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The 2022 War between Russia and Ukraine and its impact on World Food Security

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Abstract

Russia's extensive military invasion of Ukraine on February 24, 2022 and the extensive consequences of the continuation of this war have caused the world's food security to face serious challenges due to the fact that these two countries play an important role in the supply and export of grains and oilseeds. This research has sought to use the descriptive-analytical method to test the hypotheses and the library and data collection method to collect data, using the popular Pakistani human security theory, to this Answer the question: What effect did the war between Russia and Ukraine have on the food security of the world? The results indicate that, although the war in Ukraine had quickly disrupted the supply and increased the global price of grains, oilseeds and agricultural inputs, but this process did not continue and therefore with the support measures of countries and International organizations, such as the partial reopening of Black Sea ports through the Black Sea Grain Initiative under the guidance of the United Nations, the European Union Solidarity Lines Initiative, increasing global humanitarian efforts, canceling or reducing export restrictions of major food producing and exporting countries. After a period of 4 months since the start of the war in Ukraine, from May 2022 onwards, the markets have gradually become flexible and adaptable in the face of this crisis, and the prices have returned to the pre-war level by August 2022. This trend improved the adverse effects of the Ukraine crisis on the world's food security significantly and the fear of a continuous lack of grain in the world market did not come true.

Keywords: military invasion, Russia, Ukraine, grains, agricultural inputs, World Food Security

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Introduction

The idea that people should be safe in their daily lives is neither new nor surprising. Security is the first expectation of humans from the government, which today has gained wider dimensions and has affected all branches of development and life of human societies. Among the various dimensions of security, today the idea of human security is of particular importance, the processing and evolution of the concept of human security highlights the view that the threats against people and the existence of countries are changing and increasing. The idea of human security includes concerns for speeding up security in all human spheres and factors such as the shape of the international system, the multiplicity and diversity of actors, war and conflict, technological transformations, the expansion of communications, the rapid exchange of information, the movement of actors, Ideology, the position of the country, the opinions and views of the leaders, all affect its quality and quantity. Among the wide dimensions of human security, food security has a special place. It is one of the most effective factors that can weaken the ability of different human societies to meet basic food needs and affect the capacity of food systems and the performance of supply chains in the world, internal armed conflicts or war between two or more countries.

One of the most important military crises of the past decade, which has had a significant impact on the food supply and export network and has become the basis for the emergence of a food security crisis in the world, is the Russian military attack on Ukraine on February 24, 2022. . It must be acknowledged that no military-security event between countries has

been able to affect the food security field like a tsunami like the Ukraine crisis in the past few decades. The two countries of Russia and Ukraine are one of the largest producers and exporters of agricultural products, especially grains (such as wheat, corn and barley), oilseeds, as well as inputs required for production in the agricultural and livestock sectors. Following Russia's military invasion of Ukraine and the occupation of parts of this country's land and the destruction of its agricultural and port infrastructures, the world's food system faced many challenges. Considering the importance of food security and safety and the challenges facing it, especially the effects that events such as war, especially the Russia-Ukraine war, have had on this area, therefore this research by using the descriptive-analytical research method, in order to objectively and qualitatively describe the content of the concepts in a systematic way and using the method of collecting information in the form of library and data collection has tried To answer the question that What effect has the Russia-Ukraine war had on world food security? Despite the pervasive and influential dimensions of the war between Russia and Ukraine on the food security of the people of the world and the continuation of this war and the actions of international institutions and organizations and even governments in order to manage this crisis, therefore, to answer the research question, we tried to use the latest and the most recent researches or statistics provided by organizations in charge of food security should be used. Its purpose has been to conduct this research and use its results to add to the richness of the available resources in line with the impact of the war in Ukraine on the world's food security.

1- Research background

Rahimi, Alireza (2022), in an article entitled: "Ukraine war, global grain challenge and threats to food security in Iran", one of the consequences of Russia's military attack on Ukraine is the global grain crisis and the threat to world food security. With a quick look at the consequences of the war in Ukraine for world food security, this research has examined the food threats of this war for Iran and the existing solutions. The results of this research show that as the war in Ukraine will have a strong impact on the world markets, it has also disturbed the markets of Iran's wheat, livestock inputs, edible oils and beans.

Zarei (2022), in an article titled "An analysis of the global price fluctuations of wheat, barley, corn and soy products (after the start of the war between Russia and Ukraine)", investigates the price fluctuations of these products in the world market. The results of this research indicate that according to the monthly food price index of the Food and Agriculture Organization of the United Nations in April 2022, the prices of cooking oils, grains and meat have reached their highest level. This means that the price of food products has increased by more than a third compared to the same period last year. One of the weak points of this research is that due to the time it was carried out, only the rising course of prices in the first few months of the beginning of the war was mentioned.

Masoudi (2022), in an article entitled "Wheat and food security of Iran and the world in the process of the war between Russia and Ukraine according to statistics", points out that the war between Russia and Ukraine as the first two producing countries and the

wheat and grain exporter has increased the price of this strategic product in the world. The results of this research indicate that the ban on the export of many agricultural goods by the government of Ukraine and Russia, the closing of the export ports of the Black Sea for grain and wheat, the lack of conditions for spring and autumn cultivation in Ukraine, the conservatism in the supply of wheat Russia's stored warehouses and the lack of phosphate and potash fertilizers have been among the most important prominent indicators affecting the sharp jump in the global price of grains, especially wheat, after the start of the war between Russia and Ukraine.

Denninger et al. (2022), in a study titled "Real-time Quantification of War-Induced Crop Losses in Ukraine to Strengthen Local and Global Food Security," examined the impact of the Ukraine war on the loss of agricultural land and grain storages and its impact on the food crisis in many countries of the world. The results of this research show that the consequences of the war between Russia and Ukraine for regional and global food security have been very extensive. So that after the start of the war, the price of grains increased much higher than the level experienced in the food crisis of 2007-2008 and highlighted the geostrategic role of agriculture for the national security of countries. This research has described the amount of damage caused to agricultural fields in Ukraine caused by the burning of ammunition, rockets or airplanes and soil compaction due to the movement of tanks or heavy artillery. This factor will have a great impact on the reduction of grain production in the coming seasons in Ukraine.

Wertz (2022), in an article titled "Russia's war against Ukraine: the food security of the

Middle East is at risk", investigates the effects of the war between Russia and Ukraine on the food security of the Middle East and North Africa and states that the Middle East and North Africa is the largest grain importer in the world. Among them, almost 30% of the world export of wheat and barley, 20% of corn and three quarters of sunflower oil belong to Ukraine and Russia. Therefore, the war between Russia and Ukraine has disrupted the global food trade and affected food security in the Middle East and North Africa.

2- Theoretical framework: the theory of human security

Philosophically, the concept of human security is the result of the expansion and deepening of what was once considered "security". That is, in front of the main questions that are always raised in the security issues, new answers were proposed. Questions like "Security for whom and which values?" and "Security against which threats and with which tools?" In response to these questions, perhaps for the first time, "Mahboob-ul-Haq" spoke about human security in a report he prepared for the United Nations Development Program in 1994. After that date, a significant literature has been created in the field of human security and various approaches have been proposed (Qasemi, 2005, p.818).

Mahboob-ul-Haq discovered the topic of human development in a roundtable discussion on North and South relations with the title "Economy of Peace" held in Costa Rica in January 1990. This roundtable made a clear statement that the post-Cold War world needs a "new concept of global security" that "directs defense and foreign policy goals from the almost exclusive concern of military security to

a greater concern for security." All people should change from social violence, economic hardship and environmental destruction. (Jolly & Deepayan Basu, 2006, p.4) The said report has categorized human security threats into seven economic, food, health, environmental, personal, social and political groups. (Sabaghian, 2013, p.103)

The processing and evolution of the concept of human security highlights the view that the threat against people and the existence of countries is changing and increasing. These changes have fueled the debate and controversy about the meaning of security and discussions about its deepening and development. (Kar, 2005, p.604) This theory about the factors that threaten countries and societies accepts three principles: firstly, we should consider underdevelopment and violation of human rights as dangers that are as important as traditional insecurities, secondly, that threatening factors They are related to each other, and thirdly, such a relationship between the threat factors requires that we do not prioritize any one over the other. Mahboob-ul-Haq explains the answer to the question of how security is achieved as follows: "Human security can be achieved through "development" and not through "weapons". Insecurity cannot be solved through short-term military or political solutions, but a long-term strategy based on the development and improvement of the human rights situation should be found for it. (Taj Bakhsh, 2015, p.4)

3- Food Security

The right to food was stated for the first time on a global scale in Article 25 of the Universal Declaration of Human Rights, which states that "every human being deserves a life of

acceptable standards to ensure the health and well-being of themselves and their family, including the provision of food, clothing, housing, medical care and social services are necessary (Office of United Nation Human Right, 2015). The International Covenant on Civil Rights recognizes this right in Articles 1 and 6, and in Article 11 of the International Covenant on Economic, Social and Cultural Rights, the countries party to this covenant recognize the right of everyone to have a standard of living sufficient for them and their family have been recognized including enough food, clothing, housing and also the improvement of living conditions. (Kent, 2015)

The intellectual origin of food security, as one of the most important components of national security, goes back to the food crisis in the world in the early 1970s. At the beginning of this decade, food production in developing countries decreased. Day by day instability and imbalance between population and food increased in the world. In order to prevent the dire consequences of this crisis, the World Food Conference was organized at the initiative of the United Nations in 1974, in which food security was emphasized at the world level and, consequently, at the level of countries. (Esfandiari and Mir Abbasi, 2015, p.164) According to the final report of the World Food Summit in 1996, food security exists when people have, over time, physical and economic access and enough healthy and nutritious food to meet their food needs and food preferences for have an active and healthy life. (FAO, 2014, p.4)

According to the opinion of the World Health Organization, there are three basic pillars in providing food security: 1. Access to food; 2. Provision of food; 3. Use of food. The Food

and Agriculture Organization of the United Nations (FAO) adds a fourth pillar to these pillars under the title of stability of the above three dimensions over time. (FAO, 2006, p.2) According to the perspective of the United Nations Development Program, food security is achieved when not only there is enough food, but also when people have easy access to adequate and healthy food. That is, the availability of food and the purchasing power of the people is a necessary condition for achieving food security. (United Nations Development Program, 2012)

4- The impact of wars on world food security

Armed conflicts weaken the ability of nations, families and individuals to meet their food needs and affect the capacity of food systems and supply chains to function properly. Production decreases due to producers being involved in war, unable to produce or fleeing the country. Agricultural inputs are disrupted in foreign markets, or agricultural products and water infrastructures are destroyed due to military operations. Armed conflict can also affect the capacity of consumers to access adequate food, as their purchasing power is reduced. Conflicts increase food prices in local and international markets and have negative effects on low-income and food-importing countries. (Behnassi & El Haiba, 2022, p.754)

Civil wars and military conflicts between countries affect food security at the domestic level and in many cases at the global level through the lack of food items caused by the destruction of land and agricultural equipment and the loss of products and disruptions in the management system. As a result, conflicts prevent proper food production and distribution,

commercialization and stock management in food markets. On the other hand, the level of production of agricultural products, especially in the war zones, has decreased significantly, and the areas producing food products and the surrounding areas have suffered irreparable losses, including the destruction of agricultural lands, the destruction of industries and equipment active in the field of agriculture, supply interruptions. They experience market food, migration of farmers and labor force.

In general, it can be said that war usually threatens all four pillars of food security, i.e. access to food, access to food, use of food and stability in receiving food. Conflict also leads to poverty, high infant mortality, inequality and lower per capita income. (World Bank, 2010, p.7)

5- The position of Russia and Ukraine in supplying the world's food basket

The two countries of the Russian Federation and Ukraine have the best agricultural soil in the world known as "chernozem" or "black soil". This soil also includes areas such as the Black Sea coast, Hungary and Romania. The Chernozem region in Russia also includes the central plateau of the Dnieper region to Central Siberia, with an average annual rainfall of 600 mm.

According to the World Food and Agriculture Organization of the United Nations (FAO), Russia is the largest exporter of wheat in the world and Ukraine is the fifth largest exporter of wheat. (FAO, 2022a) According to the statistics of the International Grains Council, Russia and Ukraine with 102 million tons, followed by America and Argentina with 94 and 56 million tons, respectively, are among the world's largest wheat and grain producers

in 2021 and 2022. The European Union with 52 million tons and Brazil with 40 million tons of wheat and grain production are in the next positions. (Bloomberg, 2022) Today, the exports of Russia and Ukraine constitute about 12% of the total calories exchanged in the world, and these two countries are among the 5 largest exporters of grains in the world, including wheat, corn and barley. Many countries that import grains and vegetable oils in the world depend on the products of Ukraine and Russia. For example, North Africa and the Middle East import more than 50% of their grain needs and a large share of wheat and barley from Ukraine and Russia. Ukraine is an important supplier of corn to the European Union and China, as well as several North African markets, including Egypt and Libya. (Laborde & Glauber, 2022, p.1)

From 2017 to 2020, the main importers of wheat from Russia are Egypt, Indonesia, Bangladesh, Libya, Morocco, Tunisia and Turkey, and the main importers of Ukrainian wheat are Egypt, Turkey, Bangladesh, Sudan, Nigeria, Yemen and Vietnam. Many other countries that are classified in the group of countries with low food security also import Russian and Ukrainian wheat. To this group, countries such as Ethiopia, Libya and Lebanon, which suffer from internal instability, should be added. The Middle East and North Africa also import about 60% of Russian wheat exports. The re-export of Russian and Ukrainian wheat in the form of flour, especially by Turkey, is also observed in this region. (Masoudi, 2022, p.11)

From 2018 to 2020, Russia and Ukraine accounted for a large share of the world's grain and sunflower oil exports. So that 26.8% of the world export of barley, 17.7% of the world

export of corn, 23.9% of the world export of sunflower, 72.7% of the world export of sunflower oil, and 34.1% of the world export of wheat are at the disposal of these two countries. Ukraine alone is an important source of sunflower seed oil and has about 50% of the world market export of this product. This

export represents a significant share of global consumption and diets and constitutes about 12% of the total calories exchanged in the world. (Laborde & Glauber, 2022, p.2) In 2021, a large amount of grain, seed and sunflower oil exports were available to two countries, Russia and Ukraine.

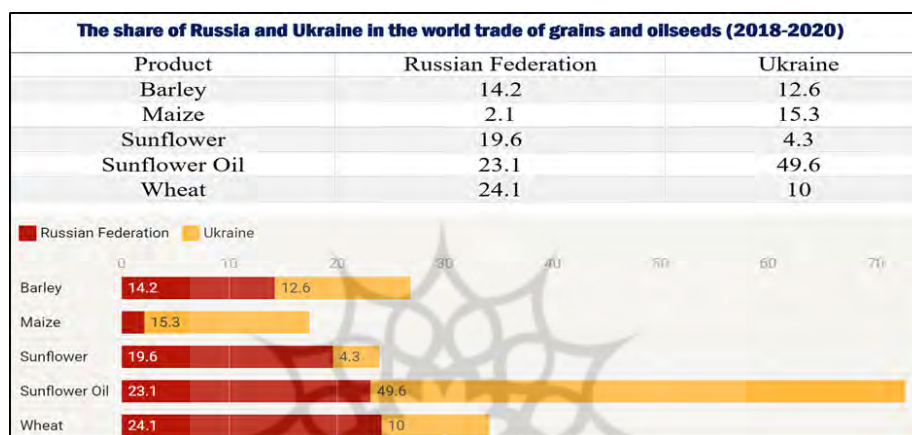


Figure 5-1: The share of Ukraine and Russia in the world grain trade 2018-2020 (Laborde & Glauber, 2022, p.2)

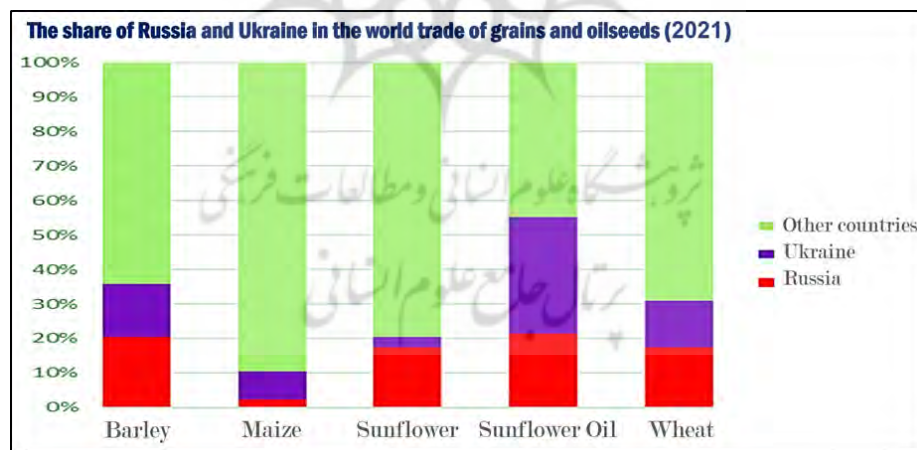


Figure 5-2: The share of Ukraine and Russia in the world trade of grains and oilseeds in 2021. (FAO, 2022a)

Russia is also the main exporter of nitrogen and potash fertilizers. This country accounts for about 15% of the world trade in

nitrogenous fertilizers. Also, Russia and Belarus have a total of 33% of global potash fertilizer exports. (Laborde and Mamun, 2022)

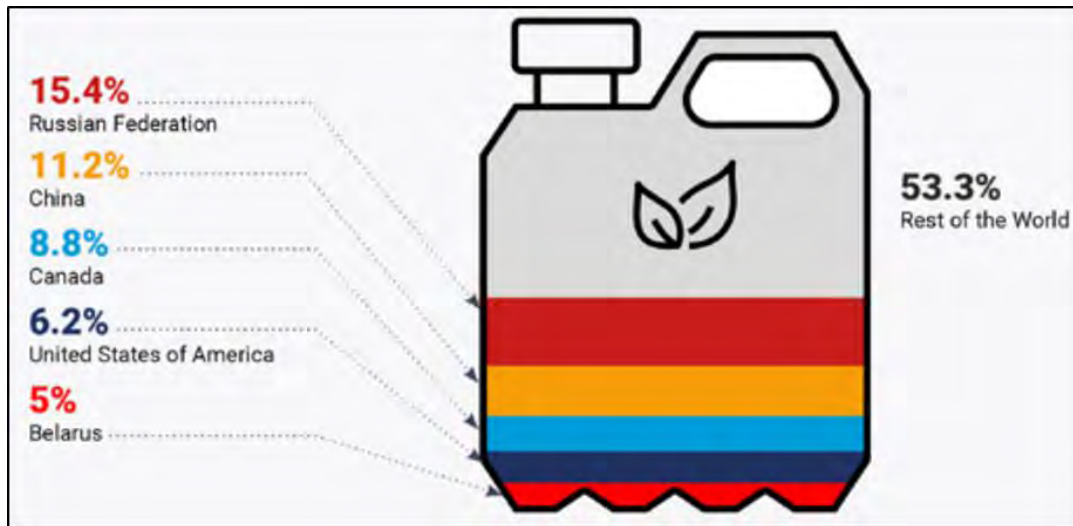


Figure 5-3: The share of Russia and Belarus of more than 20% of the total global fertilizer export. (UNCTAD, 2022, p.9)

6- The impact of the war in Ukraine on the global grain market

On February 24, 2022, Russia launched a massive invasion on Ukraine, its western neighbor, marking a dramatic escalation of the crisis in Russia-Ukraine relations that began in 2014. This war has had a significant impact on the food supply and export network and has led to the emergence of a food security crisis in the world. The war in Ukraine involved two major producers of agricultural goods in the world. Both Ukraine and the Russian Federation are net exporters of agricultural products and play a leading role in the supply of food products in the world markets. They are key exporters of basic food supplies to many countries that are heavily dependent on imported food and fertilizers. Considering the two countries' key role in the world's food basket, it is clear that the war has led to new risks for food and agricultural markets and uncertainty for global agricultural markets.

The decrease in the planting of grains and oilseeds in Ukraine due to the war has led to

the need for other countries to produce additional grains and oilseeds to help restore global reserves and reduce the price level. In Ukraine, severe financial constraints, infrastructure damage and the prohibition of access to farms in parts of the country have led to a 40% drop in wheat production. Sub-average production of wheat is predicted during 2023. The Ministry of Agrarian and Food Policy of Ukraine predicts that during 2023, the cultivated area could decrease by at least 20% compared to 2021 due to temporary occupation and soil contamination. According to the report of the State Emergency Service of Ukraine, it is estimated that up to 25,000 square kilometers of agricultural land in Ukraine is contaminated with explosives. (FAO, 2023, p.6)

The war has caused significant damage to Ukraine's infrastructure and logistics capacities, including domestic transportation networks, sea ports, as well as storage and processing facilities. Currently, the total grain storage capacity in Ukraine is 69-71 million tons (15-17 million tons or 20% less than the

pre-war capacity). The estimated cost of repairing and replacing storage facilities is close to 1.1 billion dollars. These losses have significantly reduced Ukraine's export capacity and increased the cost of grain production and trade. Inadequate storage space has also imposed economic pressure on farmers and forced many of them to sell at a loss. This may also reduce the number of future plantings. The war has also affected the logistics of maritime trade, disrupting the operations of key seaports in the global grain trade. (FAO, 2023, p.6)

6-1- Investigating grain price fluctuations in world markets

While disruptions in production and trade threaten grain supplies to countries that traditionally rely on imports from Ukraine and Russia, the major threat to food security comes from rising global food and fertilizer prices. Global food markets have seen a significant increase in prices immediately after Russia's attack on Ukraine. The FAO food

price index in March 2022 reached the highest level recorded since its inception in 1990. The increase in food prices has negatively affected the well-being of low-income households that spend most of their income on food. The World Food Program (WFP) predicts that if the war between Russia and Ukraine continues unabated, the world's poor population facing acute hunger will increase by 47 million, most of them from vulnerable areas and They are currently food insecure. (FAO, 2022b)

Prior to Russia's attack on Ukraine, global food and fertilizer prices were on the rise due to reduced harvests in Latin America, South-east Asia, and Europe in 2021, disruptions from the Covid-19 pandemic, and There has been increased demand for food in Asia. This created favorable conditions for any new shock in the global food market. In the meantime, Russia's military invasion of Ukraine in February 2022 as a catalyst has contributed to the upward trend of major food prices in the world.

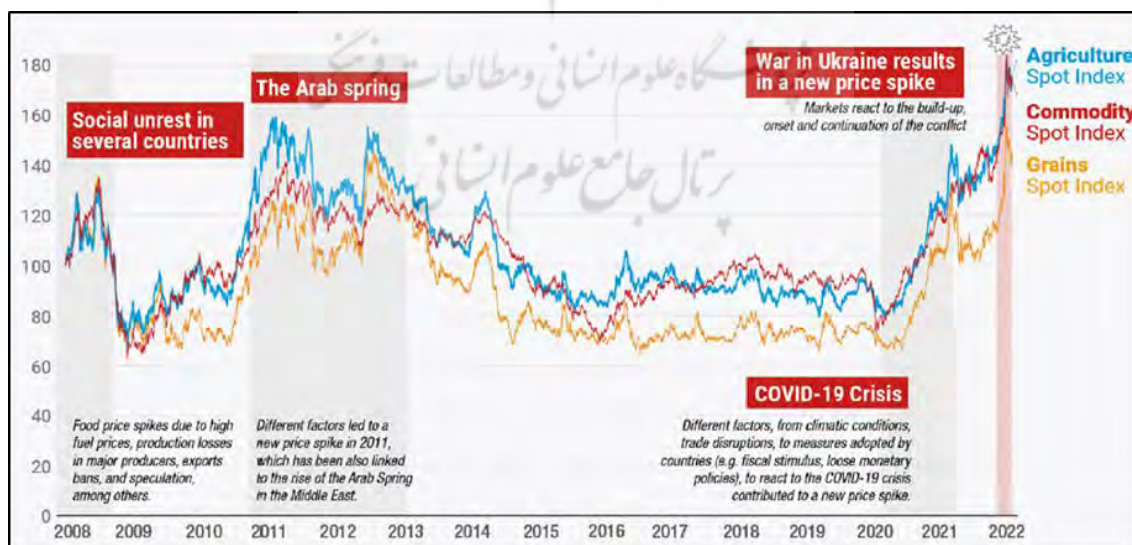


Figure 6-1: Report of the United Nations Trade and Development Conference – upward trend of indicators before the start of the war (Iran Chamber Research Center, 2022)

However, with the support measures of countries and international organizations, after a period of 4 months since the beginning of the war in Ukraine, when the grain market was faced with an unprecedented increase in prices, gradually the markets have shown flexibility in facing this crisis. But the question is, even though this invasion created uncertainty in the agricultural markets and seemed to disrupt the exports of Ukraine and Russia in the long term and create a global supply problem, why did the prices in the market decrease? And while Ukraine's wheat exports have decreased by 28% from 2021-2022 to 2022-2023

up to 5.3 million tons, along with the decrease in Argentina's exports due to drought and reduced wheat harvest, but the worst fear that is the continuous shortage of grain in the world market did not happen. The reason for this is that Russia's exports have soared in part due to record wheat production. This increase, along with the increase in grain production in Canada and the European Union in 2022, has partially compensated for the decrease in exports in other regions of Ukraine. Meanwhile, Australian wheat exports remain strong, and has increased up to 500,000 tons from last year. (Glauber, 2023b, p.1)

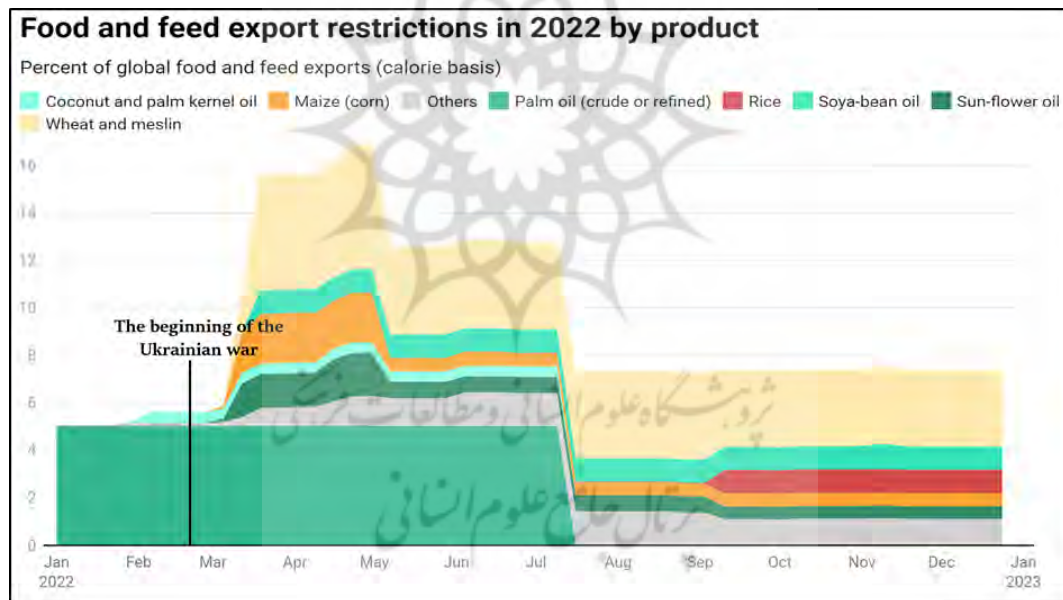


Figure 6-2: Reducing grain export restrictions from mid-July 2022 (www.foodsecurityportal.org/node/2178)

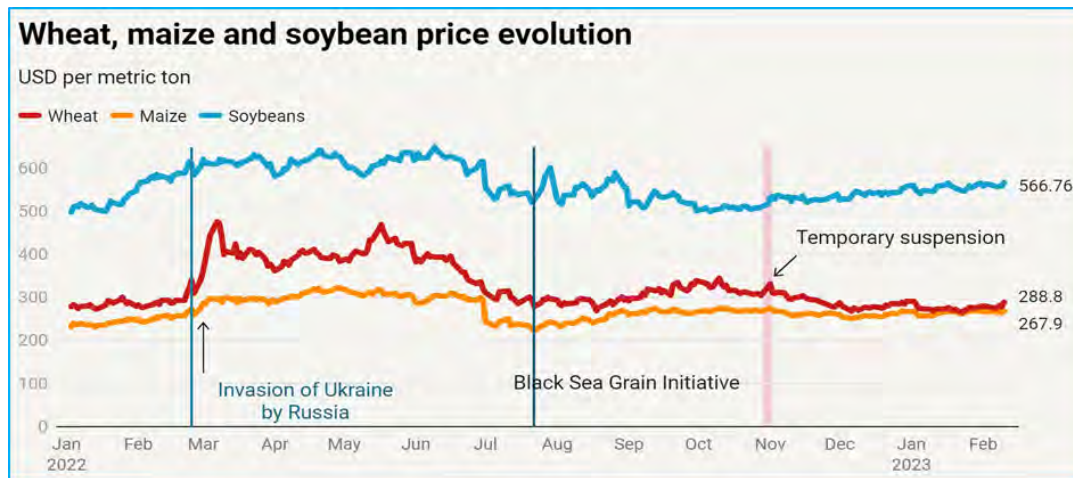


Figure 6-3: Evolution of wheat, corn and soybean prices from June 2022 to February 2023 (Glauber, 2023b, p.1)

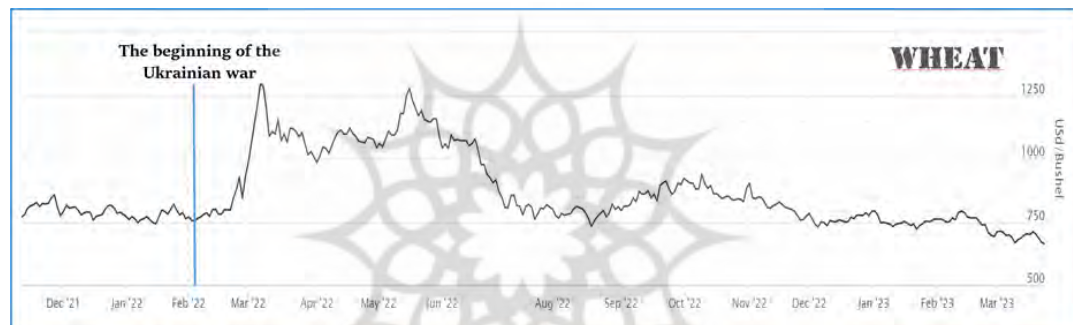


Figure 6-4: Fluctuation graph of global wheat prices from the start of the Ukraine war to March 2023 (www.foodsecurityportal.org)



Figure 6-5: Fluctuation chart of global corn prices from the start of the Ukraine war to March 2023 (www.foodsecurityportal.org)

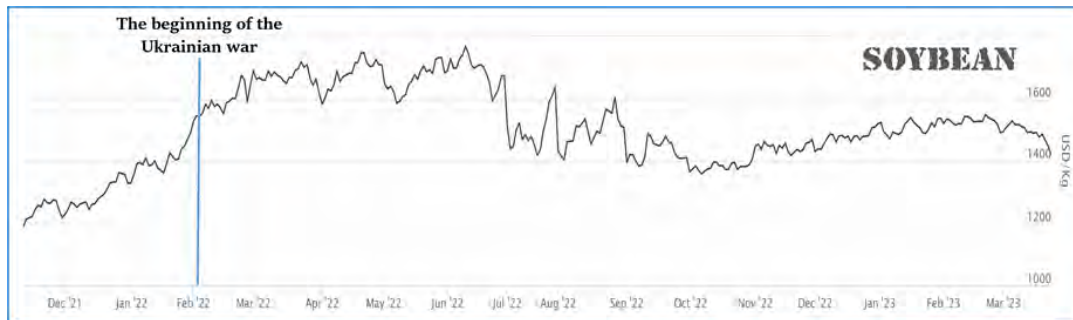


Figure 6-6: Fluctuation chart of global soybean prices from the start of the Ukraine war to March 2023 (www.foodsecurityportal.org)

The summary of the analysis of all the graphs above indicates that with the continuation of the war in Ukraine, international markets gradually adjusted and adapted, and while high prices and other problems continue, but the worst possible scenarios for agricultural trade and food security has been largely avoided. By August 2022, prices had returned to pre-war levels. Importers adapted to market disruptions and found alternative suppliers. The partial reopening of Black Sea ports through the "Black Sea Grain Initiative" helped facilitate more exports from Ukraine. While in May 2022, wheat and corn price volatility levels reached their highest levels in more than 10 years, they returned to historical

ranges in early February 2023. "The war in Ukraine also spurred increased global humanitarian efforts to help mitigate the effects of the war.

6-2- Reduction of grain in world markets

The amount of wheat reserves was at its lowest level in 2007-2008. Global wheat stocks peaked in 2019-2020 and were estimated at 147 days of use. Since then, global ending stocks have declined to an estimated 125 days of use for 2022-2023, which is 22 days below the recent peak, but still 76 days above the 2007-2008 level. (Glauber, 2023a, p.3)

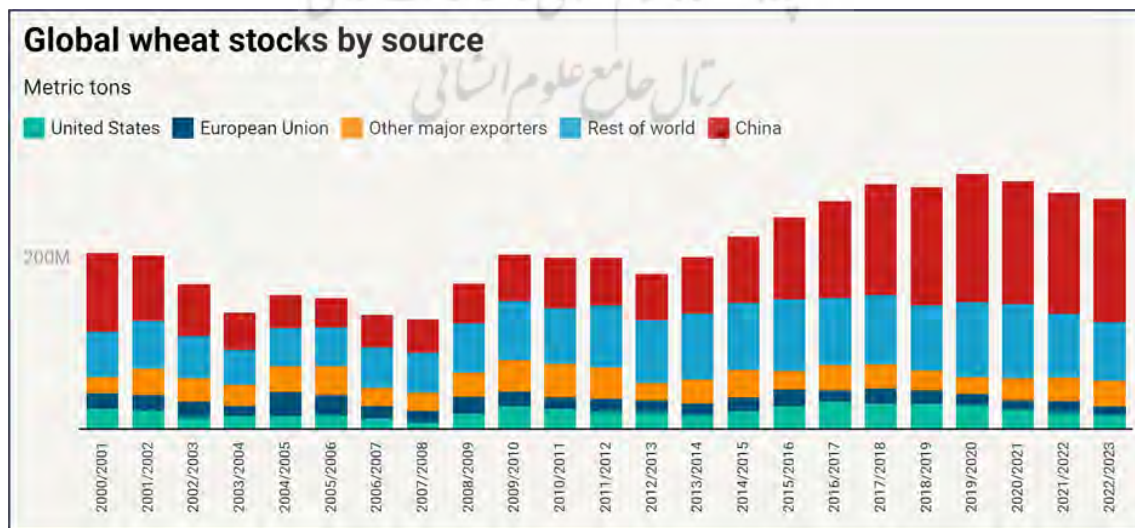


Figure 6-7: Global wheat reserves by source (Glauber, 2023a, p.3)

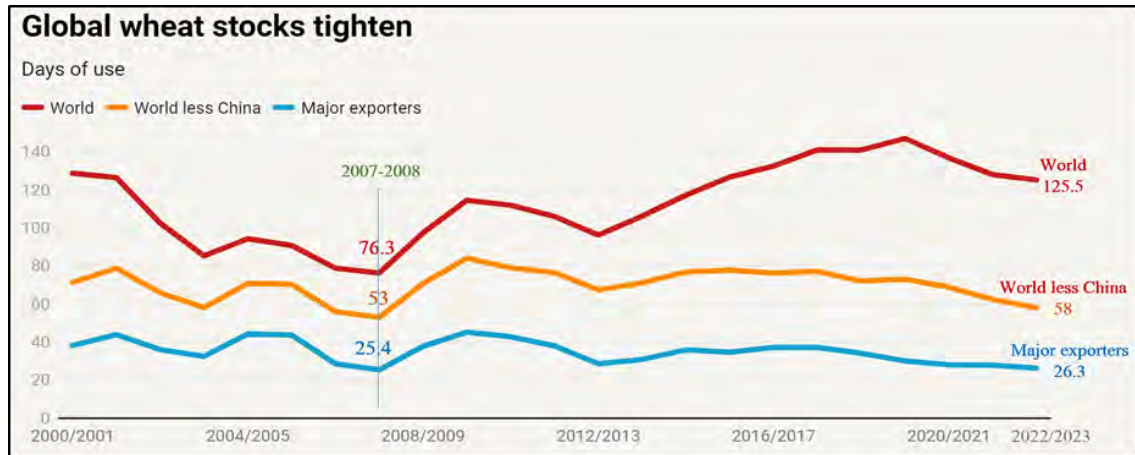


Figure 6-8: Graph of wheat stocks (world, world excluding China, major exporters) until February 2023 (Glauber, 2023a, p.3)

The important point in the analysis of the above chart is that some analysts exclude China's share when measuring the global market wheat reserves. The main reason for doing this is that the exact data on China's reserves is not reported by the government of this country and is therefore very uncertain. China's reserves are largely state-controlled and cut off from global markets. In fact, despite its large reserves, China remains a major importer of wheat. Finally, there are many concerns about the quality of wheat in those reserves.

Excluding China, global wheat reserves for 2022-2023 are estimated at 128 million tons. Leaving aside China's reserves from the above chart, two other measures show that the level of wheat reserves is much more limited. If China is excluded from the global total, the projected inventory level for 2022-2023 is estimated at only 58 days of use, the lowest level since 2007-2008 (53 days). Similarly, considering only those reserves held by major exporting countries, ending reserves for 2022/23 are estimated at only 26.3 days of use, the lowest level since 2007-2008. (25.4 days). (Glauber, 2023b, p.3)

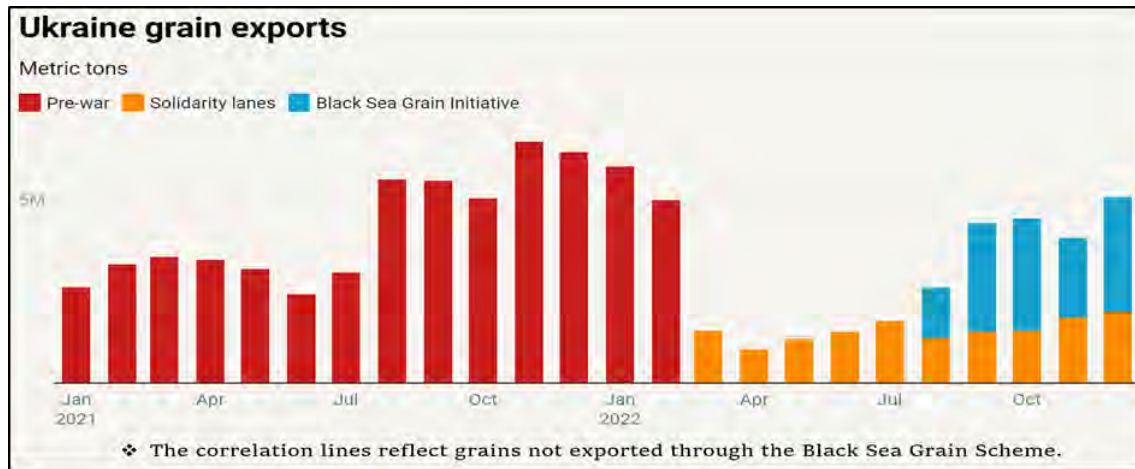


Figure 6-9: Amount of grain exports by Ukraine before and after the start of the war (Glauber, 2023b, p.3)

6-3- The impact of the war in Ukraine on the global market of fertilizers and agricultural inputs

The impact of the war in Ukraine on the global market of fertilizers and agricultural inputs is intensified by the fact that Russia is an important supplier of nitrogen and potash fertilizers. This country accounts for 15% of the global trade in nitrogenous fertilizers and 17% of the global export of potash fertilizers. Belarus, Russia's ally and the cause of the current invasion, which is currently the target of international sanctions, has another 16% of the global potash export market. The dependence of some countries, including Ukraine, on supply from these two countries can be very intense. (Laborde & Glauber, 2022, p.2)

Figures 6-9 and 6-10 show the research results of the International Food Policy Research Institute regarding the dependence of the countries of the world on nitrogen and potash fertilizers originating from Belarus and the Russian Federation from 2018 to 2020. The important point is that Ukraine, which plays a significant role in the production of grain and oilseeds, is one of the largest importers of fertilizers needed in agriculture. So that this country supplies 58.07% of the total fertilizer it needs through imports, and the most worrying thing is that 83.06% of the total fertilizer imports of Ukraine come from Russia and Belarus, both of which the country is currently on the list of international sanctions due to the war in Ukraine.

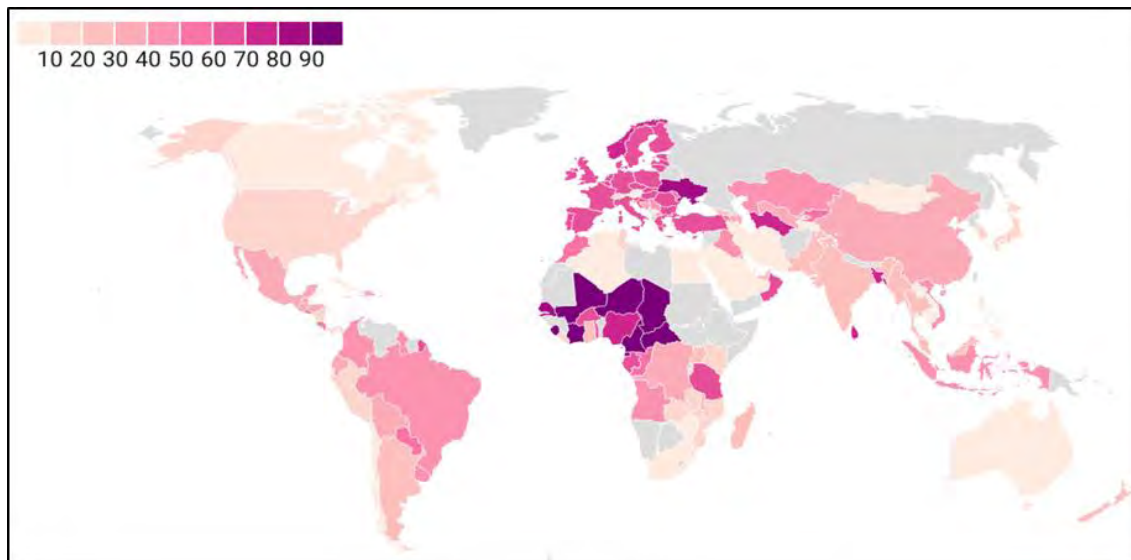


Figure 6-10: The percentage of world countries' dependence on potash fertilizers originating from Belarus and the Russian Federation from 2018 to 2020 (Laborde & Glauber, 2022, p.2)

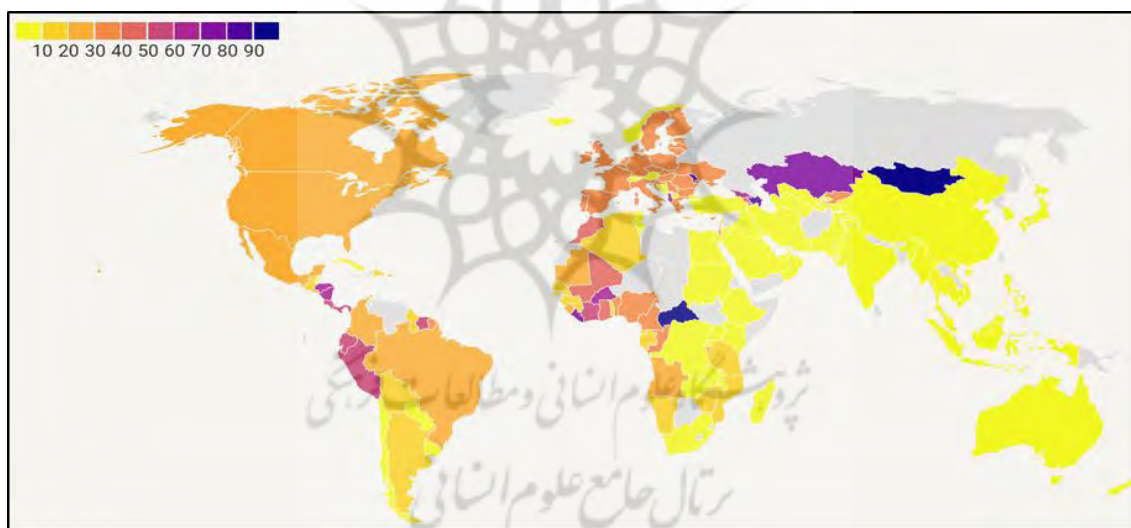


Figure 6-11: The percentage of dependence of the countries of the world on nitrogenous fertilizers originating from Belarus and the Russian Federation from 2018 to 2020 (Laborde & Glauber, 2022, p.2)

At the time of the Russian invasion, fertilizer prices were already at historically high levels. The upward trend in the prices of various agricultural inputs started in the middle of 2020 due to several factors, and therefore the war in Ukraine has only played the role of a catalyst in further increasing prices. Fertilizer demand, which was reduced during the quarantine of

Covid-19, increased again at the end of 2020-2021 when restrictions were lifted and product prices increased. On the supply side, with the increase in the prices of natural gas and coal, which are the key raw materials and energy sources in the production of fertilizer, as well as some reductions in production capacity, it put upward pressure on prices, and finally,

with the start of the war in Ukraine on February 24, 2022, the price has increased dramatically and has multiplied the uncertainty about the export of fertilizers from Russia and Belarus due to the conflict itself, new or expanded

economic sanctions against the two countries of Russia and Belarus, and the disruption of the Black Sea trade routes. . (Hebebrand, 2023, p.3)

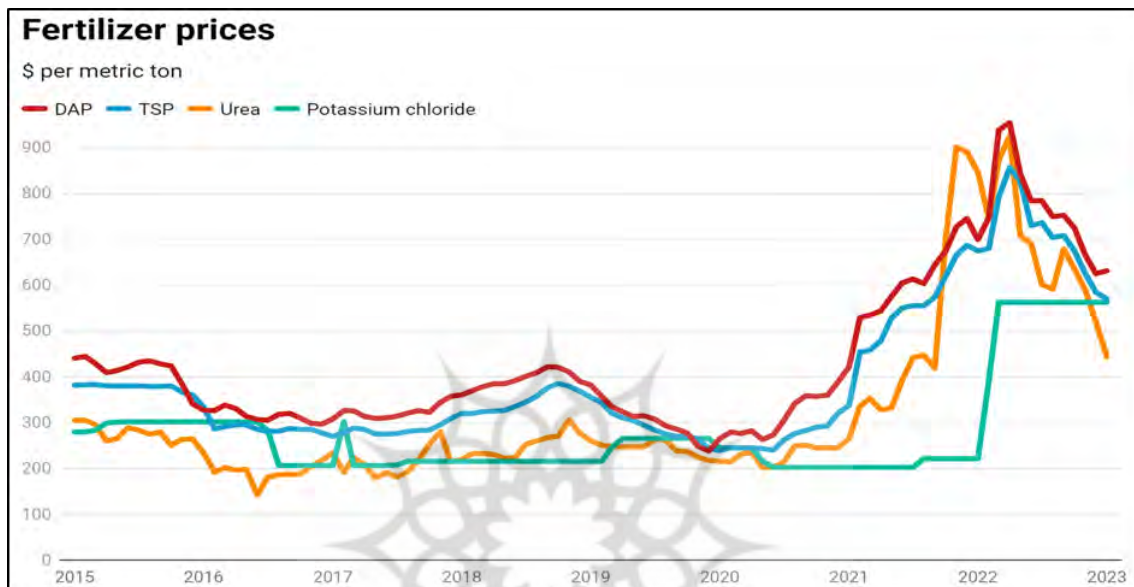


Figure 6-12: Global fertilizer price fluctuation chart from 2015 to June 1, 2023 (Hebebrand, 2023)

The fact that few countries produce a large share of international commercial fertilizers has made this sector vulnerable to trade shocks. Countries that depended heavily on fertilizer imports from Russia and Belarus feared immediate shortages due to the war in Ukraine, and many had to find alternative sources on the world market with difficulty. However, due to the fact that many countries import a high amount of their own fertilizers, the commercial shocks caused by the war in Ukraine were widely reflected all over the world.

6-4- Increase in transportation and logistics costs in the agricultural sector

The destruction of some infrastructures, especially ports in Ukraine, has aggravated the

problems in the supply chain of goods and food exported from Ukraine and Russia. Disruption in the supply chain of goods comes from three sources: 1. Disruption in land trade routes between Europe and Asia with transit through Russia and Ukraine becoming more difficult or impossible; 2. Disruption of air relations between Europe and Russia due to the decision of EU countries to close their airspace to Russian planes and cargoes; 3. Disruption of sea transport routes through the Black Sea due to the increase in shipping insecurity. (Economic Intelligence, 2022)

The closure of Russian airspace for many countries due to international sanctions and the ban on flights over Ukraine and Belarus due to the security risks caused by the war in Ukraine has not only had a negative impact on

the capacity of global air freight movement, but also It has also increased the price of air transportation. Because the transportation of

goods has to travel longer routes and spend more money on fuel.

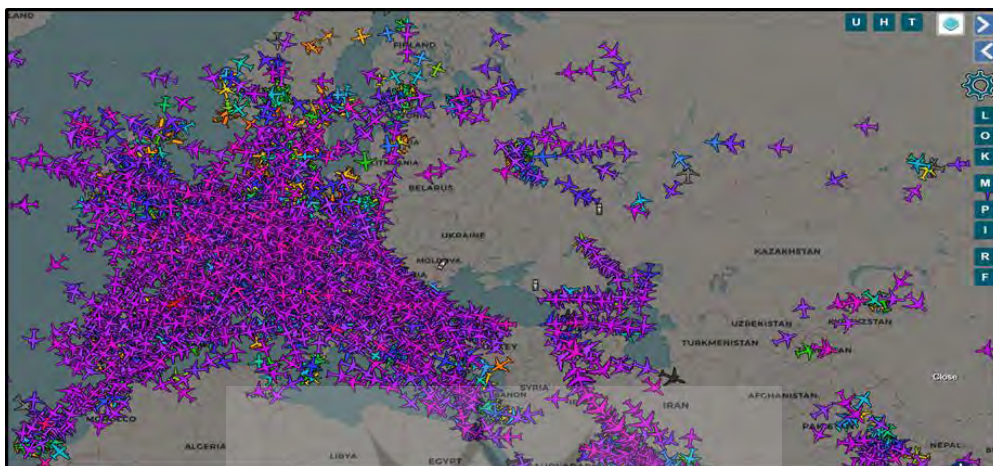


Figure 6-13: International flight traffic over Ukraine, Belarus March 28, 2023 at 17:30 (<https://globe.ad-sbexchange.com>)

Even though Ukrainian ports were closed in the early months of the war, with the Black Sea Grain Initiative under the supervision of the United Nations, a number of Ukrainian ports have been activated and the country's grain is exported from these ports. However, the risk of shipping in the Black Sea due to the

uncertainty of the security of navigation in this region has increased the insurance premiums for products and ships to travel in the Black Sea region, which increases the cost of transportation in the Black Sea and has also increased the cost of food imports from this region. (FAO, 2022a)

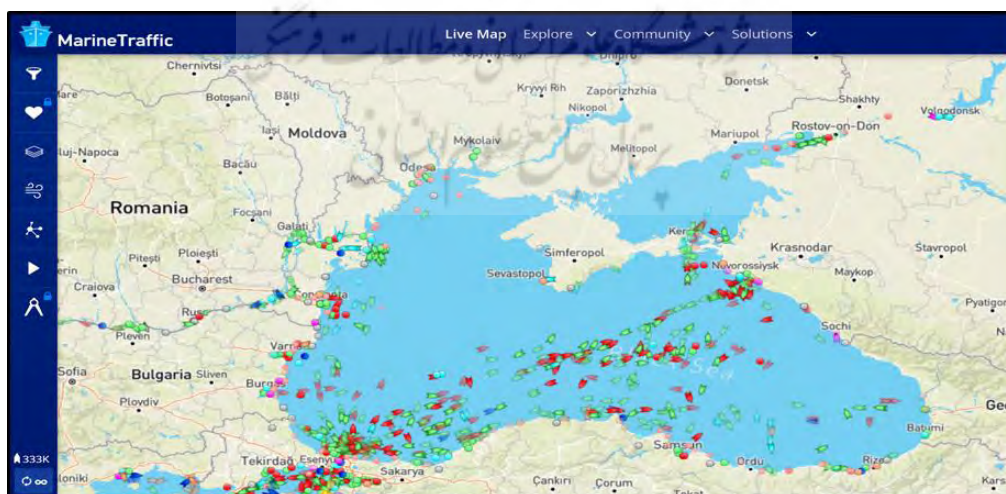


Figure 6-14: Shipping traffic in the Black Sea - March 28, 2023 at 18:00 (<https://www.marinetraffic.com>)

7- International measures to improve the food crisis caused by the war in Ukraine

Food security is one of the fundamental rights of human society and cannot be suspended under any circumstances, even in wars and international conflicts, because any disruption in access to food and the necessities of human societies has devastating consequences on people's lives, especially the poor and the disadvantaged groups. Therefore, international institutions and organizations active in the field of food security adopt different approaches to solve this problem and improve food security in times of conflict.

On the other hand, the war between Russia and Ukraine affects the ability of international institutions and organizations to provide food aid to countries that depend on food imports from Ukraine and Russia. For example, the World Food Program, which buys 50% of its grain from Ukraine, will have to reduce the rations it provides due to rising costs, at the risk of removing millions of people from the current food aid program. The important point is that focusing on the current conflict in parallel with other factors such as poverty, lack of natural resources and the effects of climate change itself may lead the global community to the challenges that are currently affecting the lives of the people of the poor countries of the world. This affects can cause more human migration and induce or intensify intra-governmental and geopolitical conflicts. Therefore, ending the current Russia-Ukraine war is synonymous with avoiding such plausible scenarios. (Behnassi & El Haiba, 2022, p.754)

After Ukraine's Black Sea ports were closed, the European Commission created an initiative called "Solidarity Belts" that allowed

Ukrainian goods to be exported to the EU by land and river. To prevent the grain crisis, the European Union canceled all customs duties and import quotas. In a joint statement after the 24th EU-Ukraine summit in February 2023, the EU and Ukraine announced that between May and December 2022, the transport of 45 million tons of Ukrainian goods, including 23 million tons of grain, oilseeds and commodities etc. have been made possible. European solidarity belts helped the Ukrainian economy to earn 20 billion euros. (Economic Deputy of the Ministry of Foreign Affairs, 2022)

Another support plan for facilitating the export of grain and fertilizer from Ukrainian ports in the Black Sea in the midst of the crisis in Ukraine is the "Black Sea Grain Initiative" with the support of the United Nations. At the signing ceremony of the agreement on July 27, 2022 in Istanbul, Turkey, UN Secretary-General Antonio Guterres said: "The resumption of Ukrainian grain exports through the Black Sea in the midst of the ongoing war is a 'spring of hope' in a world that desperately needs it." ». The initiative specifically allows the export of food and chemical fertilizers (including ammonia) from three key Ukrainian ports on the Black Sea - Odessa, Chornomursk, Yuzhny. A joint coordination center was established in Istanbul, Turkey to monitor the implementation of this project, and representatives from Russia, Turkey, Ukraine and the United Nations are present in it. The United Nations also acts as the secretariat of the center. In line with the implementation of the Black Sea Grains Initiative, Ukrainian ships direct cargo ships into the international waters of the Black Sea and avoid mined areas. Then the ships move towards Istanbul along the agreed maritime humanitarian corridor. This contract was

supposed to end on March 18, 2023; But one day before its deadline, it was extended by the United Nations for another 4 months. (United Nations, 2022)

The GS1 global organization active in the field of improving the efficiency and transparency of supply and demand chains at the global level, after the start of the war in Ukraine and the emergence of the resulting food crisis, has given the opportunity to the components of the food supply chain to use a common language and with Sharing the correct information will enable effective communication between the components of the chain. Creating the ability to track products from the beginning to the end of the supply chain, as well as the possibility of receiving detailed information about the product and the possibility of its complete tracking by the consumer and access to healthier food products, according to the request, at the right time and place, as well as checking the authenticity, The health and quality of the ingredients used in the product is one of the important services of this organization to the food supply chain and in order to improve food security during the war in Ukraine. In line with the follow-up of the food crisis caused by the war in Ukraine, the Global Food Safety Initiative conference was also held in Barcelona from March 29 to 31, 2022, with the presence of 600 participants, and its main topics include: the impact of delivering and providing sustainable and safe food; Efforts to plan capacity building, stabilization and future stabilization against potential problems of food shortages; strengthening relations with UN representatives and creating a database based on GFSI certification; Importance of a product recall mechanism for collaboration and transparent communication throughout the food supply chain; Electronic traceability

has been the solution to food security challenges around the world, especially in the European Union in the midst of the Russia-Ukraine war. (Pariab & et al., 2022, pp.2-4)

Despite the continuation of the war in Ukraine, but with the passage of time and with the efforts and follow-up of international institutions and organizations active in the field of food security, along with the support of many countries that produce and export major food products, since the fifth month after the beginning of the war, food security indicators have gradually become closer to the normal levels at the time of the war. which indicates the improvement of food security conditions in the world. However, the initiation of this process is uncertain for various reasons, so that it causes uncertainty and increases concerns about the re-escalation of the food security crisis. The most important of these factors are the continuation of the war in Ukraine and its expansion in various fields, the possibility of direct entry of European countries, the United States of America, or NATO into a direct war with Russia and its uncontrollable consequences. The non-renewal of the Black Sea Grains Initiative after the deadline indicated the possibility of a further reduction in the cooperation of the major producers and exporters of grains and goods with the responsible international institutions in the field of food security.

Conclusion

No military-security event between countries in the last few decades has been able to affect the world's food security as much as Russia's military attack on Ukraine on February 24, 2022. Considering the influential role of Russia and Ukraine in the production and export

of agricultural products such as wheat, corn, barley and oilseeds as well as agricultural inputs, therefore, following the Russian military invasion of Ukraine and the occupation of parts of this country and with the loss of land and its agricultural and port infrastructure, the world's food system faced many challenges. This research has tried to answer this question by using the descriptive-analytical research method, in order to objectively and qualitatively describe the content of the concepts in a systematic way and using the method of collecting information in the form of library and data collection. How has the war between Russia and Ukraine affected the food security of the world? To answer the research question, we tried to use the latest and most recent researches or statistics provided by international organizations active in the field of food security.

The results of the research indicate that the impact of this war on the food security of the world and the price fluctuations of food items has been variable with the passage of time and its continuation for several reasons. Prior to Russia's attack on Ukraine, global food and fertilizer prices were on the rise due to reduced harvests in Latin America, Southeast Asia, and Europe in 2021, disruptions from the Covid-19 pandemic, and increased demand for food in Asia. This created favorable conditions for any new shock in the global food market. Russia's military invasion of Ukraine in February 2022 has contributed to the upward trend of major food prices in the world.

The war in Ukraine quickly led to a global food security crisis. So that almost a month after the start of the war, the FAO food price index reached a new historical record, which was 12.6% compared to February 2022,

33.6% compared to 2021, and 15.8% more than its peak in February 2011. This process continued until the fourth month of the war. Several factors have influenced the process of price increase, the most important of which are: the increase in fuel and energy costs and the consequent increase in higher transportation costs, logistical restrictions through the sea Black area and Ukraine, the challenges of global access to production inputs, especially for low-income countries, restrictions on food trade by major food producing and exporting countries in the world, weak support measures from governments, lack of energy supply. Working in Ukraine's agricultural sector, significant reductions in global stocks of basic agricultural products have prompted hasty responses by several exporting countries, including the establishment of export restrictions on key food items.

The results of the surveys also show that from the fifth month onwards, the food security indicators gradually returned to the normal levels at the beginning of the war, and therefore, the reduction in prices has improved the food security situation in the world. Several factors have played an effective role in this process, the most important of which is the partial reopening of the Black Sea ports through the Black Sea Grain Initiative under the guidance of the United Nations, the Solidarity Lines Initiative of the European Union, the increase in global humanitarian efforts, the cancellation or reducing the export restrictions of major food producing and exporting countries, building capacity and stabilizing the future of the market with the help of the Global Food Safety Initiative Group, as well as improving the efficiency and transparency of food supply and demand chains at the global level by the GS1 World Organization.

But even though global prices of food staples have largely returned to pre-Ukraine war levels since the fifth month, this does not mean that this stability will last. Because the continuation of this war and its expansion in different fields and most importantly, the possibility of the direct entry of the Western countries and the United States of America into a direct

war with Russia and its uncontrollable consequences, uncertainty and increasing concerns about re-escalation It has perpetuated the food security crisis. Therefore, coordinated and quick efforts of countries, institutions and international organizations in order to end this war and optimally manage the resulting food crisis will be very valuable and vital.

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