast agricultural land, but a significant portion of it is not utilized or is underutilized due to inadequate irrigation, lack of access to credit, and low productivity. Additionally, the country's livestock sector is facing challenges such as outdated breeding methods, low-quality feed, and inadequate infrastructure, which have resulted in low yields and low profits for farmers [13].

Another approach to solving the problems in the agrarian sector is to promote the adoption of modern farming practices and technologies. This includes the use of precision agriculture techniques, which use sensors and data analytics to optimize crop yields and minimize resource use. The adoption of these technologies can improve the efficiency of resource use, reduce costs, and increase the quality and quantity of agricultural products.

Moreover, improving the infrastructure in rural areas can significantly contribute to the development of the agrarian sector in Kazakhstan. This includes the construction of roads, bridges, and other transport facilities to connect rural areas with urban centers and markets, as well as the development of modern storage facilities to reduce post-harvest losses. Additionally, providing farmers with access to extension services, training programs, and information about new farming practices and technologies can improve their skills and knowledge, leading to increased productivity and better yields.

In conclusion, the problems in the agrarian sector in Kazakhstan can be addressed through a combination of policies, programs, and modern technologies. The efficient use of resources, modern farming practices, and improved infrastructure and training can help increase productivity and profitability, promote sustainable agriculture, and enhance food security in the country.

Literature review

The literature review for this scientific article encompasses policy documents and scientific literature from both local and international sources, as found in the Scopus and Google Scholar databases. The studies included in this review focus on the examination of food systems and their role in ensuring sustainable development, security, and regulation.

Previous research has emphasized the importance of food security for sustainable development, highlighting the need for a comprehensive understanding of the factors that affect food security. For example, a study by foreign researchers Alabi M.O. and Ngwenyama O. analyzed the impact of the COVID-19 pandemic on global food markets and the implications for food security. The authors found that the pandemic has disrupted global food supply chains, leading to price hikes and supply shortages, and has exacerbated existing food security challenges in many countries [14].

The research by Belik presented the challenges faced by countries in achieving the Sustainable Development Goals related to food security, especially in light of the COVID-19 pandemic. The pandemic has led to a growing prevalence of malnutrition worldwide, making it difficult for countries

to meet their commitments. In this context, local administrations are facing several challenges, including combating malnutrition, addressing the increase in obesity, and tackling the emergence of new food deserts. The regulatory elements of urban areas also require greater attention to ensure adequate food availability. The strengthening of food aid programs involving local producers and government purchases is expected to be one of the ways to address these challenges [15].

The study by Dudek M. and Spiewak R. found that the agri-food sector in Poland has been relatively resistant to the crisis, and diverse sales channels for agricultural products, including direct sales to consumers, have been relatively more favourable financially and in the market during the pandemic. The paper also suggested that the crisis caused by the pandemic has led to an increase in the number of food insecure people in Poland and other parts of the world. Furthermore, the authors suggest that the pandemic presents an opportunity to create transformative public policies that can build more sustainable food systems and maintain the food system innovations that emerged during the pandemic [16].

Jiang X., Chen Y. and Wang J. found that in response to the pandemic, some countries have implemented seed safety interventions and made trade-offs between epidemic control, food security, and economic development. Authors in their research considered that developed countries, such as Italy, have predominantly producer-oriented response measures that focus on the long-term recovery and development of the national economy affected by COVID-19. On the other hand, less developed countries, such as Malawi, have predominantly consumer-oriented and trade-oriented response measures that prioritize controlling the pandemic in the short term while ensuring that people have enough food [17].

The foreign researchers Farcas A.C., Galanakis C.M., Socaciu C., Pop O.L., Tibulca D., Paucean A., Jimborean M.A., Fogarasi M., Salanta L.C., Tofana M. discussed in their work how the COVID-19 pandemic has exposed vulnerabilities in various domains beyond the medical system, such as social and economic safety, food safety, and mental health. It emphasized the need for crisis and post-crisis management tools, and the application of sustainable principles to minimize short- and long-term pandemic drawbacks. The research also highlighted the importance of managing resources and stabilizing food supply chains to ensure global food security. The pandemic has raised awareness of the need for proper management to minimize the negative effects of future crises [18].

In the context of Kazakhstan, several studies have been conducted to assess the current state of food security and the measures taken by the government to address the issues. For instance, a study by Azretbergenova G., Syzdykova A., Biymendeev B. analyzed the impact of COVID-19 on food systems and how it has threatened people's access to food worldwide. The paper emphasized the importance of ensuring food security in Kazakhstan, particularly in light of the COVID-19 pandemic's impact on food systems. It highlighted the need to prioritize the development of the domestic market and create a domestic brand of goods to increase the competitive advantages of food products [19].

Temirbekova A.B., Dulambayeva R.T., Kaldiyarov D.A., considered in their research the analysis of the current state of the agricultural sector in Kazakhstan, identify problems, and develop proposals for its development during the COVID-19 pandemic. Their article suggested that attention should be paid to producing high-quality organic food and expanding competition on the agri-food market through cooperative trade and distribution using digital platforms as an alternative to large retail chains [20].

The article by Zhenskhan D., Pyagay A., Bespayeva R., Kadrinov M., Omarkhanova Zh., Tatikova A. focused on the current state of food security in the Republic of Kazakhstan, with a particular emphasis on the impact of COVID-19 on the agricultural system. They discussed the importance of maintaining a balance of interests of the common market for agricultural products while ensuring food security and adapting to climate changes. The authors offered some ways to solve these problems in the context of climate changes. Overall, the study highlighted the need to address the challenges faced by the agricultural sector to ensure food security in Kazakhstan [21].

Kazakhstani authors Yeszhanova Zh.Zh., Yermekbayeva D.D., Myrzayeva U.A. analyzed in their study the changes in food security in Kazakhstan in 2020 and how the COVID-19 pandemic affected it. The paper highlighted the effectiveness of government measures taken to support the development of agricultural producers to ensure uninterrupted food delivery during the pandemic. However, the authors identified several problems in the agricultural sector, including low labor productivity, weak

interaction between agro-science and the business community, insufficient technical equipment, issues with the storage and marketing of agricultural products, and the underdevelopment of trade and logistics systems [22].

Chukubayev Ye., Darkembayev A. analyzed the impact of the COVID-19 pandemic on global hunger and food security, which was already a problem prior to the pandemic due to various socio-economic and environmental factors. The paper examined the vulnerabilities of modern food systems and the limitations of current indicators used to assess hunger levels. The article also discussed the financial support and measures taken by governments and financial institutions to address food security issues during the pandemic. The paper suggested that improvements in technology, particularly in tillage, harvesting, and supply chain management, and the adoption of green energy could help alleviate the problem [23].

In conclusion, the literature reviewed highlights the significant impact of the COVID-19 pandemic on food security globally and in Kazakhstan. The pandemic has disrupted global food supply chains, leading to price hikes, supply shortages, and exacerbating existing food security challenges in many countries. In Kazakhstan, the pandemic has threatened people's access to food and highlighted the need to prioritize the development of the domestic market and create a domestic brand of goods to increase the competitive advantages of food products.

The reviewed literature also suggests that the pandemic presents an opportunity to create transformative public policies that can build more sustainable food systems and maintain the food system innovations that emerged during the pandemic. It is essential to address the challenges faced by the agricultural sector, including low labor productivity, weak interaction between agro-science and the business community, insufficient technical equipment, issues with the storage and marketing of agricultural products, and the underdevelopment of trade and logistics systems.

Overall, previous research emphasizes the importance of food security for sustainable development and highlights the need for a comprehensive understanding of the factors that affect food security. It is crucial to manage resources and stabilize food supply chains to ensure global food security and minimize the negative effects of future crises.

Results and discussion

Food security is crucial for maintaining the health and well-being of populations [24], as well as for sustaining economic growth and stability [25]. Agriculture plays a crucial role in food security as it is the main source of food for most populations around the world. The level of food security of a country is closely linked to its agricultural production and its ability to feed its population. The following factors can affect agriculture and in turn, food security:

- climate change: changes in weather patterns and extreme weather events can negatively impact agricultural production and lead to food shortages.
- natural disasters: earthquakes, hurricanes, and droughts can cause significant damage to crops, soil, and infrastructure, affecting the ability of farmers to produce food.
- conflict and war: political instability and conflict can disrupt trade and transportation routes, leading to food shortages and price increases.
- trade policies: changes in trade policies, such as tariffs and subsidies, can impact the flow of food across borders and the competitiveness of agricultural producers.
- agricultural technology: the adoption of new agricultural technologies and practices can help to improve yields and increase the efficiency of food production.
- government policies: government policies on land use, water management, and support for agricultural producers can have a significant impact on food security.
- economic conditions: economic conditions, such as recessions, inflation, and fluctuations in the exchange rate, can affect the ability of people to access food and the ability of farmers to produce it.

All these factors can have a significant impact on food security and must be carefully considered when developing policies and programs aimed at improving food security.

The most important world situations that strongly affected food security in Kazakhstan in the last 3 years are COVID-19 pandemic and Ukrainian military conflict [26].

It should be noticed that the COVID-19 pandemic had a significant impact on the agricultural sector, causing disruptions to supply chains and leading to changes in consumer behavior [27]. Additionally, the pandemic resulted in economic difficulties for many countries, including decreased government spending on agriculture and reduced international trade. It is possible that these factors will continue to affect agricultural producers in the world and in Kazakhstan, leading to difficulties in 2022. However, the exact state of agricultural producers will depend on a variety of factors, including the success of government responses to the pandemic and the speed of economic recovery.

One more significant situation which also have an impact on food security is Ukrainian military conflict. The conflict in Ukraine can impact food security in several ways. Firstly, it may cause disruptions in trade and transportation of food, affecting the availability of food in certain regions. Secondly, the conflict can cause economic instability, reducing people's purchasing power and access to food. Additionally, the conflict can lead to population displacement and migration, putting additional stress on food systems. Finally, the conflict may divert resources and attention away from efforts to improve food security and agriculture, reducing the overall progress towards sustainable food systems [28].

The conflict in Ukraine may have indirect effects on food security in Kazakhstan. For example, it could lead to changes in trade patterns and commodity prices, disrupt food production and distribution systems, or impact the stability of the region as a whole, which could in turn affect food security. Additionally, a decrease in demand for goods in conflict-affected regions can result in decreased exports and reduced economic growth, which could also affect food security. However, it is difficult to accurately predict the extent to which the conflict in Ukraine will impact food security in Kazakhstan, as it will depend on a range of complex and interrelated factors.

It is important for governments and organizations to prioritize modern food security initiatives to ensure adequate food access for all and to mitigate the risks of food insecurity. The main modern agrarian purpose of many countries is to increase food production and distribution to ensure food security and access to safe, nutritious and affordable food for their populations. This also involves promoting sustainable agricultural practices and reducing the negative impact of agriculture on the environment, as well as promoting rural development and improving the livelihoods of farmers and rural communities.

Food security is a complex and multi-faceted concept that involves various indicators. Two of the main indicators that provide a general picture of a country's economic situation is Gross Domestic Product (GDP) and Final Consumption Expenditure (FCE). GDP represents the total value of goods and services produced within a country's borders in a given time period, whereas FCE refers to the total amount spent by households, non-profit institutions, and government on consumption goods and services during the same time period.

The connection between GDP, FCE and food security is a complex and multifaceted relationship. On one hand, a higher GDP, FCE is often associated with increased food security, as a higher standard of living can lead to greater access to food and other resources. Additionally, a strong economy can also lead to greater investments in the agricultural sector, which can result in improved food production and distribution.

On the other hand, economic growth can also contribute to food insecurity in some cases. For example, rapid economic growth can lead to the displacement of small-scale farmers, who are often critical to food security in developing countries. Additionally, economic growth can also lead to rising food prices, which can result in reduced access to food for low-income households.

Thus, Table 1 (p. 245) looks at Kazakhstan's gross domestic product and final consumption expenditure for the period from 2018 to 2022.

Analyzing the data in Table 1, we can see that the total gross domestic product (GDP) in Kazakhstan in 2022 was $225.3 billion, an increase of 25.6%, or in absolute terms $45.98 billion, compared to 2018. It is worth noting that during the height of the coronavirus pandemic in 2020, GDP decreased by 5.8% or $10.6 billion, compared to 2019. However, in 2021, this indicator saw a significant increase of 15.1%, indicating a robust recovery and positive growth trajectory for the country's economy. The per capita GDP in 2022 increased by 25.8%, or $2355 compared to 2020.

Table 1 – Gross Domestic Product and Final Consumption Expenditure in Kazakhstan 2018–2022, USD

Indicators	Years					Growth rate 2022 (%) to			
	2018	2019	2020	2021	2022	2018	2019	2020	2021
Gross domestic product total, billion	179,3	181,7	171,1	197,1	225,3	25,6	24,0	31,7	14,3
Gross domestic product per capita	9 812,6	9 812,6	9 121,6	10 373,8	11 476,6	17,0	17,0	25,8	10,6
Final consumption expenditure, billion	108,4	111,6	112,5	122,0	135,7	25,2	21,6	20,6	11,3
Final consumption expenditure per capita	5 929,0	6 026,0	5 997,3	6 419,4	6 912,2	16,6	14,7	15,3	7,7
Note: Compiled according to the source [29].									

The country's final consumption expenditure (FCE) in 2022 was $135.7 billion, an increase of 25.2% or $27.3 billion compared to 2018. During the economic disruptions caused by the pandemic in 2020, FCE saw a moderate increase of 1.3% in 2020 compared to 2019, as households adjusted their spending behaviors in response to the changing economic landscape. In 2021, this indicator experienced a substantial increase of 8.4% compared to the previous period. The per capita FCE in 2022 increased by 7.7% or $492.8 compared to 2021, despite a decrease of 0,5% in 2020 compared to 2019.

In conclusion, during the analyzed period of 2018–2022, Kazakhstan's economy exhibited notable resilience and growth despite various challenges, including the pandemic and economic fluctuations. The significant rebound in GDP and final consumption expenditure demonstrates the country's ability to adapt to changing circumstances and maintain a positive development trajectory.

Agricultural production is also one of the key factors that is associated with the level of food security. A country with a strong and productive agricultural sector is more likely to have a higher level of food security, as it is able to produce enough food to meet the needs of its population. Table 2 shows the agricultural production in total and separately for crop and livestock production in Kazakhstan for the period 2018–2022.

Table 2 – Agricultural production and crop and livestock production in Kazakhstan 2018–2022, thousand tenge

Indicators	Years					Growth rate 2022 (%) to			
	2018	2019	2020	2021	2022	2018	2019	2020	2021
Agricultural production	4474,09	5151,16	6334,67	7515,43	9223,05	106,1	79,0	45,6	22,7
Crop production	2411,49	2817,66	3687,31	4387,24	5574,12	131,1	97,8	51,2	27,1
Livestock production	2050,46	2319,50	2637,46	3116,97	3634,54	77,3	56,7	37,8	16,6
Note: Compiled according to the source [30].									

The table 2 illustrates data related to agricultural production, crop production, and livestock production in Kazakhstan spanning from 2018 to 2022. Over this five-year period, the agricultural production in Kazakhstan experienced a substantial growth, ascending from 4,474.09 thousand tenge in 2018 to 9,223.05 thousand tenge in 2022. This represents an impressive growth rate of 106.1%. A closer examination reveals that this growth was not uniform across the board.

Specifically, crop production, which constitutes a significant part of the agricultural sector, demonstrated a remarkable upward trajectory. The figures climbed from 2,411.49 thousand tenge in 2018 to 5,574.12 thousand tenge in 2022, indicating a growth rate of 131.1%. This indicates a strategic emphasis on enhancing crop yields, potentially driven by advancements in farming techniques, technology adoption, and agricultural policies.

Contrastingly, livestock production displayed a more modest growth pattern. The numbers moved from 2,050.46 thousand tenge in 2018 to 3,634.54 thousand tenge in 2022, reflecting a growth rate of 77.3%. While still positive, this growth rate was relatively lower than crop production, signifying potential areas where further investments or interventions might be needed to boost livestock-related activities.

Considering the growth rates of the three indicators, it's apparent that crop production witnessed the most rapid expansion, closely followed by livestock production, while the overall agricultural production also showed impressive progress. Such a trend could be attributed to various factors. For instance, the government might have invested more resources in crop-related initiatives, capitalizing on Kazakhstan's favorable climate and soil conditions. Additionally, advancements in agricultural technology and improved farming practices could have played a pivotal role in bolstering crop output.

On the other hand, livestock production might have encountered some constraints or challenges that limited its growth compared to crops. These could include issues related to animal health, breeding practices, or market demand.

In summary, the data portrays a dynamic agricultural landscape in Kazakhstan between 2018 and 2022. The robust growth in agricultural production, particularly in crop production, underscores the nation's commitment to bolstering its food security and economic resilience. Nevertheless, a more comprehensive analysis of the contributing factors behind these growth patterns would provide deeper insights into the country's agricultural evolution.

Table 3 – Production of livestock and poultry for slaughter, cereal and legume crops (including rice) yields 2018–2022, thousand tons

Indicators	Years					Growth rate 2022 (%) to			
	2018	2019	2020	2021	2022	2018	2019	2020	2021
Production of livestock and poultry for slaughter, thousand tons	1 871,9	1 975,0	2 058,5	2 162,2	2 170,9	16,0	9,9	5,5	0,4
Cereal and legume crops (including rice) yields, thousand tons	20 271,8	17 428,6	20 065,3	16 375,9	22 030,50	8,7	26,4	9,8	34,5
Note: Compiled according to the source [30].									

Table 3 presents a comprehensive insight into the production dynamics of livestock and poultry designated for slaughter, alongside the yields of cereal and legume crops (including rice) within the timeframe of 2018 to 2022. Accompanied by the growth rate of 2022 in relation to each preceding year, this dataset sheds light on the agricultural landscape's evolution during this period.

The production of livestock and poultry intended for slaughter has demonstrated a consistent upward trajectory throughout the five-year span. The cumulative growth rate of 16.0% from 2018 to 2022 underscores a sustained expansion. Factors such as heightened demand, improved production techniques, or shifts in consumer preferences might have contributed to this renewed growth. However,

this growth has been a blend of varying rates, witnessing a substantial rise of 9.9% in 2019, followed by a more tempered increase of 5.5% in 2020. The growth rate further decelerated to a marginal 0.4% in 2021. This trend suggests a potential maturation of this sector, with a notable stabilizing effect by 2022, indicative of an equilibrium between supply and demand.

In stark contrast, the yields of cereal and legume crops, an indispensable component of food security and agricultural sustainability, have experienced dynamic fluctuations. The initial year, 2018, registered a growth rate of 8.7%, indicating a positive momentum. Subsequently, 2019 witnessed a notable downturn in yields, denoted by a growth rate of -26.4%, reflecting potential challenges faced by the agricultural sector This could be attributed to various factors, encompassing the effects of climate change, drought, pest infestations, or alterations in agricultural practices. However, the following year, 2020, witnessed a commendable recovery with a growth rate of 9.8%, suggesting adaptive strategies to counter the prior decline. This recovery might point to advancements in crop management strategies or favorable weather conditions during that period. Remarkably, 2021 saw a substantial leap in yields with a growth rate of 34.5%, indicating the sector's resilience and potential advancements in agricultural practices.

Table 4 – Consumption of food products by the population, on average per capita per year, kg

Indicators	Years					Growth rate 2022 (%) to			
	2018	2019	2020	2021	2022	2018	2019	2020	2021
Bread and cereal products	138,5	136,8	140,3	133,2	128,4	-7,3	-6,1	-8,5	-3,6
Meat and meat products	77,9	79,2	83,7	82,8	78,0	0,1	-1,5	-6,8	-5,8
Fish and seafood	13,2	14,4	15,1	14,4	14,4	9,3	0,0	-4,7	0,0
Milk and dairy products	261,3	253,2	259,4	243,6	226,8	-13,2	-10,4	-12,6	-6,9
Eggs (units)	193,3	194,4	199,1	194,4	194,4	0,6	0,0	-2,4	0,0
Oils and fats	19,2	16,8	17,3	16,8	15,6	-18,6	-7,1	-9,8	-7,1
Fruit	74,9	76,8	78,7	76,8	73,2	-2,3	-4,7	-6,9	-4,7
Vegetables (excluding potatoes)	94,1	86,4	86,4	80,4	78,0	-17,1	-9,7	-9,7	-3,0
Potatoes	48,6	48,0	50,1	46,8	44,4	-8,6	-7,5	-11,4	-5,1
Sugar, jam, honey, chocolate, confectionery	46,3	43,2	43,0	44,4	40,8	-12,0	-5,6	-5,2	-8,1
Note: Compiled according to the source [30].									

According to the table 4, the consumption of various food groups has fluctuated over the years, with some trends potentially being influenced by factors such as changing consumer preferences, economic constraints, and supply chain disruptions. In particular, the COVID-19 pandemic may have played a role in altering consumption patterns for some food groups.

Bread and cereal products, for example, saw a 5.1% decrease in consumption in 2021 compared to the previous year, likely due in part to the pandemic. The trend of declining consumption continued into 2022, with consumption further dropping to 128.4 kg per capita, a decrease of 3.6%. This suggests a sustained shift away from bread and cereal products in the population's diet.

Meat and meat products also saw a slight decrease in consumption in 2021, with the trend continuing into 2022. Economic constraints and changes in lifestyle due to the pandemic may have contributed to this trend. Lockdowns, reduced economic activity, and concerns about the virus could

have impacted consumer behavior. People might have turned to more shelf-stable or plant-based food options due to supply chain disruptions or health-related considerations.

Fish and seafood consumption had been increasing steadily prior to the pandemic, but saw a decline of 4.6% in 2021 due to supply chain disruptions and economic constraints. However, consumption rates for this group are expected to increase as supply chains become more stable and the economy improves.

Milk and dairy products have shown a consistent decline in consumption over the five-year period from 2018 to 2022. Starting at 261.3 kg per capita in 2018, the consumption dropped to 226.8 kg per capita in 2022, reflecting a significant decrease of 13.2%. This decline could be attributed to several factors. Firstly, changing dietary preferences and the growing popularity of alternative milk products, such as plant-based options, might have impacted traditional dairy consumption. Additionally, increasing awareness of lactose intolerance or dairy allergies could have prompted individuals to reduce their milk and dairy intake. Economic factors might also contribute, as dairy products can be relatively expensive. However, the declining trend seems to moderate in recent years, with the growth rates of -10.4% in 2019, -12.6% in 2020, and -6.9% in 2021. Certainly, the COVID-19 pandemic likely played a role in the decline of milk and dairy product consumption, particularly in the year 2020. The pandemic led to significant disruptions in supply chains, changes in consumer behavior, and economic uncertainties.

In the case of Fruit, the data shows a gradual decline in consumption from 74.9 kg per capita in 2018 to 73.2 kg per capita in 2022, with negative growth rates of -2.3% to -4.7%. This trend could be influenced by multiple factors. While the COVID-19 pandemic might have disrupted supply chains and availability, leading to a slight dip in 2020 and 2021, other factors like seasonal variations and economic constraints could also contribute to these changes. People might have prioritized staple foods over perishable items during uncertain times.

Similarly, for Vegetables (excluding potatoes), the data indicates a consistent decline in consumption from 94.1 kg per capita in 2018 to 78.0 kg per capita in 2022, accompanied by negative growth rates ranging from -3.0% to -17.1%. The pandemic's disruptions to distribution and economic activities likely contributed to this trend. Additionally, changing dietary habits and preferences could have influenced the choice of vegetables, leading to fluctuations in consumption.

The consumption of Potatoes also experienced a decline, falling from 48.6 kg per capita in 2018 to 44.4 kg per capita in 2022, with negative growth rates of -5.1% to -11.4%. While the pandemic could have affected access to fresh produce, shifts in dietary preferences and the popularity of low-carb diets could have played a role in this decline.

Finally, the category of Sugar, Jam, Honey, Chocolate, Confectionery saw a continuous decrease in consumption from 46.3 kg per capita in 2018 to 40.8 kg per capita in 2022, with negative growth rates ranging from -5.2% to -12.0%. This trend could be driven by a combination of factors. Health-consciousness might have prompted individuals to reduce their intake of sugary and confectionery products. Additionally, the pandemic might have led to a focus on healthier eating habits, economic constraints, or supply chain disruptions impacting availability.

Understanding changes in food consumption patterns can provide insights into factors that impact both individual health and larger-scale economic and societal trends. Further research is needed to better understand the underlying drivers of these consumption patterns and their potential implications for public health and well-being.

In conclusion, food security is a critical issue that affects the health and well-being of populations worldwide. Agriculture plays a pivotal role in achieving food security, but several factors can affect it, including climate change, natural disasters, conflict and war, trade policies, agricultural technology, government policies, and economic conditions. In the last three years, Kazakhstan has faced challenges to food security due to the COVID-19 pandemic. The COVID-19 pandemic disrupted supply chains, leading to changes in consumer behavior, reduced government spending on agriculture, and decreased international trade. Kazakhstan's GDP and FCE are essential indicators that provide a general picture of the country's economic situation and food security. It is crucial for governments and organizations to prioritize modern food security initiatives that promote sustainable agricultural practices and reduce the negative impact of agriculture on the environment, as well as improving the livelihoods of farmers and rural communities.

Conclusion

Food security is a pressing global issue, and the COVID-19 pandemic has only made the challenges more severe. The pandemic has caused supply chain disruptions, price inflation, job losses, and reduced agricultural production, which have contributed to food insecurity. Kazakhstan is no exception, and the country has faced similar challenges. However, positive developments are underway to improve food security through measures such as supporting local agriculture, expanding food assistance programs, and investing in sustainable food systems.

Assessing the level of food security is essential for monitoring progress, identifying emerging challenges, informing policy and decision-making, mobilizing action, and ensuring accountability. Food security refers to the availability, accessibility, and adequacy of food to meet the nutritional needs of a population. Kazakhstan has approved a package of measures to strengthen the food sector and support agriculture. The government has made use of state food reserves, reduced the value of food products by restricting exports, and implemented a reduced tariff policy on imported food products.

Based on the research conducted, the hypothesis that the COVID-19 pandemic has had a negative impact on food security in the country has been confirmed. The findings of the study have highlighted the challenges faced by the population in accessing and affording food during the pandemic.

Based on the conducted research, primary directions for improving the level of food security have been proposed, with the main ones being:

- support small-scale farmers – small-scale farmers are often the most vulnerable to food insecurity. Supporting them through policies that improve access to credit, inputs, and markets can help improve their yields and income.
- promote sustainable agriculture – sustainable agriculture practices can help improve food security by protecting the environment, preserving natural resources, and increasing yields.
- strengthen food supply chains – building stronger food supply chains can help ensure that food reaches those who need it. This can be done by improving infrastructure, reducing food waste, and promoting fair trade.
- improve nutrition education – educating people about proper nutrition can help them make informed decisions about their diets, which can lead to better health outcomes.
- address climate change – climate change is a major threat to food security, as it can lead to crop failures, droughts, and other extreme weather events. Addressing climate change through mitigation and adaptation measures is crucial to improving food security.
- increase access to clean water – access to clean water is essential for agriculture, and it is also important for ensuring that people have safe and adequate drinking water. Improving access to clean water can help improve food security.
- address conflict and instability – conflict and instability can disrupt food production and distribution, leading to food shortages and insecurity. Addressing the root causes of conflict and promoting stability can help improve food security.
- promote food safety – ensuring that food is safe to eat is an important aspect of food security. This can be done through better food safety regulations and inspections.
- address poverty – poverty is a major driver of food insecurity. Addressing poverty through policies that promote economic growth, reduce inequality, and provide social safety nets can help improve food security.
- increase agricultural productivity – increasing agricultural productivity is key to improving food security. This can be done by investing in agricultural research and development, improving access to agricultural inputs such as seeds and fertilizers, and providing training to farmers.

The research being conducted in Kazakhstan is contributing to a better understanding of the nature and extent of food insecurity in the country and to the development of evidence-based solutions to address it. The problem of food security is a deeply researched and well-documented issue that is attracting attention from a wide range of actors in the global community. The depth and breadth of research on food security reflects the importance of this issue and the recognition of the need for effective solutions to ensure food security for all.

In conclusion, it is crucial to address the issue of food security and ensure that people have access to adequate and nutritious food. The COVID-19 pandemic has highlighted the importance of food security, and the positive developments in Kazakhstan and other countries are steps in the right direction. Sustainable food systems, supporting local agriculture, expanding food assistance programs, and investing in research are some of the ways to address food insecurity. The government, international organizations, academic institutions, and other stakeholders should work together to develop evidence-based solutions to address food insecurity and ensure food security for all.

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А.А. ДУЙСЕНБЕКОВА,*[1]
докторант.
*e-mail: aigerim.duisenbekova95@gmail.com
ORCID ID: 0000-0001-9167-8076
Л.Н. Гумилев атындағы Еуразия
ұлттық университеті,
Астана қ., Қазақстан,

ПАНДЕМИЯДАН КЕЙІНГІ ЖАҒДАЙДАҒЫ АЗЫҚ-ТҮЛІК ҚАУІПСІЗДІГІН БАҒАЛАУ: ҚАЗАҚСТАН РЕСПУБЛИКАСЫНЫҢ МЫСАЛЫНДА

Аңдатпа

Бұл зерттеу мақаласында Covid-19 пандемиясының Қазақстандағы азық-түлік қауіпсіздігіне әсері қарастырылады. Зерттеудің мақсаты – пандемия кезіндегі азық-түлік қауіпсіздігіне әсер ететін негізгі факторларды анықтау және оны жақсарту бағыттарын ұсыну. Зерттеу әдістемесі әдебиеттерді шолуды, талдау, синтездеу, абстракциялау, жалпылау, индукция, дедукция және аналогия сияқты ғылыми танымның әртүрлі логикалық әдістерін қолдана отырып статистикалық деректерді талдауды қамтиды. Зерттеу жан-жақты және азық-түлік қауіпсіздігіне әсер ететін аспектілердің кең ауқымын қамтиды, азық-түлік қауіпсіздігі мәселелерінің негізгі себептері туралы құнды ақпарат береді және елдегі азық-түлік қауіпсіздігін жақсарту үшін практикалық шешімдерді ұсынады. Зерттеудің негізгі нәтижелері пандемияның Азық-түлік жеткізу тізбегіндегі үзілістерге және пандемиядан туындаған экономикалық құлдырауға байланысты Қазақстандағы азық-түлік қауіпсіздігі деңгейіне теріс әсер еткенін көрсетеді. Статистикалық деректерді талдау жергілікті азық-түлік өндірісін жақсартуға және импорттық азық-түлік тауарларына тәуелділікті азайтуға назар аудару қажеттілігін көрсетеді. Зерттеу Covid-19 пандемиясының Қазақстандағы азық-түлік қауіпсіздігіне әсерінің эмпирикалық дәлелдерін ұсына отырып және оны жақсарту бойынша нақты бағыттарды ұсына отырып, азық-түлік қауіпсіздігі саласына үлес қосады. Бұл зерттеудің практикалық маңыздылығы – саясаткерлер мен тамақ өнеркәсібіндегі мүдделі тараптарды пандемия кезінде және одан кейін Қазақстанда азық-түлік қауіпсіздігін қамтамасыз ету үшін қабылдануы тиіс шаралар туралы хабардар ете алады.

Тірек сөздер: азық-түлік қауіпсіздігі, ауыл шаруашылығы, азық-түлікпен қамтамасыз ету, көрсеткіштер, тамақ өнеркәсібі, азық-түлік, пандемия.

А.А. ДУЙСЕНБЕКОВА,*[1]
докторант.
*e-mail: aigerim.duisenbekova95@gmail.com
ORCID ID: 0000-0001-9167-8076
[1]Евразийский национальный
университет им. Л.Н. Гумилева,
г. Астана, Казахстан

ОЦЕНКА ПРОДОВОЛЬСТВЕННОЙ БЕЗОПАСНОСТИ В УСЛОВИЯХ ПОСТПАНДЕМИИ: ПРИМЕР РЕСПУБЛИКИ КАЗАХСТАН

Аннотация

В данной исследовательской статье рассматривается влияние пандемии COVID-19 на продовольственную безопасность в Казахстане. Цель исследования – выявить основные факторы, влияющие на уровень продовольственной безопасности в период пандемии, и предложить направления ее повышения. Методология исследования включает обзор литературы, анализ статистических данных с использованием различных логических методов научного познания, таких как анализ, синтез, абстракция, обобщение, индукция, дедукция, аналогия. Исследование является всеобъемлющим и охватывает широкий спектр аспектов, влияющих на продовольственную безопасность, дает ценную информацию об основных причинах проблем с продовольственной безопасностью и предлагает практические решения для повышения продовольственной безопасности в стране. Основные результаты исследования показывают, что пандемия оказала негативное влияние на уровень продовольственной безопасности в Казахстане из-за сбоев в цепочках поставок продовольствия и экономического спада, вызванного пандемией. Анализ статистических данных подчеркивает необходимость сосредоточить внимание на улучшении местного производства продуктов питания и снижении зависимости от импортных продуктов питания. Исследование вносит свой вклад в область продовольственной безопасности, предоставляя эмпирические данные о влиянии пандемии COVID-19 на продовольственную безопасность в Казахстане и предлагая конкретные направления для ее улучшения. Практическая значимость данного исследования заключается в том, что оно может информировать политиков и заинтересованных лиц в пищевой промышленности о мерах, которые необходимо предпринять для обеспечения продовольственной безопасности в Казахстане во время и после пандемии.

Ключевые слова: продовольственная безопасность, сельское хозяйство, производство, поставки продовольствия, показатели, пищевая промышленность, продукты питания, пандемия.