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To cite this article: G K Dzhancharova *et al* 2022 *IOP Conf. Ser.: Earth Environ. Sci.* **981** 022089

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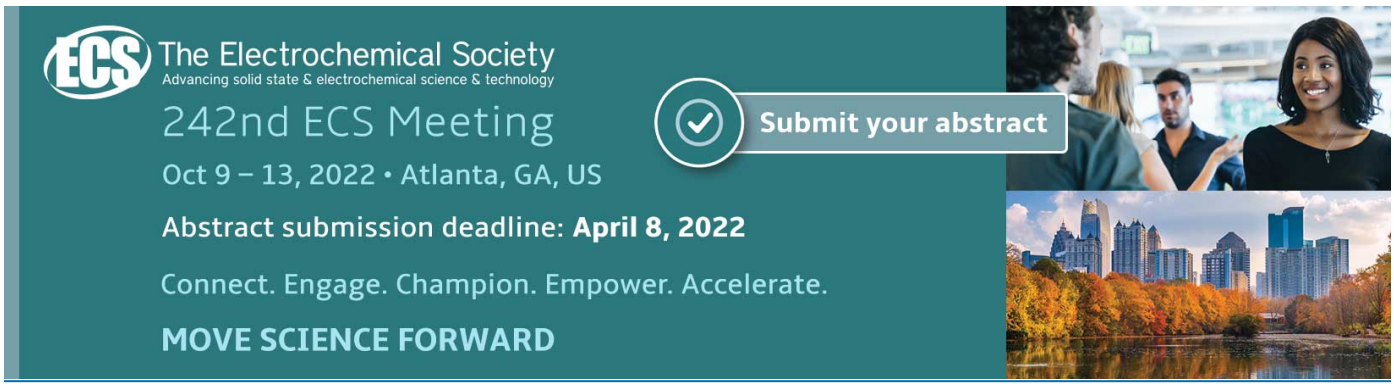

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Global triggers of reduced resilience of national food security

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Abstract. National food systems are constantly exposed to external triggers that reduce their resilience and integrity. The COVID-19 pandemic has shown the vulnerability of many food systems that do not have a sufficient margin of safety and resilience, which requires the introduction of additional government support measures and stimulation of food production and transportation to destinations. The expanded concept of food security allows a more multifaceted look at this concept and reveal its essence. Assessment of existing external triggers and their clear identification will allow in the future to minimize their impact on the state of sustainability of the national food system.

1. Introduction

The Sustainable Development Goals defined by the world community, which should be achieved by 2030, directly depend on the sustainability of national food systems, which in times of crisis should provide the country's population with the most necessary resource - food. An alarming fact remains the upward trend in world hunger in its various manifestations (food shortages, hidden hunger, poor nutrition, dystrophy and obesity), which has not yet been reversed by existing regulatory and financial instruments. In addition to the problems of hunger, there are problems associated with the impoverishment of agricultural land and climate change on the planet, political and economic conflicts, demographic imbalances in the poorest countries, biological threats and periodic epidemiological outbreaks of diseases of various origins. Such problems are facing the food systems of countries today, which dictates the need to find the most effective methods and tools for regulation [1].

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In 2021, the situation with world hunger was aggravated and aggravated by political conflicts and the crisis of the Covid-19 pandemic. Statistics show not the most positive prospects - at the beginning of 2021, about 41 million people in the world are experiencing hunger, mainly residents of Ethiopia, Madagascar, South Sudan, and Yemen. The number of people potentially close to hunger increased from 135 million to 270 million people, which was provoked by new covid-19 factors. In fact, humanity is faced with an unprecedented food crisis, when, despite all the efforts of international charitable organizations and humanitarian missions, the problem of hunger and the number of people below the poverty line continues to grow [2]. If we consider the countries where the population is most undernourished, then the following ranking can be built (figure 1).

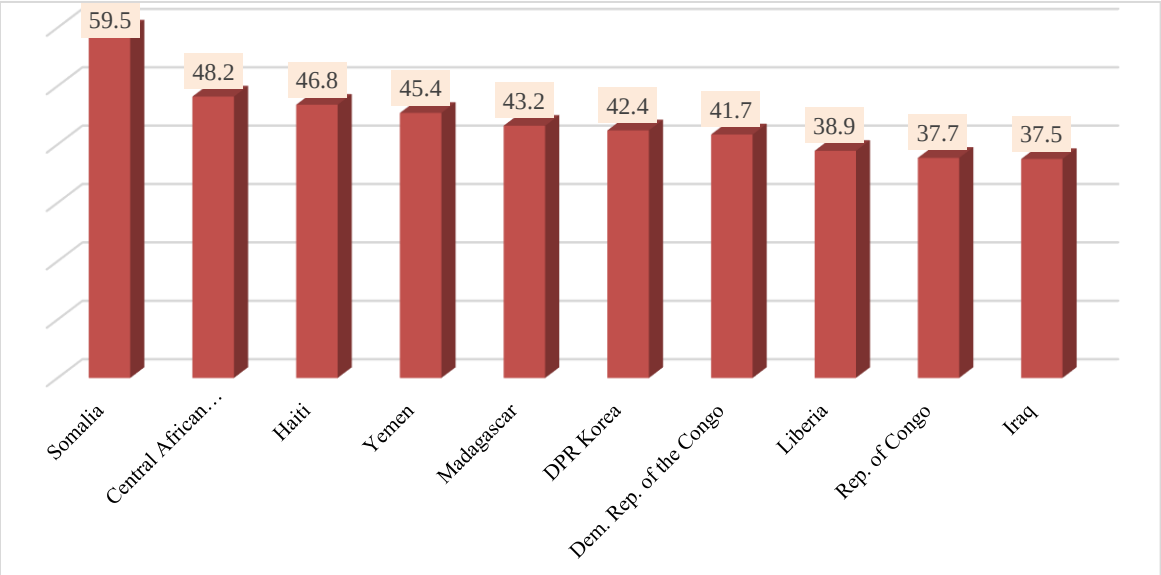

Figure 1. Countries with the highest levels of the Global Hunger Index (GHI) index of "malnutrition" in 2021 according to UN calculations.

According to the graph presented, we see that the highest rate of malnutrition among the local population is observed in Somalia, where about 59.5% of the population is regularly undernourished. This is due to the unstable political and economic situation within the country, as well as natural anomalous phenomena (drought, locust), which were additionally joined by high mortality and morbidity due to covid-19. The second place is occupied by the Central African Republic with an index of 48.2, that is, about half of the people do not have access to food. The reason is the protracted civil war, which does not provide an opportunity for stable work and the movement of goods and people within the country. In fact, all the countries represented are in the zone of military conflicts, risky agricultural production, do not have enough production resources and a high level of overpopulation. In addition to covid factors, the listed triggers have unleashed a growing threat of instability in the global food market [3, 4].

2. Results

The modern understanding of food security is constantly expanding and supplemented by new criteria for assessing and measuring this concept. The gradual complication of this concept is dictated by the development of the world economic system, the complication of interaction between countries, new triggers for the formation of the stability of national economies in the context of the ongoing pandemic.

The accepted definition of food security as the existence of permanent physical, social and economic access for people to a sufficient amount of safe and nutritious food for a high-quality and healthy lifestyle no longer meets the modern requirements of social development. In this connection, it is customary to supplement the definition and measurement of this concept with 2 additional criteria -

subjectivity and stability. It is possible to schematically represent the change in food security along 6 dimensions.

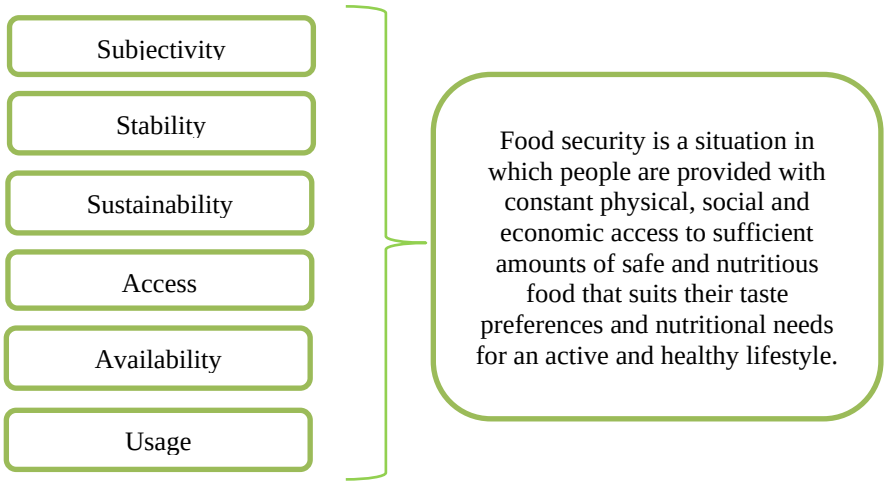

Figure 2. Food safety measurement parameters.

Figure 2 shows modern representations of measurements of the concept of "food security", which today form not only the general concept of this category, but also make it possible to quantitatively measure its level depending on clear criteria [5].

Let us consider in more detail the criteria for food security: availability of food of sufficient quality and quantity to meet people's needs for food produced by domestic producers; accessibility (economic, social, physical) presupposes the availability of a sufficient amount of financial resources for the purchase of food by all social groups of the population; the use of all possible sources of clean water and food in compliance with sanitary and medical standards for the safe satisfaction of physiological needs; stability is the ability of the food system to maintain its condition and perform its functions even in times of crisis and natural disasters; Subjectivity is the ability of individuals to choose food and participate in food policy regulation processes; sustainability - the application of methods of strategic formation of natural, social and economic systems to meet the needs of the current generation without harming the future generation. Thus, the presented measurements of food security focus on various angles of research of food systems in the context of the implementation of new sustainable approaches. The food systems themselves, due to their specificity, cause certain damage to the environment and change its ecology, sometimes violate biodiversity by invading the wild human environment. These systems have a significant impact on the planet's climatic changes, on the level and reserves of fresh water, on the total area of fertile soils, on the level of the World Ocean, on the conservation of the planet's biodiversity, which cannot but worry the world community [6]. Therefore, many countries are trying to define clear boundaries of their "food production" to create sustainable and safe food supply systems, while not crossing the boundaries of wildlife.

Today, much attention is paid to the criterion of the sustainability of the food system due to the need for consistency between the main goals of sustainable development and the principle of the right to food of every person [7]. The concept itself is complex and includes not only the food system, but also the production system, the logistics system for the supply of raw materials and food, food supplies and consumer behavior, nutrition indicators and the quality of nutrition of every person in the country. On the basis of the listed ecosystems, a national system of food security and food security is being formed. It can even be noted that a specific food environment is being formed, determined by the physical, economic, socio-cultural and political conditions to ensure the availability and safety of food for everyone. A more complex chain of interconnection of the food environment can be represented in figure 3.

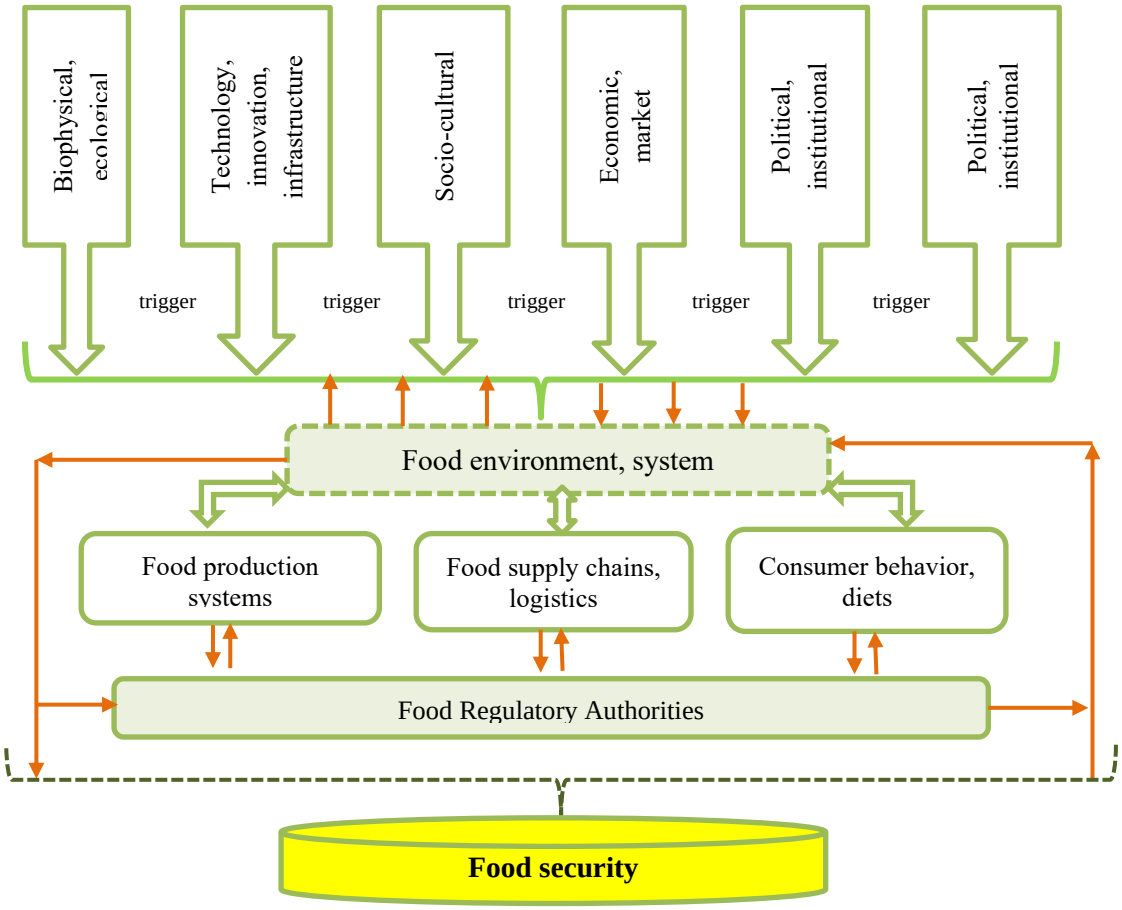

Figure 3. Triggers for the resilience of the national food system.

The presented scheme reflects the main triggers affecting the sustainability of the national food system in the context of competition for world food markets. The listed triggers represent various aspects of the interdependence between the points of intersection with production systems and the points of intersection with transport systems, as well as potential threats to the existing agro-ecological system and food security of the country. In order for them not to work during crisis periods, it is necessary to regularly monitor them and assess the state of the life support systems associated with them. An important role in this relationship is played by the state of the environment, in which the food environment and the health of citizens are formed. Depending on the environmental situation, a program of food supply for the country's population and a model of agricultural production will be implemented [8, 9]. In our study, we distinguish 6 categories of triggers that directly affect the state of the food environment, among which there are unadjustable and directly dependent on human activity in the environment. Nevertheless, all of them must be regularly assessed for the impact on food security and food policy of the state. The task of food policy and regulation of food resources is to adjust the performance of food systems through the control of triggers of environmental change, changes in consumer behavior. Therefore, the policy of state regulation and management in the field of food security plays an important role in the current situation. Thus, the implementation of state food programs to support national producers and processors of food raw materials will make it possible to adjust the general food security policy in the country and not only meet domestic needs for food supplies, but also to establish food export supplies to world markets.

Today, Russia is implementing a policy of protectionism in food markets, which makes it possible for Russian producers to increase their own production capacities and open new international markets for their products. Thanks to government support measures, for the first time in many years, Russian

agricultural producers received record harvests of grain crops, increased grain exports, increased the export of livestock products to the markets of China, Asia, and the Middle East, while proving the high potential and stability of the Russian agro-industrial complex.

In the context of a global crisis and a global pandemic, only sustainable viable food systems will be able to withstand, which will not only maintain the achieved level of development, but also provide the population with stable earnings and sufficient food [10, 11]. The pandemic has shown that the established food supply chains between countries are highly unstable, that it is necessary to have some reserve stocks in case of supply disruptions for countries that do not have sufficient production resources. In this situation, the poorest strata of the city dwellers are at great risk, who actually not only do not have reserves, but also do not have sufficient production resources for food production.

Food systems directly affect the health of the nation and the quality of the labor force produced, which requires an integrated approach to the formation of their sustainability and usefulness. Today, in many developed countries, a big problem is not just an insufficient amount of food, but the problem of the completeness and balance of the diet of the population. The diets should be sufficient, balanced, of high quality and beneficial to health [12]. Therefore, an important role in the food production system is played by the production of healthy food with a high level of essential macro and micronutrients, rich in useful fiber, proteins of animal and plant origin. In this case, there is a need for educational work in educational and health care institutions, stimulation of purchases of fresh vegetables and fruits, fresh meat and fish by subsidizing producer prices from the state, as well as introducing additional measures of state support for agricultural producers producing organic food.

At the level of state regulation of the national food policy, it is necessary to take into account the strategic directions of the state's development, which requires the implementation of certain stimulating and supportive measures at all levels of government [13, 14]. The experience of the Covid-19 pandemic has shown that there is a need for clear coordination of activities between all life support systems. The zoonotic origin of this virus proves that human invasion of wildlife is undesirable and entails serious threats, up to complete isolation and lockdown. The disruption of the system of interaction and food supply between countries led not only to a shortage in food markets, but also to huge losses in crops, products and profits of enterprises. The further continuation of the limited work schedule and movement between countries exacerbates the crisis situation and leads to an increasing depletion of resources and a decrease in the working capacity of the working-age population among the poorest groups of the population.

3. Conclusion

Summarizing this study, we note that the global triggers for reducing the resilience of food systems require careful analysis and monitoring in terms of predicting their impact on various aspects of the country's food security, especially in times of crisis. The current unstable situation in the world food markets had a rather positive effect on Russian agriculture, since it was during the pandemic that the domestic agro-industrial complex proved its high efficiency and a good production base, which allowed not only not to reduce production rates, but also to increase export supplies of grain and certain categories of livestock products to the markets of Asia, the Middle East and China. Nevertheless, it is necessary to ensure the sustainability of the formed food systems, since they are subject to the influence of various external triggers that have a negative impact on their functionality and reduce their viability. Identified triggers of varying quality require careful monitoring and forecasting.

References

[1] Overview for Green Bond Market Participants Retrieved from: https://www.icmagroup.org/assets/documents/Regulatory/Green-Bonds/June-2020/Guidance-on-Sustainability-StandardsJune-2020-090620.pdf

[2] High-Level Mapping to GBP Environmental Objectives and other Green Classifications Retrieved from: https://www.icmagroup.org/assets/documents/Sustainable-finance/2021-updates/Green-Project-Mapping-June-2021-100621.pdf

[3] Fedotova G V and Slozhenkina M I 2020 The impact of climate change on the structure of the world agro-industrial complex *Izvestiya Yugo-Zapadnogo State University. Series: Economy. Sociology. Management* **10 (3)** 23-35
[4] Fedotova G V 2008 The specifics of building national systems of state financial control in Western countries and the applicability of foreign experience in Russia *Finance and Credit* **10(298)** 77-80
[5] Telichenko V I 2017 "Green" living environment technologies: concepts, terms, standards *Vestnik MGSU* Vol. **4(103)** 364-72
[6] Gorlov I F and Mosolova N I et all 2019 The main directions for the development of agrarian and food technologies *Agricultural and food innovation* **2(6)** 7-8
[7] Sazonov S P and Fedotova G V et all 2016 *Financial mechanisms for creating a favorable image of the territory* (Volgograd: Volgograd State Technical University Press) p 227
[8] Gorlov I F, Fedotova G V, Sazonov S P, Sergeev V N and Yuldashbaev Yu A 2018 *Cognitive approach to food security research* (Volgograd: Volga Region Research Institute of Manufacture and Processing of Meat-and-Milk Production) p 167
[9] Salaev B K, Natyrov A K, Solodova S V, Slozhenkina M I, Fedotova G V and Mosolova D A 2021 Impact of food quality on the economic security *IOP Conference Series: Earth and Environmental Science* **677** 032008
[10] Solodova S V, Slozhenkina M I, Fedotova A M, Mosolova E A and Knyazhechenko O A 2020 Statistics of food quality as a factor in the dynamic s of development of nutritionally dependent diseases in Russia *IOP Conference Series: Earth and Environmental Science* **548** 082033
[11] Dzhancharova G K, Ibragimov A G and Leshcheva M G 2020 Prospects and problems of digitalization of agriculture in Russia *Economics and Entrepreneurship* **9(122)** 587-9
[12] Sazonov S P, Fedotova G V, Kharlamova E E, Ezangina I A, Lomakin N I, Ermakova A A, Vaisbein K D, Polynskay A A and Ycechko S S 2016 *Financial mechanisms for forming a favorable imageof the territory* (Volgograd: Volgograd State Technical University) p 227
[13] Fedotova G V, Larionova I S, Maramygin M S, Sigidov Yu I, Bolaev B K and Kulikova N N 2021 Agriculture 4.0 as a new vector towards increasing the food security in *Russia IOP Conference Series: Earth and Environmental Science* **848** 32016
[14] Dzhancharova G K, Baduanova S, Leshcheva M G, Besshaposhnyi M N and Rusanovsky E 2019 Trends in the development of livestock industry in Russia and Kazakhstan *Indo American Journal of Pharmaceutical Sciences* **9(8)** 15171-5