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Evaluation of Food Security Developments in the Arab Countries: An Analysis Based on Global food security Indicators (2010–2022)

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Abstract:

This paper evaluates the developments in food security across Arab countries during the period 2010–2022, drawing on the four dimensions outlined in the Global Food Security Index: availability, affordability, quality and safety, and resilience. The study highlights the critical role of food security in achieving economic and social stability, particularly in a region highly exposed to external shocks, climate change, and geopolitical tensions. Despite notable progress in some areas, the findings reveal persistent disparities among Arab countries, especially in terms of affordability and resilience. The analysis also underscores the importance of sustainable agricultural practices, investment in infrastructure, and enhanced regional cooperation to ensure long-term food security. Based on the results, the study offers a set of policy recommendations to strengthen food systems, improve nutritional outcomes, and reduce vulnerability to future crises.

Key words: Food security, Self-sufficiency rate, Basic food commodities, Global food security indicators.

JEL Classification Codes: Q17, Q18, L66

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INTRODUCTION

The agricultural sector in Arab countries is considered one of the sectors that produce wealth and employ a large number of skilled and unskilled labor, and contribute to economic growth, which has increased in importance in light of the growing domestic demand for food and the agricultural sector's dependence on importing seeds, fertilizers and agricultural fertilizers, as Arab countries have many natural, material and human capabilities that allow them to achieve self-sufficiency and food sovereignty in the most prominent products and basic commodities, if this is accompanied by government policies compatible with encouraging agricultural investments aimed at achieving their food security and securing the growing domestic demand for food.

The agricultural strategies followed by Arab countries in order to achieve their food security and diversify their exports during the period (2010-2022) have varied according to their financial and economic situation, their trends towards liberalizing the sector and supporting investment in it. Then came the Covid-19 pandemic to create more complications for the food situation with lockdown measures, import restrictions and growing risks resulting from disruptions in global food chains, which prompted Arab countries to adopt strategies to raise self-sufficiency rates and achieve their food security according to available internal capabilities, in light of the growing domestic demand for basic food commodities such as wheat, vegetable oils and legumes. And the position of food and processing industries within these countries' efforts to achieve food sovereignty.

Given this context, the central research problem addressed in this study is:

How can we evaluate the performance of Arab countries in achieving food security according to the Global Food Security Index during the period 2010–2022?

To explore this issue, the study investigates the following sub-questions:

- **Q1:** What are the underlying causes of the widening food gap in Arab countries during the period 2010–2022?

- **Q2:** What are the key challenges and obstacles preventing Arab countries from achieving food security?
- **Q3:** Which sectors have contributed most to the positive performance of Arab countries in food security indicators?

In light of these questions, the study tests the following hypotheses:

- **H1:** The widening food gap in Arab countries is driven by internal constraints—primarily related to financing—and external factors linked to global food market volatility.
- **H2:** During the study period, Arab countries faced several obstacles to food security, including reliance on traditional irrigation systems, low rainfall, and geopolitical tensions with neighboring states.
- **H3:** Cereals, legumes, and meat were the most significant sectors contributing to improved food security indicators across the region.

To address these questions, the study employs a mixed-method approach: a descriptive method to establish the theoretical framework, an inductive method to identify key food security indicators, and an analytical method to interpret these indicators in line with global benchmarks. The analysis draws on data from the Arab Organization for Agricultural Development.

Based on the above, we will address in this research paper the following main topics: LITERATURE REVIEW (Food security in Arab countries : Coordination of Efforts, Challenges and Obstacles); RESULTS (Analysis of the self-sufficiency rate of basic food commodities and its implications for achieving food security in Arab countries during the period 2010-2022); DISCUSSION (Evaluation of food security indicators in Arab countries during the year 2022); And finnaly CONCLUSION.

LITERATURE REVIEW

Today, more than 2 billion people on Earth suffer from food insecurity, represnting 26.4% of the world's population (Akroud, 2022, p. 51), including 828 million people who suffer from hunger in 2021 (acute food insecurity) (Ikudayisi & Adejumo , 2025, p. 1)

While the rest, about 1.3 billion people suffer from moderate food insecurity, that is, they don't have regular access to healthy, nutritiuos and sufficient food

The term of food security refers to the avaibality of food at the local and global levels, which is based on the ideas of researcher Thoms Malthus in 1798, according to which agricultural output tends towards food abundance in a numerical sequence (Gahamanyi & Tchouassi , 2025, p. 4), while population increases in a geometric sequence, and this leads to a widening of the gap between food supply and demand over time, with famine acting as a mechanism for closing this gap (F. Ben Abid., and al. 2017, p.139). The Food and Agriculture Organization of the United Nations (FAO), concluded that food security is a situation that exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO., The state of food security and nutrition in the world, Urbanization and transformation of agricultural systems, nutrition and healthy eating patterns across the rural-urban continuum, 2023)

This is according to the following four main dimensions, to achieve food security goals, all four dimensions must be achieved simultaneously :

- Physical availability of food : Food availability addresses the supply side of food security, and is determined by the level of food production, stock levels, and net trade.
- Physical and economic access to food: Adequate food supply at the level of Arab countries does not in itself guarantee food security at the household level, and concerns about inadequate access to food have led to a greater focus of policies on income and expenditure, markets, and prices in achieving food security goal. (Ikudayisi & Adejumo , 2025, pp. 1-2)
- Nutrient utilization: It refers to the way in which the body makes the most of the different nutrients contained in food. Whether individuals consume enough food to provide them with energy and nutrients is a result of good care and feeding practices, food preparation and diet diversity, and food distribution within the household. Together with the good biological utilization of the food consumed, this determines

the nutritional status of individuals (FAO., The state of food security and nutrition in the world, Financing to eradicate hunger, food insecurity and malnutrition in all its forms, 2024).

- Stability of the other three dimensions over time: Even if a person eats enough food during the day, they are still considered to be food insecure if they do not have adequate access to food on a regular basis, putting them at risk of deteriorating nutritional status (Gahamanyi & Tchouassi , 2025, p. 5) . Adverse weather conditions, political instability, or economic factors (such as unemployment and rising food prices) may have an impact on food security.

The world Bank's definition of food security has been distinguished according to (Mettai, 2014, p. 139) between chronic food insecurity, which constitutes continuous insufficient food due to the permanent inability to obtain sufficient food, and the transient food insecurity which is a temporary decline in a family's ability to obtain adequate food.

We note that both concepts are based on the perspective of food eligibility in the food policy panel, both focus on the situation of the family and individuals rather than focusing on the concept of food security at the absolute (self-sufficiency) and relative (ensuring the minimum production of food needs on a regular basis) levels (Ben Abid, Metai, & Sallah, 2017, p. 140) . The cultivated areas in Arab countries are estimated at about 70.9 million hectares (representing 5.3% of their total geographical area), and 1.45% of the agricultural areas in the world (estimated at 4.9 billion hectares) (Letaif & Bouzid, 2016, p. 149), the agricultural labor force is estimated at approximately 135.8 million people (Ben Aissa & Ben Aichou, 2023, p. 749) .Arab countries differ in terms of the area occupied by agriculture in each of them, due to several geographical and environmental factors, in addition to the agricultural policies followed and the volume of investments in the sector (Mettai, 2014, p. 140).

There are many factors behind the rise in food prices in global markets, the most important of which are the rise in oil prices and the resort of some countries to biofuel as an alternative, in addition to the decline in the global stock of grains and the imposition

of high customs duties on agricultural products by some countries due to the Russo-Ukrainian war and The COVID-19 Pandemic (AL-Rousan, AL-Najjar, & AL-Najjar, 2024, pp. 3-5), and speculation in the prices of basic commodities, and the imbalance between supply and demand, finnaly the decline in agricultural productivity, especially in developing countries (Ben Laria, 2014, pp. 69-75) .In the context of the transformation of many agricultural crops from a source of food for humans to a source of fuel (such as the transformation of corn to produce ethanol and the transformation of vegetable oils to produce biodiesel), which sheds light on the impact of biofuels in achieving food security and rising food prices in Arab countries (Boukera & Chemmam, 2016, p. 226).In addition to sustainable agriculture in Arab countries faces many challenges that hinder the achievement of food security and the development of the agricultural sector. These challenges overlap with many natural, economic, social and political factors, the most prominent of which are water scarcity, as limited water, climate change, and increased demand for water as a result of population and industrial growth (Khurshid & Abid , 2024, p. 2), desertification, and land degradation lead to the loss of large areas of agricultural land (Ben Aissa & Ben Aichou, 2023, pp. 762-763), which negatively affects agricultural productivity, with the impact of climate change through rising temperatures, drought, floods, and the encroachment of rain, the spread of agricultural pests and diseases, and the lack of investments in agricultural research and development, modernization of technologies, and the provision of infrastructure, bad management of resources, the lack of qualified and trained agricultural competencies, in addition to difficulties in marketing that reduce the competitiveness of agricultural products, conflicts and wars that lead to the destruction of the agricultural infrastructure and the migration of people from rural areas to cities, and finally, changing consumption patterns towards manufactured and imported foods, which reduces the demand for local agricultural products (Ben Abid, Metai, & Sallah, 2017, pp. 143-146) .

The Arab Organization for Agricultural Development expects the food gap to reach about $71 billion in 2030 due to the failure of Arab countries to find clear financing

mechanisms to meet the challenge of rising food prices in the global market (Letaif & Bouzid, 2016, p. 144).The increasing use of agricultural products in the production of biofuels is one of the factors behind the rise in agricultural commodity prices (such as rising energy prices, increasing demand for food, changing consumption patterns, declining stocks in major grain exporting countries, climate fluctuations and speculation), as biofuels continue to exert a pressure on food security, and all countries of the world, including Arab countries, are affected by the growth in demand for biofuels, regardless of their contribution to the growth of its production (Boukera & Chemmam, 2016, p. 227).

There is a close relationship between global food prices and local prices in Arab countries, as most of them depend on imports to cover the food deficit. Any change in global prices causes fluctuations in local markets, where many Arab countries witnessed an increase in food consumer price indices (Ben Laria, 2014, p. 80). In order to overcome these challenges, Arab countries should take a set of mechanisms and strategies to enhance agricultural economic integration and developing scientific research in the agricultural field, including developing modern irrigation techniques such as drip irrigation (Akroud, 2022, p. 61), using organic fertilizers to improve soil fertility, developing drought- and pest-resistant crop varieties to increase the ability to withstand harsh climatic conditions, training farmers on the latest agricultural techniques, developing infrastructure such as storage warehouses, improving transportation, supporting agricultural cooperatives to enhance farmers' negotiating power and improve their access to emerging markets, implementing agricultural policies that encourage agricultural investment, and finally spreading awareness among farmers and consumers about the importance of sustainable agriculture and its products, all of which aim to develop bilateral trade relations. (Mettai, 2014, pp. 150-154) .Climate change poses a major threat to sustainable agriculture and food security in Arab countries through water scarcity, drought, high temperatures, and increased evaporation, which leads to a decrease in water resources available for agriculture, with crop damage and deterioration of agricultural land. High temperatures also affect the healthy growth of crops and lead

to a decrease in productivity, increased evaporation leads to a significant loss of moisture from the soil, which necessitates the adoption of modern irrigation methods (Khurshid & Abid , 2024, pp. 3-4) . The increase in extreme events such as floods, drought, and irregular rainfall destroys agricultural crops and makes it difficult to plan agriculture, and determine planting and harvesting dates. In addition to the rise in sea level, which leads to the salinization of arable lands near the coasts, changing the environment for pests and diseases, which increases their spread and causes significant losses to crops. Finally, the phenomenon of global warming and its negative impact on erosion, loss of organic matter, and deterioration of soil structure (Boubagra, 2023, pp. 45-51) .

International organizations such as the Food and Agriculture Organization of the United Nations (FAO), the World Food Program (The largest humanitarian organization in the world) and the World Bank BIRD play a vital role in supporting the efforts of Arab countries to achieve their food security. These organizations contribute their knowledge, expertise, financial and technical resources to address the various challenges facing food security in the Arab region, such as drought, poverty, conflicts and climate change with the Russian-Ukranian crises (Al-Salem & Al-Saadoune, 2023, pp. 351-353) .

They play many roles, including providing financial and technical support, as these organizations provide loans and grants to support agricultural projects and provide modern technology, provide food and humanitarian aid in emergency and disaster situations, and support school feeding programs, help build the capacity of government institutions and non-governmental organizations in the field of food security through training and knowledge exchange. International organizations also help Arab countries develop effective policies and strategies to achieve their food security based on global best practices, monitor and evaluate food conditions in those countries and provide reports on progress made and existing challenges, while working to build partnerships between governments, non-governmental organizations and the private sector to enhance cooperation in the field of food security.

RESULTS

The sectors and divisions of plant, animal and fish production provide significant quantities of basic food commodities in the Arab countries. Basic food commodities refer to the groups of grains, legumes, vegetables, fruits and vegetable oils, the availability of which varies from one product to another, and from one country to another.

Through this axis, we will address the analysis and evaluation of the most important indicators of food security in the Arab countries during the period (2010-2022) in terms of the development of the quantity of production, the value of exports and imports, the trade balance, availability for consumption, and self-sufficiency rates. As well as studying the indicators of achieving food security in the Arab world during the year 2022.

Cereal Division :

Cereal division are among the most important agricultural crops in the Arab countries, which contribute significantly in terms of the area they exploit or in terms of contributing to the value of the food gap for basic commodities. They are the basic material for the Arab individual's food, and are also considered the main source of calories.

Cereal production in the Arab contries in 2022 amounted to: 49.5 million tons. The following table shows the development of production, the value of exports and imports, the trade balance, availability for consumption, and the self-sufficiency rate for Cereal division in the Arab countries during the period (2010-2022).

Table (1): Development of production, value of exports and imports, trade balance, availability for consumption, self-sufficiency rate of cereal division in Arab countries during the period (2010-2022)
Unit: Thousand tons (Million dollars)

Years	Production quantity	Exports	Imports	Trade balance	Availability for consumption	Self-sufficiency rate
2010	50867.94	1586.26	19065.22	17478.96	113309.48	44.89
2012	51886.92	1587.01	22845.01	21258	112737.6	46.02
2014	51854.7	1016.7	24583.8	23567.1	127928.99	40.53
2016	49626.96	1792.42	21011.4	19219	126552.4	39.22
2018	54126.34	1241.66	24369.66	23128	142460.49	37.99
2020	53358.36	676.8	22102.4	24425.6	137404.06	38.83

2022	49493.72	427.91	30212.3	29784.39	128122	38.63

Source: Prepared by the researchers based on:

- Arab Organization for Agricultural Development, **Data of the Arab Agricultural Statistics Yearbook,** Volume from 30 to 41, Khartoum, SUDAN, 2010-2021.
- Arab Organization for Agricultural Development, **Arab Food Security Status,** Issues from 2010 to 2022, Khartoum, SUDAN, 2010-2022.

We note from the previous table that cereal production in Arab countries was characterized by fluctuations during the period (2010-2022), and irregularity in terms of quantity that fluctuated between high and low. By comparing the annual grain production for the year 2022, it becomes clear that it decreased by about 9.1% compared to 2021, and it also decreased by about 9.9% compared to the average cereal production during the period (2016-2021). We also note that during the year 2019, the productivity of the cereal division was high as a result of the high productivity of wheat, barley, maize, and sorghum. Despite this, that productivity remains weak, as it reached 1.78 tons per hectare, while the global average is estimated at about 3.97 tons per hectare.

The self-sufficiency rates of the cereal division recorded average and fluctuating values, as they reached 50.25% in 2013, which is considered the best rate achieved during the period (2010-2022), while in 2022 they reached 38.63%, which represents a slight decrease after reaching 39.33% in 2021. Grains top the list of plant products in Arab countries, and include both hard and soft wheat, barley, rice, and corn.

Wheat : Wheat is considered one of the most important grain crops due to the consumption pattern in Arab countries, as wheat flour and its products occupy the top spot in the list of consumer food commodities for Arab citizens. The area used for wheat crops amounted to about 38.3% of the area of grain crops in the Arab world during the year 2022, and grain production is concentrated at about 92% of its production in six (06) Arab countries, led by Egypt with a production of about 9.8 million tons, equivalent to 40% of the total wheat production, then Algeria with about 15%, Iraq with about 12%, Morocco, Syria and Tunisia with rates of 11%, 8%, and 5% respectively.

We also note that there is a disparity in productivity between Arab countries, and within countries themselves according to the irrigation method used (irrigated, rain-fed) as a result of the lack of use of modern and advanced technologies, and the reliance on

growing a large percentage of grains in the rain-fed sector, which is low in productivity. There is also a large gap between the actual productivity in the extension fields based on research experiments and the productivity of the fields at the level of farmers, which requires the adoption of Arab strategies to promote grain crops and the use of appropriate technologies to develop productivity as it is the primary source of calories for the Arab individual.

Barley: Its ranks second after wheat in terms of its contribution to the volume of grain production in the Arab countries. Algeria, Syria, Morocco and Tunisia are among the most important Arab countries that produce it, with a combined production rate estimated at 94% of the total barley production in the Arab countries during the year 2021. Barley production in the Arab countries during the year 2022 amounted to about 4.4 million tons. This result is considered a decrease from the production in the year 2021, when it amounted to 8.9 million tons. This is due to the decrease in barley productivity, which amounted to about 1.02 tons per hectare. However, the annual growth rate of its productivity during the last ten years is estimated at about 4.5% compared to the average growth rate of global productivity of 0.8%.

Corn: Sudan is considered the main producer of corn, and the importance of this crop is due to the fact that it occupies about 47% of the area of grain crops in Arab countries during the year 2021. During the year 2022, corn production of both types witnessed a significant increase, as the production volume reached about 7.9 million tons, equivalent to 15.9% of grain crop production. This percentage is considered an increase of 22.4% compared to the production in 2021 and by 18.4% compared to the average period (2016-2021), This increase is due in particular to the improvement in rainfall rates during the year 2022.

Rice: Egypt is considered the main country for rice production, followed by Mauritania and Iraq. It is one of the main food crops as its consumption trend is constantly increasing. During the year 2022, its production amounted to 8.9% of grain crop production, although it occupies about 2.8% of the grain crop area in Arab countries. Rice production

in the Arab region represents about 1% of global production between 2020 and 2021. It is noted that the annual growth rate of rice productivity during the last ten years decreased by about 0.82%.

Legumes Division:

Legumes are among the basic nutrients for the individual in Arab countries, as they constitute the main source of vegetable protein in daily nutrition, and therefore their production is of great importance, as increasing the production of any type of them achieves more food security, but the cultivated area in Arab countries represents a small percentage of Arab agriculture, as the legumes division needs to adopt a complete system to improve their productivity, and confront the pests and weeds they suffer from, and each of : beans, lentils and chickpeas is considered among the most important legumes division, and the following table shows the development of production, the value of exports and imports, the trade balance, available for consumption, and the self-sufficiency rate of legumes in Arab countries during the period 2010-2022.

Table (2): Development of production, value of exports and imports, trade balance, availability for consumption, self-sufficiency rate of legumes division in Arab countries during the period (2010-2022)

Unit: Thousand tons (Million dollars)

Years	Production quantity	Exports	Imports	Trade balance	Availability for consumption	Self-sufficiency rate
2010	1227.97	553.77	1061.18	507.41	1875.95	65.46
2012	1352.2	308.95	1113.96	805.01	2270.87	59.55
2014	1543.9	451.7	1496.2	1044.5	2934.76	52.61
2016	1229.84	251.45	1289.39	1037.94	2387.97	51.50
2018	1720.04	406.2	1783.18	1376.98	4033.7	42.64
2020	1800	554.7	1854.1	1299.4	4200	42.86
2022	1850	296	2219	1923	5050	36.60

Source: Prepared by the researchers based on:

- Arab Organization for Agricultural Development, **Data of the Arab Agricultural Statistics Yearbook,** Volume from 30 to 41, Khartoum, SUDAN, 2010-2021.
- Arab Organization for Agricultural Development, **Arab Food Security Status,** Issues from 2010 to 2022, Khartoum, SUDAN, 2010-2022.

We note from the previous table that the production of legumes fluctuated during the period (2010-2022), where production recorded its lowest level in 2010, reaching 1.22

million tons. However, since 2015, production began to tend towards increasing and fluctuating until it reached its highest level in 2021, where it reached 1.93 million tons. It is noted from the results achieved that the productivity of legumes increased, and this is due to the use of hybrid seeds, the use of bacteria that fix atmospheric nitrogen, fertilization, and regular irrigation, all of which helped increase productivity. Despite the improvement in the average productivity of legumes during 2021, it is less than the global average productivity by about 5.6%.

The availability of legumes division for consumption in Arab countries is estimated at about 5 million tons, and is constantly increasing, as it reached about 1.8 million tons in 2010. The self-sufficiency rates of the total legumes division were in continuous decline, as they reached 65.46% in 2010, which is considered the best rate achieved during the period (2010-2022), and in 2022 it reached 36.6%, which is more of an import commodity than an export, and trade exchange is limited, although Morocco, Egypt, Sudan and Syria are the main producing countries of legumes in Arab countries.

Vegetables Division :

The vegetable division is distinguished by its nutritional importance, as demand is increasing at high rates with the increase in population, improvement in income levels, and increased interest in healthy food, as well as the suitability of different conditions for its production. It is also distinguished by its spread in all Arab countries under different agricultural patterns and systems, including traditional and modern, and its production achieves export surpluses in many Arab countries. Vegetables include a large group of plant crops, the most important of which are: potatoes, tomatoes, onions, beans, carrots. The following table shows the development of production, the value of exports and imports, the trade balance, available for consumption, and the self-sufficiency rate of vegetables division in Arab countries during the period (2010-2022).

Table (3): Development of production, value of exports and imports, trade balance, availability for consumption, self-sufficiency rate of vegetables division in Arab countries during the period (2010-2022) **Unit: Thousand tons (Million dollars)**

Years	Production quantity	Exports	Imports	Trade balance	Availability for consumption	Self-sufficiency rate
2010	55020.83	3602.82	1595.8	(2007.02)	51547.97	106.74
2012	52694.68	3757.43	1511.68	(2245.75)	49152.6	107.21
2014	68806.1	2915.9	2901.1	(14.8)	69486.18	99.02
2016	53861.4	2282.5	2874.9	592.4	56346.8	95.59
2018	57447	3467.7	3284.5	(183.2)	58480.6	98.23
2020	55515.9	2550.7	2782.3	231.6	57869.5	95.93
2022	54771.1	2724.72	1359.2	(1365.5)	56500	96.94

Source: Prepared by the researchers based on:

- Arab Organization for Agricultural Development, **Data of the Arab Agricultural Statistics Yearbook,** Volume from 30 to 41, Khartoum, SUDAN, 2010-2021.
- Arab Organization for Agricultural Development, **Arab Food Security Status,** Issues from 2010 to 2022, Khartoum, SUDAN, 2010-2022.

The production of vegetable division in Arab countries in 2022 was estimated at about 54.7 million tons. This result is considered a decline from 2014, when production reached about 68.8 million tons as the maximum production during the study period. This is due to the decrease in the area of vegetable division. Vegetable production in Arab countries constitutes about 5% of the total global vegetable production, and (06) six Arab countries together contribute 84% of the total Arab vegetable production. Egypt alone contributes about 33% of the total value as a result of the expansion of its cultivation in new reclamation areas, and the adoption of the technology of protected agriculture with high productivity for most vegetable division, while Algeria, Morocco, Sudan, Tunisia and Jordan contribute 25%, 8.5%, 7.5%, 5.4% and 4.4%, respectively.

We also note from the previous table that the self-sufficiency rates of the vegetables division were high, which is a very positive indicator due to the increase in vegetable productivity in Arab countries, and it has become superior to its global counterpart by a percentage of about 6.5%, as it reached 20.84 tons per hectare in it compared to 19.5 tons per hectare in the world during the period (2015-2018).

Despite the positive results achieved in productivity, Arab countries rely on imported seeds to produce vegetable seedlings, especially tomatoes, which requires them to adopt an integrated program to produce vegetable seeds, or to establish Arab seed

production companies at the Arab level in which joint Arab enterprises contribute, especially in light of the spread of tissue culture technology and seedlings free of viral diseases, in addition to the expansion of vegetable cultivation in greenhouses.

Fruits Division :

Fruits are considered among the general food sources in Arab countries, and the fruit basket includes several products due to the diversity of climate in the Arab world, which made it distinguished by its economic importance as one of the export commodities, which is grown on a wide area across the Arab countries, as it reached 5.2 million hectares in 2018. The following table shows the development of production, the value of exports and imports, the trade balance, available for consumption, and the self-sufficiency rate of fruits in Arab countries during the period (2010-2022):

Table (4): Development of production, value of exports and imports, trade balance, availability for consumption, self-sufficiency rate of fruits division in Arab countries during the period (2010-2022)

Unit: Thousand tons (Million dollars)

Years	Production quantity	Exports	Imports	Trade balance	Availability for consumption	Self-sufficiency rate
2010	32107.41	4195.74	3059.9	(1135.84)	31185.32	102.96
2012	32658.48	4273.9	3882.18	(391.72)	31377.00	104.08
2014	34963.6	3511.5	6187.4	2675.8	37484.46	93.27
2016	35916.1	4276.4	5966.1	1689.71	36480.6	98.45
2018	36659.7	4449	5934.8	1485.8	38145.5	96.1
2020	45460	5303.8	8162.9	2859.1	47994	94.72
2022	44220	4372.9	5512.4	1139.5	46048.11	96.03

Source: Prepared by the researchers based on:

- Arab Organization for Agricultural Development, **Data of the Arab Agricultural Statistics Yearbook,** Volume from 30 to 41, Khartoum, SUDAN, 2010-2021.
- Arab Organization for Agricultural Development, **Arab Food Security Status,** Issues from 2010 to 2022, Khartoum, SUDAN, 2010-2022.

Fruits represent one of the important agricultural export commodity groups in Arab countries, which rank first in terms of the value of their exports. The value of fruit exports from Arab countries in 2020 amounted to about 5 billion dollars. The previous table shows that the production of fruit crops witnessed an increase that reached about 47 million tons in 2021 as the maximum production during the period (2010-2022), despite

the decrease in the average productivity of these crops during some years due to the Arab region being exposed to sudden changes in temperature, winds and relative humidity, especially in fruit set, which directly affected the set rate, and thus the quantity produced from the division. These conditions led to losses for fruit farmers, which forced them to sometimes get rid of fruit orchards and move towards replacing them with vegetable and field divisions.

The area planted with fruit crops in the Arab countires reached about 3.6 million hectares, an increase estimated at about 10% of the planted area, while the self-sufficiency rate of fruit in the Arab countries reached 96%. The total fruit production is based on (06) six Arab countries: Egypt, Algeria, Morocco, Sudan, Syria, and Saudi Arabia.

Oils and greases Division :

Oilseeds come second after the group of cereal division in terms of relative importance of cultivated areas in Arab countries. Their importance is highlighted as a source of vegetable oils, the self-sufficiency rates of which are low despite the large cultivated areas, as a result of the low productivity of these crops, especially in rain-fed agriculture (N. Al-Rousan, H. Al-Najjar, D. Al-Najjar, 2024, p. 9). The oilseed production sector in Arab countries is mostly a rain-fed sector controlled by fluctuations in rainfall and dominated by traditional systems characterized by low productivity and quality.

Vegetable oils are produced in Arab countries mainly in : Sudan, Morocco, Syria, Egypt and Tunisia. Sudan contributes in terms of area to more than half of the area planted with oilseed crops in the Arab countries 52.62%, while Sudan contributes to the production of Arab countries by about 21%, meaning that there is a large production gap. The following table shows the development of production, the value of exports and imports, the trade balance, availability for consumption, and the self-sufficiency rate for oilseeds and olives in Arab countries during the period (2010-2022):

Table (5): Development of production, value of exports and imports, trade balance, availability for consumption, self-sufficiency rate of oils and greases division in Arab countries during the period (2010-2022) Unit: Thousand tons (Million dollars)

Years	Production quantity	Exports	Imports	Trade balance	Availability for consumption	Self-sufficiency rate
2010	2067.82	1994.16	5980.85	3986.69	5241.73	39.45
2012	2004.02	2878.64	7805.02	4926.38	5932.9	33.78
2014	2002.6	2636.6	10462.5	7825.9	9119.42	21.96
2016	1919.8	1766.2	4356.1	2589.9	5301.6	36.21
2018	3261.4	2381.5	7440.1	5058.6	9887.6	32.98
2020	3432.1	2829.5	7239.7	24410	9796.1	35.04
2022	/	2966	10057	7091	/	34.36

Source: Prepared by the researchers based on:

- Arab Organization for Agricultural Development, **Data of the Arab Agricultural Statistics Yearbook,** Volume from 30 to 41, Khartoum, SUDAN, 2010-2021.
- Arab Organization for Agricultural Development, **Arab Food Security Status,** Issues from 2010 to 2022, Khartoum, SUDAN, 2010-2022.

Despite the vast areas occupied by oilseeds in Arab countries, which were estimated at 10.2 million hectares during the year 2020, and their oil production was estimated at about 3.4 million tons during the same year, and it was extracted from about 10.5 million tons of oilseeds, which is not commensurate with either those areas, or with the quantity of oilseeds produced, which requires working to develop value chains, in order to improve productivity per hectare, the quality and type of seeds and their oil content, and vegetable oil manufacturing and extraction systems.

Sesame, peanuts, sunflowers and soybeans are considered among the most important oilseed crops, as the production of both peanuts and sunflowers witnessed relative stability, as their production decreased during the year 2022 by about 0.3% and 0.1%, respectively, compared to the production of the year 2021, while the production of both sesame and soybeans witnessed a significant increase during the year 2022, amounting to about 10.8% and 7.9%, respectively, compared to the production of the year 2021.

Meat Division :

Animal products represent an important source of animal protein in Arab countries, which have a huge livestock wealth. However, their production of meat and dairy products is not commensurate with their size due to their low levels of production and

weak exploitation efficiency. This is mainly due to the prevailing pattern of raising livestock, which is a traditional pastoral system in poor-production pastures that suffer from overgrazing (Boubagra, 2023, p. 47). The number of livestock herds in Arab countries was estimated at about 344.05 million heads during the year 2022. The number of sheep and goats is about 273.16 million, equivalent to 79.3% of the number of Arab livestock herds, cows and bulls are estimated at about 54.19 million heads, equivalent to about 15.7% of the number of herds, while the number of camels is estimated at about 16.6 million heads, equivalent to 4.8%. In general, most of the livestock is concentrated in five major Arab countries are: Sudan, Algeria, Somalia, Mauritania, and Egypt.The data in the previous table shows that meat production in Arab countries increased from 8 million tons in 2010 to 9.5 million tons in 2018, reaching 9.3 million tons in 2022. The reason for the increase in meat production in Arab countries is due to the increase in population, and to the relative improvement in the standard of living and the slight increase in the level of household income, which led to an increase in consumption, especially during seasons and holidays.

The following table shows the development of production, the value of exports and imports, the trade balance, availability for consumption, and the self-sufficiency rate of the meat division in Arab countries during the period (2010-2022) :

Table (6): Development of production, value of exports and imports, trade balance, availability for consumption, self-sufficiency rate of meat division in Arab countries during the period (2010-2022)

Unit: Thousand tons (Million dollars)

Years	Production quantity	Exports	Imports	Trade balance	Availability for consumption	Self-sufficiency rate
2010	8094.00	499.75	6517.84	6018.11	10681.55	75.78
2012	8605.8	467.2	8072.9	7605.7	11650.0	73.90
2014	8478.3	335	8873.9	8538.9	11213.9	75.60
2016	9045.4	420.1	8712.3	8292.2	13413.9	67.43
2018	9517.67	570.09	9050.15	8480.06	13572.9	70.12
2020	9475.52	567.15	8521.78	7954.63	13432.7	70.56
2022	9332.6	639	8358.7	7720	13500	69.13

Source: Prepared by the researchers based on:

- Arab Organization for Agricultural Development, **Data of the Arab Agricultural Statistics Yearbook,** Volume from 30 to 41, Khartoum, SUDAN, 2010-2021.
- Arab Organization for Agricultural Development, **Arab Food Security Status,** Issues from 2010 to 2022, Khartoum, SUDAN, 2010-2022.

The annual growth rate data also shows that the increase in meat production is also due to the continuous development in the production of white meat, especially poultry, which is widespread in all Arab countries and relies on modern production systems in most of them. Therefore, we note that when comparing red and white meat, we find that red meat is declining compared to white meat. As for the self-sufficiency rates for the meat division, they were relatively high and fluctuating, as the highest rate was recorded in 2013, where it reached 77.49%, and the lowest rate in 2019, where it reached 67.87%.

Marine Fisheries Division :

Marine fishing products constitute a significant source of animal proteins that the Arab individual needs in his daily diet, and they also help secure the needs of Arab countries for an important food item (Ouaar & Doufi, 2021, p. 70). This sector is characterized by achieving an export surplus, and there are great potentials and opportunities to increase current production by optimally exploiting the available capabilities that include large resources of waterways and valleys (16.6 thousand km), swamps and sea coasts (22.4 thousand km), and the continental shelf (604 thousand km), in addition to the unexploited potential of fish farming. The following table shows the development of production, the value of exports and imports, the trade balance, available for consumption, and the self-sufficiency rate of marine fishing products in the Arab countries during the Study period:

Table (7): Development of production, value of exports and imports, trade balance, availability for consumption, self-sufficiency rate of marine fisheries division in Arab countries during the period (2010-2022) Unit: Thousand tons (Million dollars)

Years	Production quantity	Exports	Imports	Trade balance	Availability for consumption	Self-sufficiency rate
2010	4136.14	2134.69	1635.22	(499.47)	4106.69	100.72
2012	4198.37	2435.67	2353.47	(82.2)	4420.67	94.97
2014	4561.3	1453.9	2524.1	1070.2	4738.24	96.27
2016	5127	1582.5	2387.6	805.1	4902.1	104.59

2018	4982.3	3107.2	2848.9	(258.3)	4543.1	109.71
2020	5745.4	3868.6	2835.3	(1033.3)	5403.5	106.33
2022	6184.2	3750.45	1616.78	(2133.67)	5682.96	108.82

Source: Prepared by the researchers based on:

- Arab Organization for Agricultural Development, **Data of the Arab Agricultural Statistics Yearbook,** Volume from 30 to 41, Khartoum, SUDAN, 2010-2021.
- Arab Organization for Agricultural Development, **Arab Food Security Status,** Issues from 2010 to 2022, Khartoum, SUDAN, 2010-2022.

We note from the previous table that the production of marine fisheries division fluctuated significantly during the period (2010-2022), as production in 2010 amounted to about 4.13 million tons, then increased until 2017, when production reached 5.29 million tons, and production continued to rise to reach 6.18 million tons in 2022. Fish production is based in the following major Arab countries: Morocco, Egypt, Mauritania, Oman, Saudi Arabia, Tunisia, Algeria, and the Emirates. We also note that self-sufficiency rates were high, not less than 94% during the study period, and reached 108% in 2022.

Despite the previous results achieved, the average annual consumption of fish by Arab citizens in 2022 amounted to about 11.46 kg per person/year, which is a percentage considered a decline from 2019 when it amounted to 12.41 kg per person/year. It is also worth noting that there are different percentages between Arab countries in terms of average fish consumption. We find that the average consumption is high in Tunisia, Morocco and Mauritania compared to other Arab countries, while in Algeria, for example, we find that the average Algerian individual consumption of fish did not exceed 4.7 kg per person/year, which is a small percentage estimated at a quarter compared to the average individual consumption worldwide, which is equivalent to 17.7 kg per person/year.

DISCUSSION

Through this section, we will analyze and evaluate the most prominent food security indicators in Arab countries during the recovery phase from the Corona pandemic-19 and during the year 2022.

Food Availability Index :

The Food Availability Index measures the adequacy of food supplies, the risk of supply disruptions, national capacity to distribute food, research efforts to expand agricultural and food production. The Food Availability Index is measured through five (05) indicators: food supply adequacy, public spending on agricultural research and development, agricultural infrastructure, variability of agricultural production, and risk of political instability (Ben Abid, Metai, & Sallah, 2017, p. 148).

The average food availability index in the Arab countries for the year 2022, represented by 14 countries - the subject of this study - amounted to about 55.6 points, which is less than the global average estimated at about 57 points. The UAE ranked first with a score of 73.8/100, followed by Qatar with a score of 72.9/100, then Saudi Arabia with 67.2/100, in the food availability index, while Syria ranked last with a score of 26.6/100.

Food Accessibility Index :

Access to food is measured by the ability of individuals in Arab countries to meet their food needs, and thus represents the consumer demand for food commodities according to their financial capabilities and the factors affecting access to them. There is increasing interest in studying and analyzing the axis of access to food and the factors affecting access to it, such as: individual incomes, food commodity prices, population growth, food production growth, development of marketing systems and availability of social safety nets (Ouaar & Doufi, 2021, pp. 74-75) .

The Food Accessibility Index in Arab countries reflects the ability of consumers to purchase food, their exposure to price shocks, and the availability of programs and policies to support them when shocks occur. This index is calculated through six sub-indices (06): food consumption as a share of total household expenditure, the percentage of the population living below or near the global poverty line, per capita GDP (gross domestic product) (Gahamanyi & Tchouassi , 2025, p. 5), tariffs on agricultural imports,

food safety net programs, and farmers' access to finance. Individual income levels also vary in Arab countries, with individual incomes rising in the Gulf Cooperation Council countries, with the average per capita share in Qatar, which has the highest average income in 2022, at $82,150, and the lowest average for an Omani citizen at $23,810, while the average ranges between $6,000 and $3,000 in : (Iraq, Libya, Algeria, Lebanon, Tunisia, Egypt, Palestine, Morocco, and Djibouti). In the rest of the Arab countries (Comoros, Sudan, Syria, Somalia, Mauritania, and Yemen), the average ranges between $2,000 and $460.

One of the most important factors affecting the quantities and types of food basket commodities in Arab countries is income levels. World Bank statistics for 2022 indicate that the average per capita share of GDP in Arab countries during the year 2022 amounted to $7,630, after it was during the years 2021 and 2020, respectively: $6,280 and $5,750, as the global average per capita of GDP during the year 2022 was recorded at about $12,420.

As for the average per capita share of agricultural production in the Arab countries, it reached during the year 2022: 323.87 dollars, after it was during the years 2020 and 2021, respectively: 326.8 and 337.52 dollars, and the average per capita share of agricultural production in the world per capita during the year 2022 about 520.75 dollars. With the upward trend in global prices of major food commodities between 2021 and 2022, the ability to obtain food in the required quantity and quality in Arab countries was affected especially: grains, oils, sugar and animal products. The food gap for major commodities during 2022 also witnessed an increase in their prices, especially the following: beef, vegetable oils, wheat, and rice.

Food Utilization Index :

Food utilization refers to the way in which the body uses the different nutrients in food (Al-Salem & Al-Saadoune, 2023, p. 348). The nutritional status of an individual consumer in Arab countries is determined by the intake of adequate food components of energy, protein, fat and micronutrients, in addition to the appropriate biological

utilization of the food consumed by the individual. Optimal nutrition is an essential element of food security, as it leads to increased immunity to food-borne diseases, food-borne diseases, or diseases caused by unsafe food, have harmful effects on health and nutrition by impairing the absorption of nutrients, growth and development (Akroud, 2022, p. 58) . The food security index in the Arab countries during the year 2022 reached: rates ranging between 7.07/10 for the UAE as the highest rank, followed by Saudi Arabia and Qatar, and in last place Somalia with a score of 2.97/10.

Regarding the average per capita share of energy components, it reached 2920 kilocalories per person/day in Arab countries in 2022, and 2913 kilocalories per person/day in 2021. While the average per capita share of energy components in the world in 2022 was: 2977 and in 2021: 2990 kilocalories per person/day, where the Tunisian citizen ranked first as the highest share of energy components in 2022 with an average of 3509 kilocalories per person/day. As for the Arab citizen's share of protein during the year 2022: 79.2 grams per person/day, and as for fats, it amounted to 80.9 grams per person/day, which is less than the global average estimated at about 89 grams per person/day, which result the Kuwaiti citizen ranked first as the highest share of fat components during the year 2022 with 111.8 grams per person/day.

Malnutrition Index :

An unbalanced diet leads to malnutrition, including overeating. The term undernutrition refers more specifically to a lack of nutrients, and undernutrition leads to stunted growth, wasting, and underweight. Malnutrition in Arab countries is the result of an individual getting too little or too much of the nutrients, which leads to health problems, however most clinical studies use the term malnutrition to refer to undernutrition (Ben Aissa & Ben Aichou, 2023, p. 752) . Statistics on malnutrition in Arab countries were monitored through the rates of malnutrition and underweight among newborns, where Yemen ranked second to last in the hunger index during the year 2022: 45.1/100 points, followed by Sudan with: 28.8 points.

United Nations UN reports also indicate that the prevalence of moderate or severe food insecurity is due to many factors that have affected nutritional conditions, such as rising prices, natural disasters and instability. During the period (2010-2022), the phenomenon of hunger and malnutrition increased in many Arab countries that witnessed instability and unfavorable natural conditions, the spread of drought waves, increased desertification, and the impact of international conflicts.

CONCLUSION

The problem of food security in arab countries are linked to several economic and environmental determinants, in order to succeed in this, it must coordinate efforts between governments and organizations to confront hunger and malnutrition, while implementing joint programs far from political and ideological calculations and identifying vulnerable groups that are actually deserving of food support.

Developing agricultural systems in arab countries also contributes to ensuring the regular availability of food, while ensuring the support of sustainable biological corps that are adapted to climate change and have high nutritional value to ensure the right of future generations to obtain sufficient and healthy food.

The study achieved the following **results:**

- ✓ Food security in Arab countries has been the most prominent economic challenge and issue during the period (2010-2022) due to their heavy reliance on global markets to cover their food needs, which makes them vulnerable to sudden fluctuations in commodity prices, and poses a threat to achieving their food sovereignty.
- ✓ The rates of achieving self-sufficiency in basic food commodities by divisios and sectors in Arab countries during the period (2010-2022) varied, as they were low in cereal, oils and greases divisions (between 21% and 46%), medium in meat and legumes divisions (between 36% and 75%), and high in vegetables, fruits and marine fisheries divisions (between 93% and 109%).
- ✓ The levels of achieving food security during the study period are considered to be variable among Arab countries and average compared to global food security

indicators, the requires intensified efforts to preserve food sovereignty and achieve sustainable agricultural development.

- ✓ Biofuels emit less carbon than fossil fuels, but their environmental risks may be greater in Arab countries due to the shrinking arable area. In addition to climate challenges, the severity of the drought crisis in many Arab countries and the increase in population growth are all challenges that require Arab governments to increase coordination of inter-agricultural policies to achieve integration and sustainable food security.

Based on the previous results, we present the following research **recommendations:**

- ➢ Coordination between agricultural policies in Arab countries, and activating joint Arab action to survey and classify agricultural resources, and establish networks for monitoring renewable and non-renewable water.
- ➢ Establishing joint Arab investment projects in the fields of agricultural technical research and development, and facilitating the transfer of qualified and unqualified labor and capital to strengthen the basic infrastructure necessary to achieve agricultural development and food security.
- ➢ Activating the Greater Arab Trade Area with the aim of exchanging agricultural products with a comparative advantage, while overcoming the obstacles and tax that hinder it.
- ➢ Support transparency and disclosure of country-specific agricultural and trade procedures and policies.

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