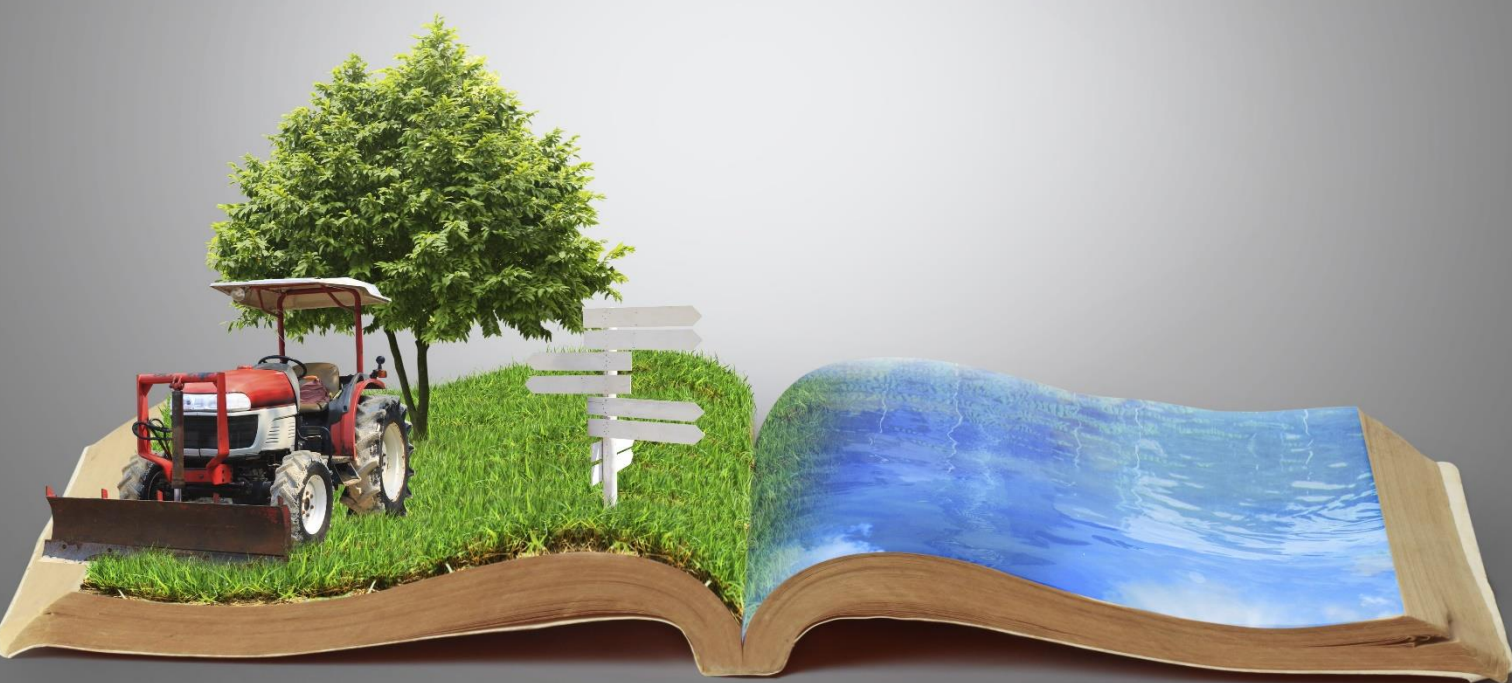


COMCEC AGRICULTURE OUTLOOK 2025



COMCEC COORDINATION OFFICE
September 2025



**Standing Committee
for Economic and Commercial Cooperation
of the Organization of Islamic Cooperation (COMCEC)**

COMCEC AGRICULTURE OUTLOOK 2025

**COMCEC COORDINATION OFFICE
September 2025**

For further information please contact:

agriculture@comcec.org

COMCEC Coordination Office
Necatibey Caddesi No: 110/A 06100
Yücetepe Ankara/TÜRKİYE

Phone : + 90 312 294 57 10

Fax : + 90 312 294 57 77

Web : www.comcec.org

e- mail : comcec@comcec.org

Foreword

COMCEC Strategy adopted during the 4th Extraordinary Islamic Summit held in Makkah Al-Mukarramah on 14-15 August 2012, envisages Working Group Meetings as one of the instruments for its implementation. Through the Working Groups, experts from the member countries get the chance of elaborating the issues thoroughly in the respective cooperation areas and sharing their good practices, views and experiences. The Working Groups are established for each cooperation area defined by the Strategy, namely Trade, Transport and Communication, Tourism, Agriculture, Poverty Alleviation, and Finance.

The COMCEC Outlooks are prepared in each cooperation area of the Strategy with a view to exploring the global trends and current situation in the COMCEC in the respective areas and to enrich discussions during the Working Groups Meetings by providing up-to-date data and analysis.

The COMCEC Agriculture Outlook 2025 has been prepared by **Prof. Dr. Erdoğan GÜNEŞ (Ankara University Faculty of Agriculture, Department of Agricultural Economics)**, who serves as Consultant for the Agriculture Working Group to the COMCEC Coordination Office. The aim of this report is to provide a comprehensive overview of the agricultural sector in the Member States. It aims to be a frequently referred handbook for decision makers and other users; to identify the relationships between agriculture and food industry and other sectors; to be a source for monitoring and evaluation of current agricultural policies and to assist in formulation of better policies in the Member Countries by combining various data and statistics published or compiled by different institutions. This document also dwells on the major issues with regards to agricultural sector development and provides comparisons for different country groupings to expose the situation in the Member States and thus the cooperation potential.

Views and opinions expressed in the report are solely those of the author and do not represent the official views of the COMCEC Coordination Office or the Member States of the Organization of Islamic Cooperation. The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the COMCEC/CCO concerning the legal status of any country, territory, city or of its authorities, or concerning the delimitation of its political regime or frontiers or boundaries. Designations such as “developed,” “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgement about the state reached by a particular country or area in the development process. Excerpt from the report can be made as long as proper references are given. All intellectual and industrial property rights for the report belong to the COMCEC Coordination Office. This report is for individual use and not be used for commercial purposes. Except for purposes of individual use, this report shall not be reproduced in any form or by any means, electronic or mechanical, including printing, photocopying, CD recording, or by any physical or electronic reproduction system, or translated and provided to the access of any subscriber through electronic means for commercial purposes without the permission of the COMCEC Coordination Office.

TABLE OF CONTENTS

Foreword.....	iii
TABLE OF CONTENTS.....	iv
Abbreviations	v
List of Tables	vi
List of Figures	vii
Introduction	1
1. Macro-Economic Agricultural Indicators.....	2
1.1 Agricultural Value Added.....	2
1.2 Agricultural Growth Rates.....	8
1.3 Population.....	10
1.4 Agricultural Employment	12
1.5 Agricultural Trade.....	13
1.6 Land Use	16
1.7 Crop and Livestock Productions.....	18
1.8 Agricultural Productivity	21
1.8.1. Product Productivity: Crop and Livestock Yields	22
1.8.2 Land Productivity.....	25
1.8.3. Labor Productivity/ Agricultural Value Added Per Worker	27
1.9 Selected Agricultural Input Usage.....	29
1.9.1 Water	29
1.9.2 Fertilizer.....	34
1.9.3 Pesticide and Insecticide.....	35
1.9.4 Mechanization.....	37
2. The State of FoFod Security	38
2.1 Availability.....	39
2.1.1. Dietary Energy Supply Adequacy.....	39
2.1.2. Average Protein Supply.....	41
2.1.3. Undernourished People.....	43
2.2 Access.....	44
2.2.1. GDP Per Capita.....	45
2.3 Utilization.....	46
2.4 Stability	48
3. Main Agricultural Problems and Recommendations.....	51
3.1. Agricultural Problems	51
3.2. Recommendations to Address Agricultural Problems.....	52
4. Agricultural Cooperation under the COMCEC.....	54
Conclusion.....	56
References.....	57

Abbreviations

AWG	Agriculture Working Group
COMCEC	The Standing Committee for Economic and Commercial Cooperation of the Organization of Islamic Cooperation
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
CFS	World Food Security
GDN	Gross National Income
IFPRI	International Food Policy Research Institute
IFAD	International Agricultural Development Fund
ILO	International Labor Organization
IMF	International Monetary Fund
IPCC	The Intergovernmental Panel on Climate Change
km ³	Cubic Kilometer
m ³	Cubic Meter
OECD	Organization for Economic Co-operation and Development
OIC	Organization of Islamic Cooperation
SESRIC	Statistical, Economic and Social Research and Training Centre for Islamic Countries,
TRADEMAP	Trade Data Repository developed by International Trade Center
UN	United Nations
UNCTAD	UN Conference on Trade and Development
UNICEF	United nations children's fund
UNDP	United nations development programme
WB	World Bank
WFP	World Food Programme
WTO	World Trade Organization

List of Tables

Table 1 Agriculture, forestry and fishing value added (GDP) rankings in the OIC	7
Table 2 Comparison of Agricultural Growth and Overall Growth in the OIC and the World .	9
Table 3 Comparison of Agricultural and Overall Growth in OIC Sub-Regions	10
Table 4. Some Main Indicator of Population OIC and World (2025)	11
Table 5 Population Growth Rate in the OIC and World (%)	11
Table 6 Land Use in the OIC and its Share in the World (2023)	17
Table 7 The Shares of Land Use in OIC Sub-Regions (2023)	18
Table 8 Renewable Water-Rich OIC Member Countries (2022)	32
Table 9 Renewable Water-Poor OIC Member Countries (2022)	32
Table 10. Agricultural Water Withdrawal and Renewable Water Resources Ratio in OIC Countries by Sub Region	33
Table 11. Pesticide and Insecticide use (1000 Tons) by Sub Region in OIC Countries	37

List of Figures

Figure 1 Agricultural Forestry and fishing value added GDP current US\$) in OIC Countries and Share in the World (%)	4
Figure 2 The Share of Agriculture GDP by Sub-Regions in OIC.....	5
Figure 3 Share of Agriculture, forestry and fishery value added (GDP) in the OIC and World (%).....	6
Figure 4 Share of Agriculture, forestry and fishing value added in Total GDP by Sub-Regions.....	7
Figure 5 Change in Agricultural Growth in the OIC and World.....	8
Figure 6 Share of Rural Population in the OIC.....	12
Figure 7 Share of Agricultural Employment in the OIC and World	13
Figure 8 Agricultural Exports and Import Values of the OIC Members.....	13
Figure 9 OIC Agricultural Trade Performance of OIC Member Countries in the World	15
Figure 10. Agricultural Products Trade Balance in the OIC by Sub-Regions, 2023	16
Figure 11 Crop Productions in the OIC and Shares in the World	19
Figure 12 Meat Productions in the OIC and Shares in the World.....	20
Figure 13 Fishery Productions in the OIC and Shares in the World	21
Figure 14 Wheat Yield in the OIC and the World	23
Figure 15 Maize Yield in the OIC and the World.....	23
Figure 16 Cotton Seed Yield in the OIC and the World	24
Figure 17 Meat and Milk Yield in the OIC and the World (2023)	25
Figure 18 Land Productivity in the OIC and World (Agr. GDP at 2010 constant prices, US Dollar per hectare).....	26
Figure 19 Land Productivity in the OIC by Sub-Regions (Agr. GDP at 2015 constant prices, US Dollar per hectare)	27
Figure 20. Agricultural Labor Productivity in the OIC and World (US Dollars Per Worker (2015 constant Prices US Dollar)	28
Figure 21 Agricultural Labor Productivity in the OIC by Sub-Regions (US Dollars Per Worker (2015 constant Prices US Dollar)	29
Figure 22 Renewable Water Potential in OIC and the World (2022).....	30
Figure 23 Renewable Water Potential in the OIC by Sub-Regions (2022)	31
Figure 24 Fertilizer Consumption in the OIC and World.....	34
Figure 25 Fertilizer Consumption in the OIC by Sub-Regions.....	35
Figure 26. Pesticide and Insecticide use the OIC and World (2020-2023)	36
Figure 27 The use of Agricultural machinery in OIC and Other Group Countries (Tractors per 100 sq. km of arable land)	38
Figure 28 Average Dietary Energy Supply Adequacy in the OIC and the World	40
Figure 29 Average Dietary Energy Supply Adequacy in the OIC by Sub-Regions.....	41
Figure 30 Average Protein Supply in the OIC and the World.....	42
Figure 31 Average Protein Supply in the OIC Sub-Regions	42
Figure 32 Undernourished People in the OIC and its Share in the World.....	43
Figure 33 Undernourished People in the OIC by Sub-Regions.....	44
Figure 34 GDP Per Capita in the OIC and World.....	45
Figure 35 GDP Per Capita in the OIC Sub-Regions.....	46
Figure 36 Access to Improved Water Sources in the OIC and the World.....	47
Figure 37 Access to Improved Water Sources in the OIC by Sub-Regions.....	48
Figure 38 Per Capita Food Supply Variability in the OIC and World, kcal/capita/day.....	49
Figure 39 Per Capita Food Supply Variability in the OIC by Sub-Regions, kcal/caput/day.....	50
Figure 40 Average Protein Supply in the OIC by Sub-Regions and world average, (g/cap/day)	50

Introduction

In recent years, the world has been undergoing a rapid and profound economic and technological transformation. While this transformation has reshaped production and consumption patterns on a global scale, it has caused multidimensional problems such as increasing drought due to climate change, rising costs of agricultural products, health crises caused by epidemics, food insecurity, wars and mass migration to become more visible (FAO, 2023; IPCC, 2023; World Bank, 2024). Low-income countries are disproportionately affected by this process; economic vulnerabilities, food price increases and rising trade costs have a direct negative impact on living standards in these countries (IFPRI, 2024).

The negative impacts of the COVID-19 pandemic on global agriculture and food systems have continued even after the peak of the pandemic; in addition, regional wars, the energy crisis and the accelerating effects of climate change have led to persistent upward trends in food prices (OECD, 2023; UNCTAD, 2023). Higher input costs in the agriculture and food sector - especially seed, fertilizer and feed prices - as well as increased logistics costs and disrupted supply chains due to oil price fluctuations have increased cost pressures at all stages from production to consumption (IMF, 2023). These developments have reduced households' purchasing power, changed consumption patterns and deepened food security problems (FAO, 2024).

In such a period, inter-country rapprochement and cooperation is critical, especially in terms of reducing trade costs and ensuring food supply security. The Organization of Islamic Cooperation (OIC) member countries need to develop mechanisms to mitigate the negative effects of rising global trade costs (COMCEC 2023). Various studies show that low-income countries are disproportionately affected by the rise in the food price index (FAO, 2024). According to FAO records, around 850 million people worldwide suffer from hunger and a similar number of people are malnourished. This situation creates inequities in the global dietary pattern and this trend is likely to increase in the coming years (FAO, 2023; IFPRI, 2024).

Low-income levels in OIC member countries worsen malnutrition, increase social problems and negatively affect development processes. However, the agricultural sector is one of the most important sources of both employment and food security. In OIC member countries, agriculture is often one of the main sectors contributing to income, employment and trade. By 2023, OIC agricultural gross domestic product (GDP) reached USD 823 billion, which corresponds to 18.93% of world agricultural production (COMCEC 2024). Moreover, the number of people employed in the agricultural sector in OIC member countries reached 212 million in 2022, representing 28.97% of the world's agricultural employment. However, the vast majority of OIC member countries continue to have deficits in agricultural foreign trade. As of 2022, OIC's agricultural foreign trade deficit is USD 86.2 billion, with an export/import ratio of about 65% (COMCEC 2024).

For many OIC member countries, the agricultural sector is therefore critical for generating income, increasing prosperity and eradicating extreme poverty and hunger. This importance is even more evident given the challenges faced globally and locally. But the opportunities for the future are also considerable. Through sustainable agricultural practices, the use of modern technologies and strengthening regional cooperation, these countries have the potential to achieve food security and economic development goals (FAO 2024; UNDP 2023).

This report aims to reveal the agricultural structure and development of OIC countries at a time when the effects of post-pandemic global health problems have started to diminish, but these effects have deepened in combination with climate change, energy crisis and geopolitical risks. The report analyzes macro agricultural indicators, sectoral indicators and the food security situation; dimensions such as agricultural value added, growth, population, employment, foreign trade, resource utilization, production, productivity and food security are discussed in terms of OIC member countries. The findings are presented in comparison with world averages and other regional country groups and supported by tables and graphs enriched with the most recent data from international organizations such as FAO, World Bank, IMF, UNCTAD, IFPRI and COMCEC. In addition, the challenges facing the agricultural structure of the countries are evaluated with global and local dimensions and the cooperation activities carried out within the scope of the Standing Committee on Economic and Commercial Cooperation within the Organization of Islamic Cooperation are included in the report.

continues and is compounded by other problems. It highlights the state of the agricultural sector by analyzing macro agricultural indicators, sectoral indicators and the state of food security in OIC member countries. Selected dimensions of agricultural value added, growth, population, employment, trade, resource use, production, productivity and food security in OIC member countries are presented and analyzed in this outlook. The report presents OIC countries in comparison with the world and regional group of countries. Updated key figures and tables, using the latest data from various international organizations, are presented to enrich the understanding of the state of agriculture in the OIC. The challenges facing the agricultural structure of the countries are assessed in their global and local dimensions. The report also covers the cooperation efforts under the Standing Committee on Economic and Commercial Cooperation of the Organization of Islamic Cooperation.

1. Macro-Economic Agricultural Indicators

Macroeconomic agricultural indicators represent an overview and development of the agricultural sector in the national economy. With these data, the state of agricultural performance in the country in general is analyzed. In addition, these data can be used to compare the performance of countries over a certain period with the continent and group to which they belong, as well as with the OIC and world average. In this respect, the impact of global developments and changes is also revealed through these analyses.

The value of agricultural production in general economic data, the share of agricultural production in an economy, the growth rate of the sector, the agricultural population and the contribution of the agricultural sector to total employment, the share of agriculture in total exports and imports, and export/import ratios are macro indicators useful for assessing the role and performance of agriculture in OIC member countries. With the help of these indicators, it is possible to measure the process of economic growth, changes in employment and income distribution, as well as to reveal the impact of government policy on the process of efficiency and sustainability of foreign trade balance.

1.1 Agricultural Value Added

In developing countries, agriculture is one of the leading sectors of the economy in terms of its contribution to income. At the same time, agriculture is seen as the main sector for income generation for the poorest segments of the population. This is vital for the

development and prosperity of the sector.

Favorable ecological conditions, availability of natural resources, human capacity to carry out agricultural activities, technological infrastructure, production and marketing infrastructures play a crucial role in agricultural output and income generation. The agricultural sector is of critical importance for many OIC Member Countries, especially for less developed countries. The level of dependence of overall economic growth on agriculture is very high in most of the Member Countries and in this regard, agriculture is considered strategic for development through sustainability of agricultural structure and integration of agriculture and industry.

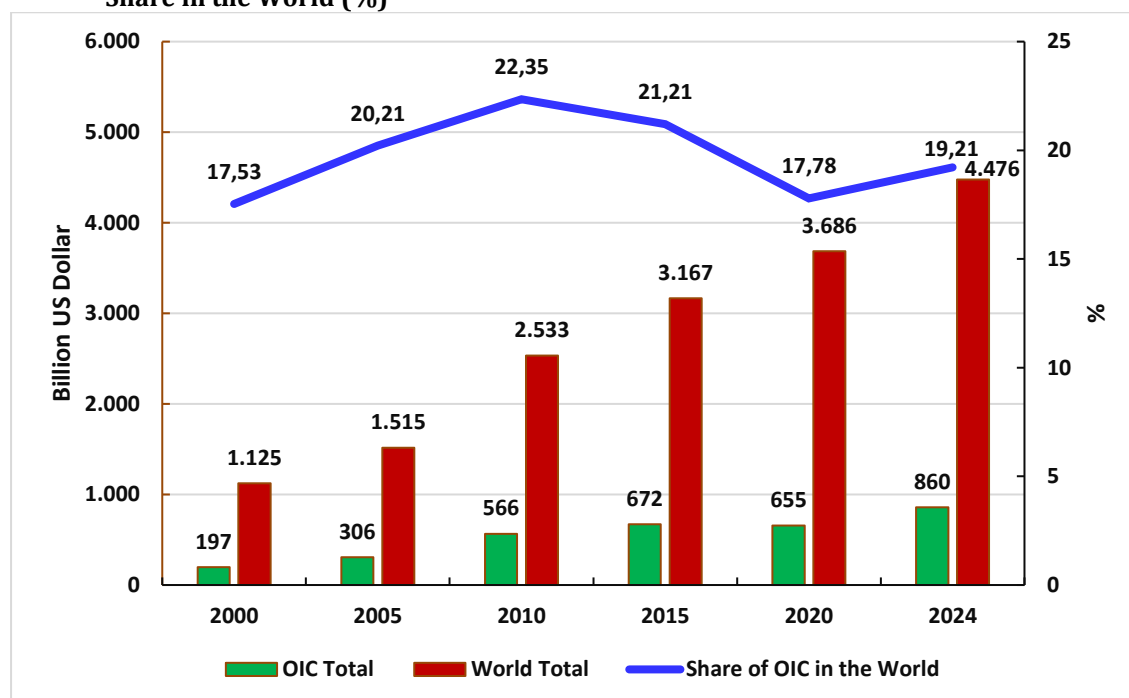
The importance of agriculture in national economies varies widely across OIC countries. In the least developed countries, agriculture accounts for more than 50 per cent of GDP, while in many high-income economies, such as members of the Organization for Economic Co-operation and Development (OECD), agriculture accounts for less than 1.5 per cent of total economic output.

Therefore, the role of agriculture in overall economic growth varies from country to country and it is generally recognized that the agricultural sector is more important and strategic in poorer countries. In other words, in the least developed countries, agricultural activity is one of the most important drivers of overall economic growth. This is largely due to the higher income elasticity of demand for non-agricultural goods and services.

At the same time, lack of capital is an important constraint in the industrialization process. As incomes increase, consumers increase their consumption of manufactured goods and services faster than their consumption of agricultural goods. In line with the theory of economic development, this characteristic of agriculture can be clearly observed in the OIC.

The values of agricultural production in OIC member countries are increasing after 2020 due to increases in production as well as high prices. Figure 1 shows the contribution of the agricultural sector to GDP and its share in world agricultural production.

Figure 1 Agriculture forestry and fishing value added (current US\$) in OIC Countries and Share in the World (%)



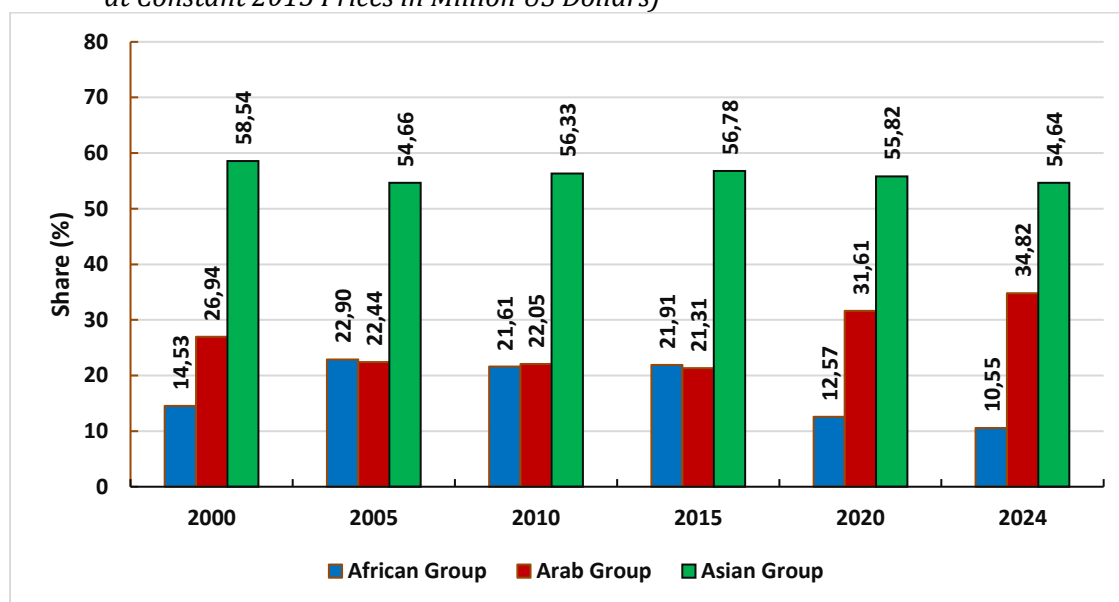
Source: <https://data.worldbank.org/indicator/NV.AGR.TOTL.CD?locations=TR>

In 2000, the OIC agricultural GDP was USD 197 billion with a share of 17.53 per cent of world agricultural production. In 2020, OIC agricultural GDP reached USD 655 billion with a share of 17.8 per cent of world agricultural production. This ratio increased to 19.21 per cent in 2024 as USD 860 billion.

It reveals that the agricultural GDP of OIC countries increased in absolute terms in the 2000-2024 period, but its share in global agricultural GDP followed a fluctuating course and tended to decline in the long run. This suggests that OIC countries should give more importance to policies focused on productivity, diversification and value-added in their agricultural development strategies.

OIC member countries are divided into 3 groups as African, Arab and Asian group. The contribution of these groups to the OIC's total agricultural value added varies significantly and shows an uneven pattern over time. In the period 2000-2024, the relative performance of the Asian Group continues to be strong compared to the Arab and African Groups (Figure 2). Moreover, the Asian Group is the highest contributor to agricultural output over the years. Within the OIC, the Asian Group plays a critical role in terms of the value of agricultural production with its large population, vast agricultural land, agricultural diversity and strong position in global agricultural trade. This has a significant impact on both regional food security and global trade.

Figure 2 The Share of hare of Agriculture GDP by Sub-Regions in OIC (Total GDP/Breakdown at Constant 2015 Prices in Million US Dollars)



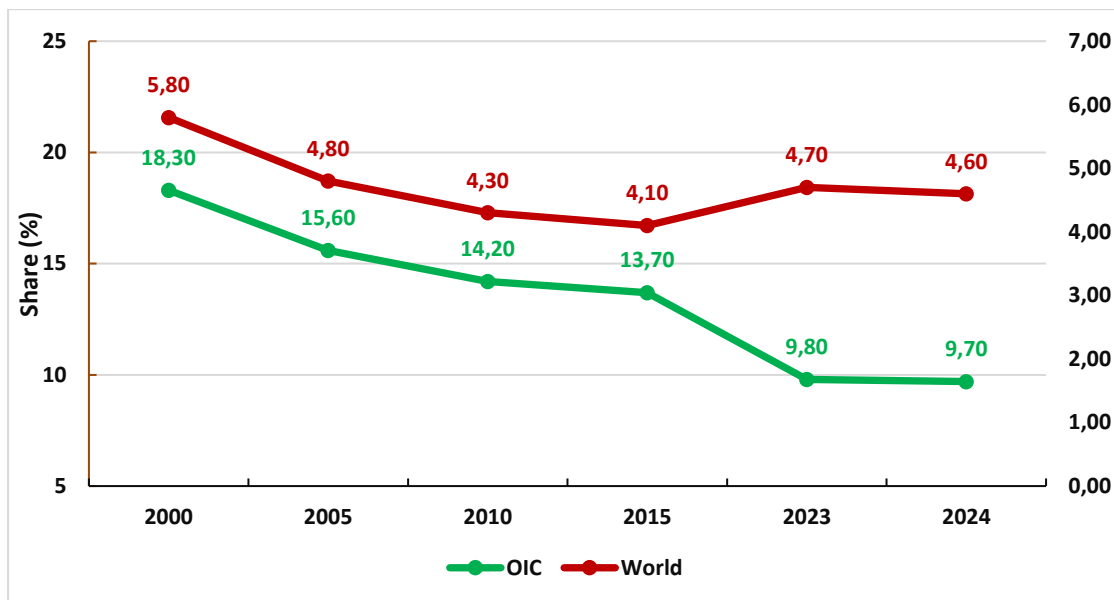
Source: <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD>

By 2024, the OIC agricultural GDP has reached USD 860 billion and the contribution of the Asian group to this value is USD 470 billion, which is more than half of the total agricultural GDP of the OIC Member Countries. The share of the Asian group is 54.64 per cent in the 2000-2024 period, despite a slight decline. The Asian Group, which has the highest amount of agricultural GDP, is followed by the Arab and African Groups with approximately USD 299 billion and USD 91 billion, respectively. From 2000 to 2024, the share of the Arab Group agricultural GDP in the OIC agricultural GDP is 26.94 per cent in 2000 and 34.82 per cent in 2024 and has increased. On the other hand, the share of African Group agricultural GDP in OIC agricultural GDP decreased from 14.53 per cent to 10.55 per cent in the same period.

During the last decades, agriculture activity in most of the OIC member countries has gradually been replaced by services and industrial activity leading to decrease in the share of agriculture sector of OIC member countries to their total GDP (Figure 3).

Figure 3 shows that the share of the agricultural sector in total GDP in OIC member countries was around 18.3 per cent in 2000, which gradually decreased to 9.70 per cent in 2024. This shows that the agricultural contribution to GDP in the OIC region is gradually approaching its low-level share. **This decline is an important indication not only that the agricultural sector is shrinking, but also that the economy is becoming more diversified and industrialized with the growth of other sectors. However, as the strategic importance of the agricultural sector is still great, it is important that this transformation is realized in a sustainable and balanced manner.**

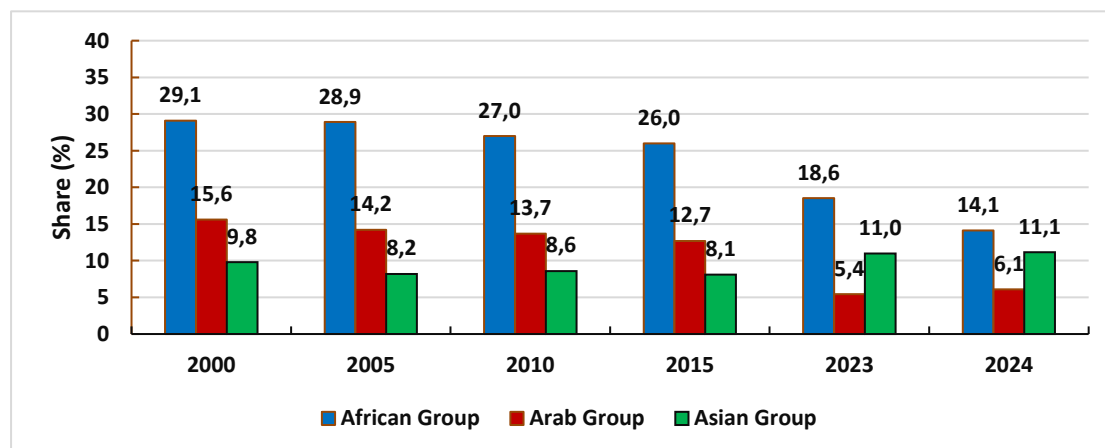
Figure 3 Share of Agriculture, forestry and fishery value added in the OIC and World (%)



Source: estimated from <https://databank.worldbank.org/source/world-development-indicators>

The share of the agricultural sector in total GDP varies significantly across OIC regions (Figure 4). The African Group has the highest share in agricultural GDP with 29.1 per cent in 2000. It is followed by the Asian and Arab groups with 15.6 per cent and 9.8 per cent, respectively. Although the relative contribution of agricultural activity to the economy fluctuates around the same values in African Countries, it has recorded a decreasing path in both Arab and Asian Countries over the last 24 years. This process is associated with changes in the economic structure, the growth of non-agricultural sectors, population growth, climate change and other structural factors. Factors such as climate change, problems in agricultural productivity, lack of investment and urbanization also accelerate this process. Although agriculture is still a strategic sector, its relative importance is declining as higher value-added sectors such as industry and services take a larger share in the economy.

Figure 4 Share of Agriculture, forestry and fishing value added in Total GDP by Sub-Regions



<https://databank.worldbank.org/source/world-development-indicators>

Table 1 shows the top 10 OIC member countries in terms of agricultural value added and the share of agricultural sector in their economies in 2015 and 2024.

Table 1 Agriculture, forestry and fishing value added (GDP) rankings in the OIC

	2015			2024		
		Agricultural GDP (Billion Dollar)	Share %		Agricultural GDP (Billion Dollar)	Share (%)
1	Indonesia	116,2	17,29	Indonesia	176,1	27,75
2	Nigeria	100,4	16,25	Pakistan	87,8	13,83
3	Pakistan	64,4	10,43	Türkiye	74,0	11,66
4	Türkiye	59,4	9,62	Iran	56,8	8,95
5	Iran	40,4	6,54	Bangladesh	50,3	7,93
6	Egypt	37,5	6,07	Egypt	53,3	8,40
7	Bangladesh	28,8	4,66	Nigeria	38,2	6,02
8	Uzbekistan	25,2	4,08	Malaysia	34,4	5,42
9	Malaysia	25,0	4,05	Algeria	32,4	5,10
10	Sudan	20,8	3,37	Saudi Arabia	31,4	4,95
Top Ten Total		518,10	77,13%	Top Ten Total	634,7	73,78%
OIC Total		671,7	21,21%	OIC Total	860,3	14,18%
World		3166,9		World	4476,4	

Source: Estimated from <https://data.worldbank.org/indicator/NV.AGR.TOTL.CD?locations=TR>

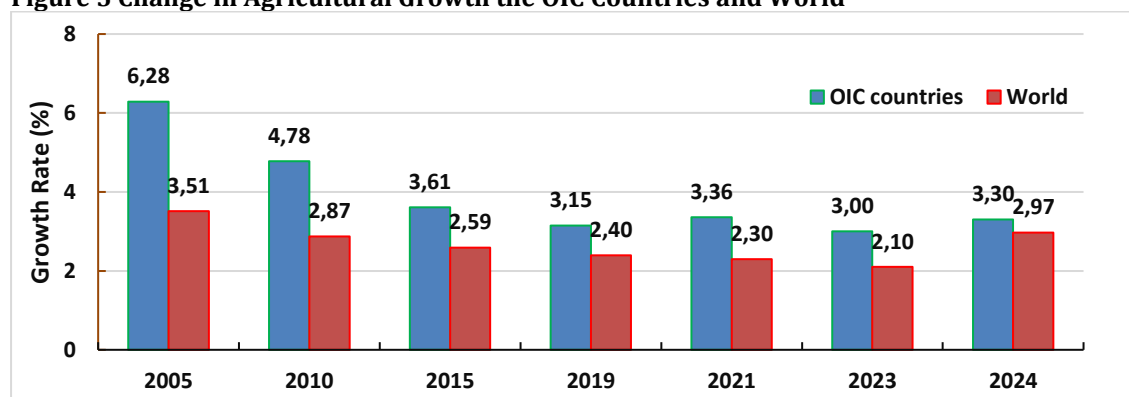
In both years, the top 7 countries have remained almost identical in the ranking. Indonesia is seen as the country with the highest agricultural value added in the OIC with USD 238.7 billion, 27.75 percent of total GDP in 2024. Pakistan, Turkey, Iran, Bangladesh, Iran, Turkey, Iran, Bangladesh, Pakistan, Turkey, Iran, Iran, Bangladesh, Bangladesh, and Egypt have a combined

agricultural value added of 70.59 percent. The fact that these countries have large and fertile lands and are engaged in a wide range of agricultural production, from tropical plants to cereals and vegetables and fruits, causes them to be at the forefront. At the same time, the geographical location, historical and cultural structures of the countries and the agricultural policies implemented and the objectives to increase their agricultural production capacity are also striking. **The Nigerian case is interesting here, with agricultural potential being negatively affected in recent years. Indeed, the relatively weak performance of agricultural GDP in Nigeria in 2023-2024 is attributed to several complex factors, including security, climate stress and structural investments (Reuters. 2024)**

1.2 Agricultural Growth Rates

Since the agricultural sector is highly dependent on external factors such as rainfall, temperature, climate change, humidity and soil condition, real growth rates adjusted for price effects show a fluctuating path over the years. Therefore, the growth rate can be calculated as nominal or real growth and can be used to measure the performance of economies as a whole or of some sectors at selected time intervals. Recently, the influence of uncontrollable factors on agricultural growth rate has been increasing. Apart from natural factors, market and market conditions and factor productivity have an increasing influence on this process. Considering the dynamic nature of agriculture, continuous monitoring and strategic management of these factors is critical to increase the agricultural growth rate. Figure 5 shows that annual agricultural growth in the OIC recorded ups and downs, decreasing between 2000 and 2024. It can be stated that natural conditions and global problems have caused this fluctuating structure. These unstable growth rates are closely related to fluctuations in world agricultural growth. This means that almost the same factors affect the growth of the agricultural sector in the OIC and the world. In 2024, it is seen that the economic activity of the countries has regained momentum in the post-COVID-19 recovery process. However, global economic uncertainties, high inflation and fluctuations in commodity prices are considered as factors limiting the growth rate. On the other hand, average annual agricultural growth in the OIC declined from 4.25 percent in the 1995-2004 period to 3.57 percent in the 2005-2014 period. This rate was realized as 3.30 percent in the period 2022-2024. Average annual agricultural growth in the OIC is generally higher than the world average. Over the last 25 years, both the OIC's agricultural and overall growth rates have been above the world average at 3.30 percent and 4.72 percent, respectively (Table 2).

Figure 5 Change in Agricultural Growth the OIC Countries and World



Source: <https://www.imf.org/en/Publications/WEO/Issues/2024/04/16/world-economic-outlook-april-2024>

The pace of agricultural growth in OIC countries has been affected by many factors in recent times. The agricultural sector has faced challenges such as global economic uncertainties, high production costs, climate change and drought in the world and in OIC countries. While these factors slowed down agricultural growth in some OIC countries, growth continued in others. The average growth rate of 3.30 percent was limited in some countries by high inflation and increases in the cost of agricultural inputs, which limited the rate of further growth.

Table 2 Comparison of Changes in Agricultural and Overall Growth in the OIC and the World

Period	OIC		World	
	Agricultural Growth	Economic Growth	Agricultural Growth	Economic Growth
(1995-2004)	4.25	4,43	2.66	3.18
(2005-2014)	3.57	4.87	2.84	2.83
(1995-2019)	3.90	4.34	2.71	2.97
2022-2023	3,00	4,20	2,10	2,90
2022-2024	3,30	4,72	2,97	4,17

Source: <https://data.worldbank.org/indicator/NV.AGR.TOTL.CD?locations=TR>
<https://data.worldbank.org/indicator/NY.GDP.MKTP.KD>

The global economic growth rate was 4.17 percent in the 2022-2024 period. This rate showed an increase compared to previous years and showed a trend towards a recovery process (Table 2). It can be said that this development in global growth has emerged as a problem of technology and innovative approaches despite various problems. However, geopolitical and regional problems, migration and economic uncertainties continue to affect its sustainability. In addition, the impact of these conditions may lead to sharper growth in some periods, or some emerging markets may be able to maintain their growth rate.

Table 3 presents the sub-regional average yearly overall and agricultural growths in 10-year periods within the last two decades in OIC member countries. African Group's average yearly agricultural growth was the highest in the periods of 1995-2004 as 4.30 percent value. The lowest growth in agriculture was observed in the Asian Group with 3.22 percent in 2005-2014 period.

However, all values have decreased in the last 2023-2024. In the African group, the problems of low agricultural productivity and climate change, as well as low capital investments and inadequate use of modern agricultural technologies, were noteworthy. In the Arab group, agricultural growth is most affected by water scarcity, climate change and regional conflicts. Asian countries have the highest decline value. However, investments of industrialized countries in Asia in non-agricultural areas are important in this process. In the Asian group, advanced agricultural techniques and the use of high technology are important in the development of agro-industry. All three sub-regions lagged the general economic growth in the 1995-2023 period in terms of average annual agricultural growth rate.

Table 3 Comparison of Changes in Agricultural and Overall Growth in OIC Sub-Regions

Period	African Group		Arab Group		Asian Group	
	Agricultural Growth	Economic Growth	Agricultural Growth	Economic Growth	Agricultural Growth	Economic Growth
(1995-2004)	4.30	4.47	4.28	4.65	3.31	4.56
(2005-2014)	3.91	4.83	3.36	4.94	3.22	5.41
(1995-2019)	4.12	4.59	3.73	4.54	2.81	3.18
2022-2023	3,20	4,00	3,00	4,60	2,80	4,00
2023-2024	-19,33	5,81	17,34	4,73	6,17	4,51

Source: <https://data.worldbank.org/indicator/NV.AGR.TOTL.CD?locations=TR>
<https://data.worldbank.org/indicator/NY.GDP.MKTP.KD>

In this year, the significant decline in the value of Nigeria negatively affected African countries on average, while Arab countries prevented this average from declining. In addition to Nigeria, declines in Niger, Senegal and Sierra Leone negatively affected the agricultural growth of the African group.

Another noteworthy aspect is the increase in the agricultural growth of the Arab group countries during this period. All countries belonging to this group experienced increasing agricultural growth. The Asian group maintained its stable structure in agricultural growth in this period as well.

1.3 Population

As one of the most fundamental determinants of economic, social and environmental developments, world population occupies an important place on the global agenda. Since the mid-20th century, the population has been increasing rapidly and has reached a critical threshold for human history. According to United Nations estimates, the world is expected to reach a population of 8.5 billion in 2030, 9.7 billion in 2050 and 10.4 billion in 2100. The United Nations Population Funds (UNFPA) explains this dramatic growth by the increasing number of people surviving to reproductive age, with major changes in fertility rates, increasing urbanization and accelerating migration. At the same time, this increase is not only a demographic phenomenon, but also has direct implications for food security, energy demand, urbanization, environmental sustainability and employment policies.

According to the Food and Agriculture Organization (FAO), the total population of the OIC was about 2.1 billion in 2025. This accounted for almost a quarter (26.3%) of the world population. By 2025, the OIC population exceeded 2.1 billion, representing 26.3% of the world's total population. Although its share of the total population is declining year by year, 47.70% of the population of OIC member countries live in rural areas. Africa has the highest proportion of people living in rural areas with 52,91% (Table 4).

Table 4. Some Main Indicators of Population OIC and World (2025)

	Total Population (Million)	Rural Population	The Rate of Rural Population (%)	Rural Population Growth (2024-2025 Annual %)	The Rate of Male in Total Population (%)	The Rate of Female in Total Population (%)
African Group	560,4	296.5	52,91	1,47	50,08	49,92
Arap Group	496,7	198,7	40,00	0,67	53,93	46,07
Asian Group	1.073,7	499.9	46,56	0,04	50,68	49,32
OIC Total	2.130,7	974.3	47,70	0,73	51,56	48,44
World Total	8.097.9	3.420.5	41,88	-0,08	50,27	49,73

Sources: Estimated from <https://databank.worldbank.org/source/population-estimates-and-projections/Type/TABLE/preview/on#>

Table 5 presents the average population growth in OIC member countries over the last twenty-five years for OIC country groups. Compared to the world, all three OIC sub-regions have experienced higher population growth rates over the last twenty-five years. Among the regions, the African Group's average annual population growth was the highest in the 1995-2005 and 2005-2016 periods, at 2.71 percent and 2.83 percent, respectively. Moreover, the African Group was the only group with an average annual population growth rate (more than double the world population growth rate) over the last decade. The Asian Group had the lowest population growth, at 1.71 percent in 1995-2005, 1.53 percent in 2005-2016 and 1.48 percent in 1995-2018. It is observed that this ratio decreases slightly in the average of 2020-2025. In recent years, the rate of population growth in the Organization of Islamic Cooperation (OIC) member countries has been above the world average. The average annual population growth rate in OIC countries is almost at the same level as the world average, at around 1%. **For many years, OIC countries have exhibited a population growth rate above the world average but have recently entered a process of convergence with global trends.**

Table 5 Population Growth Rate in the OIC and World (%)

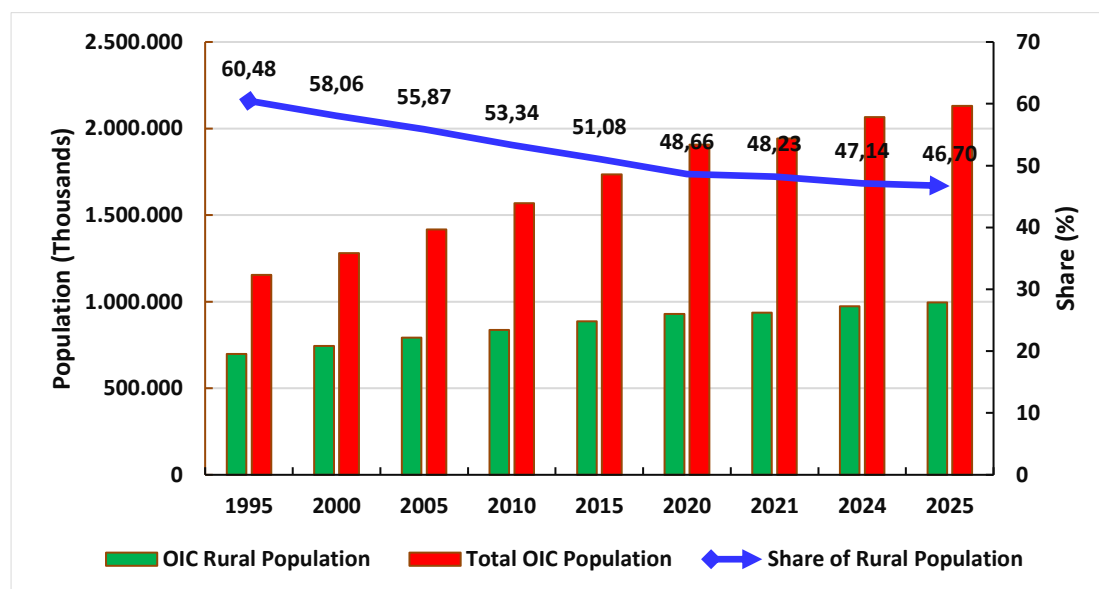
Period	African Group	Arab Group	Asian Group	OIC	World
(1995-2005)	2.71	2.19	1.71	2.04	1.32
(2005-2016)	2.83	2.32	1.53	2.01	1.20
(1995-2018)	2.83	2.85	1.48	2.41	1.26
(2020-2025)	1,13	1,11	1,06	1,09	1,05

Source: Estimated from <https://databank.worldbank.org/source/world-development-indicators#>

While the rural population of the OIC member countries was 698 million people in 1995 with 60,48 percent share in total population, it increased to almost 974 million people, constituted

46,70 percent of the total OIC population in 2025 (Figure 6). The main reason of decreasing the rural population share was that the increase in rural population was lower than the increase in total population throughout the years. This reflects that worldwide trend of urbanization is also observable for the OIC member countries, in general. In addition, urbanization, increased employment opportunities in non-agricultural sectors and decreased labor demand due to mechanization in agriculture can also be counted among the important reasons.

Figure 6 Share of Rural Population in the OIC



Source: Estimated from <https://databank.worldbank.org/source/world-development-indicators>

On the other hand, at the individual country level, the rural population represents more than 50 percent of the total population in 22 OIC Member States. In some OIC countries, such as Chad and Niger, the proportion of people living in rural areas and engaged in agriculture is over 75 percent. Moreover, nearly 30 percent of rural people are employed in agricultural activities. The agricultural sector is of vital importance for OIC member countries in the African Group, as most of the population depends on agriculture for their livelihoods.

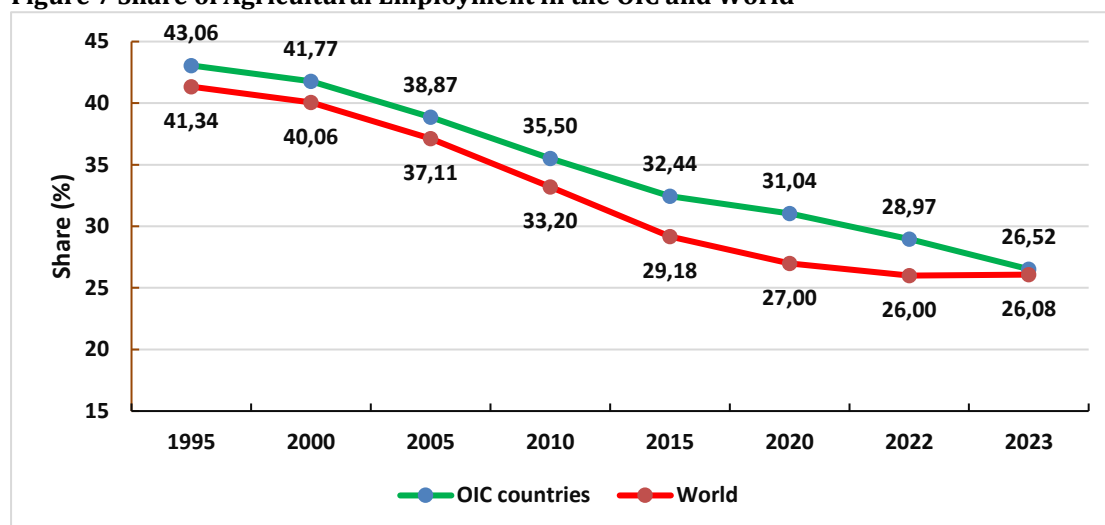
1.4 Agricultural Employment

In OIC member countries, the agricultural sector still provides a high level of employment as the economic structure is largely characterized by the characteristics of developing countries. In 2023, the agricultural employment rate of 26.52%, which is close to the world average (Figure 7), is due to the high rural population density, the underdevelopment of the industrial and service sectors, and the fact that agriculture continues to be a source of livelihood.

During this period, agricultural employment has been declining. In 1995, agriculture accounted for about 41.06 percent of total employment in the OIC, higher than the share of world agricultural employment. In the early 2000s, the contribution of agriculture to total employment

declined to around 41.77 percent and 40.06 percent in the OIC and the world, respectively. Thereafter, the share of agriculture in total employment in the OIC and the world is still declining. In 2022, the agricultural employment rate was 28.97 percent in the OIC and 26.00 percent in the world. Economic, social and environmental changes are among the reasons for the slight decline in agricultural employment in OIC countries. These include the development of non-agricultural sectors as well as the decline in the rural population and the development of mechanization in agriculture, especially in Asian countries. Climate and water resource issues are among the natural problems that negatively affect investment in the sector.

Figure 7 Share of Agricultural Employment in the OIC and World



Source: Estimated from ILO (2025); <https://databank.worldbank.org/source/world-development-indicators/Type/TABLE/preview/on#>

In 2023, the regional breakdown of OIC countries indicates that 46.27% of the population in Africa, 22.08% in Asia and 11.22% in Arab countries are employed in agriculture (ILO 2025). The rate is decreasing in all regions.

In addition, the decline in the proportion of agricultural employment can be explained by biological, chemical, and mechanical advances eliminating many plantations, cultivation and harvesting task, increasing agricultural productivity, rapid urbanization, and non-farm activities providing an increasingly important share of rural incomes.

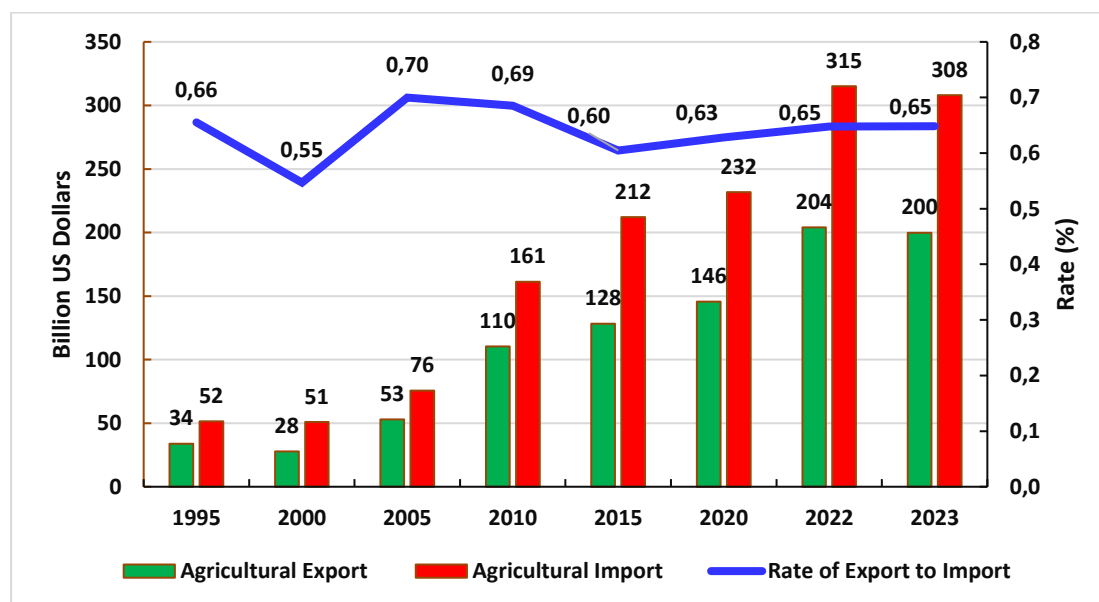
1.5 Agricultural Trade

The agricultural commodity trade of all OIC member countries is on an upward trend between 1995 and 2023. Total agricultural trade in OIC member countries grew nearly 6-fold during this period, reaching USD 200 billion in exports and USD 308 billion in imports in 2023 (Figure 8).

Looking at the export/import ratio, a useful indicator for assessing trade performance, the ratio of agricultural exports to agricultural imports declined from around 66 percent in 1995 to 55 percent in 2000 but has fluctuated between 60-65 percent on average in subsequent years. This appears to be due to a combination of factors, ranging from inadequacies in the production

capacity of most OIC countries to trade policies, especially over the years. OIC countries generally export agricultural raw materials and import processed and value-added agricultural products. Some OIC countries impose restrictions on the export of agricultural products (e.g. wheat, rice, sugar in Egypt, palm oil in Indonesia, fruits and vegetables in Morocco, etc.) to protect domestic consumption and ensure food security. Another reason is the continued dependence on imports for some food products (e.g. wheat, rice, sugar, animal products, etc.).

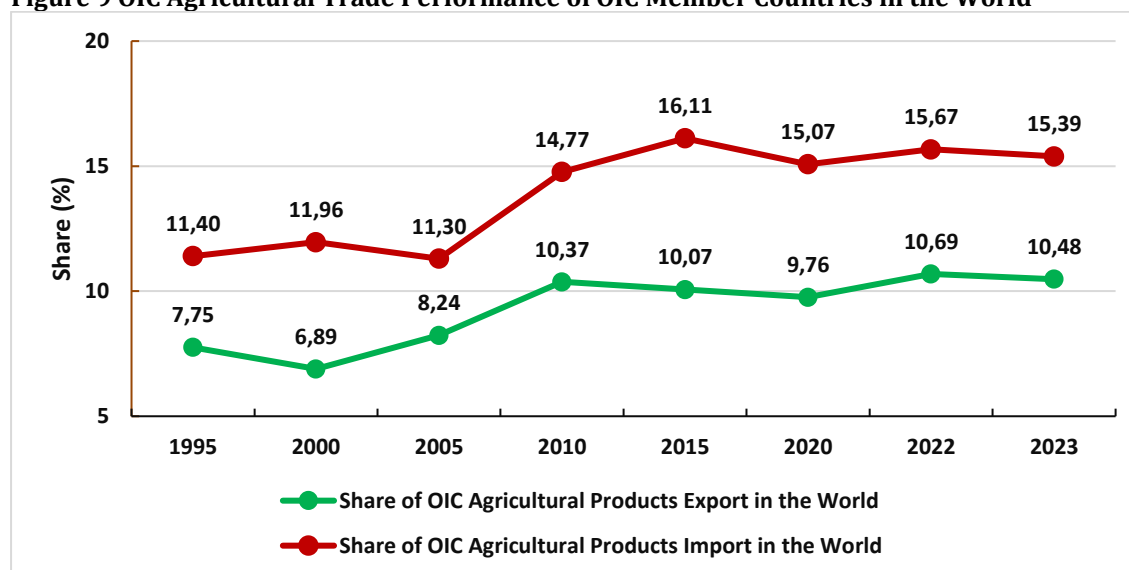
Figure 8 Agricultural Exports and Import Values of the OIC Members



Source: Estimated from <https://www.fao.org/faostat/en/#data/TCL>

The development of agricultural trade performance in the OIC and the world is shown in Figure 9. The share of OIC member countries' agricultural imports in the world decreased from 11.40 percent in 1995 to 15.30 percent in 2005 and increased in the following years to 15.39 percent in 2023. The contribution of OIC agricultural exports to total world agricultural exports decreased from 7.75 percent to 6.89 percent in the same period, while both agricultural imports and exports increased significantly in the 2005-2010 period. In the 2010-2023 period, the share of OIC member countries' agricultural commodity exports stabilized, while the contribution of OIC agricultural imports to total world agricultural imports increased. As can be seen, most OIC member countries are running trade deficits in agricultural trade. By 2023, the OIC trade deficit is USD 108 billion.

Figure 9 OIC Agricultural Trade Performance of OIC Member Countries in the World

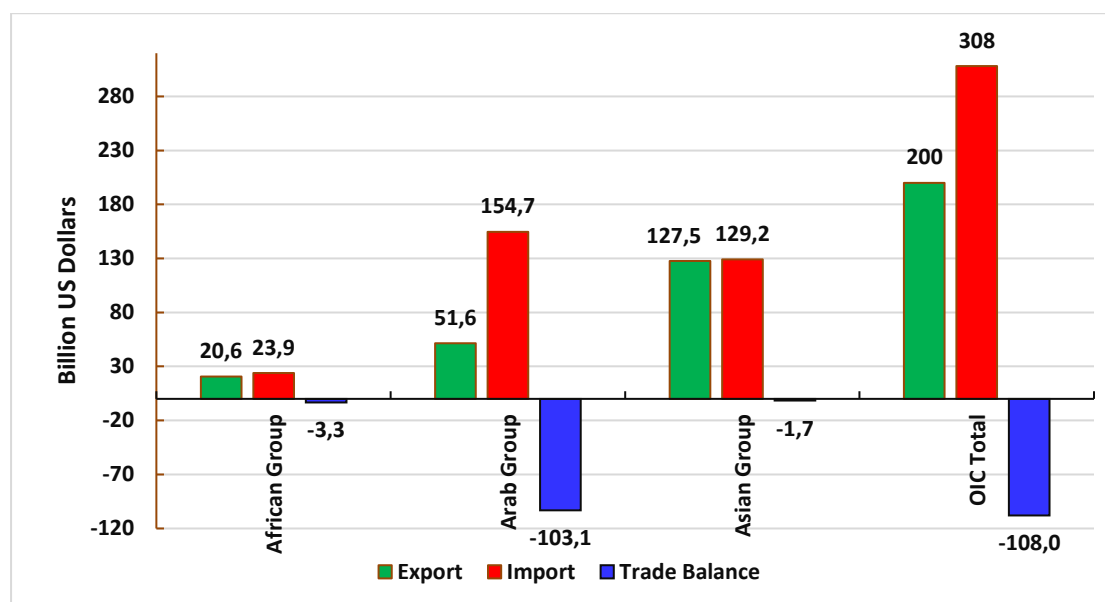


Source: Estimated from <https://www.fao.org/faostat/en/#data/TCL>

Figure 10 shows the agricultural trade balance in the OIC Subregions in 2023. Accordingly, the Asian, African and Arab Groups recorded trade deficits of USD 1.7, 3.3 and 103.1 billion, respectively. At the subregional level, the Asian Group has the highest exports of agricultural products in 2023, while the Arab Group has the highest imports (Figure 10).

In general, the main export products of OIC countries are coffee, cocoa, rice, cotton, dates, palm oil, tropical fruits, spices, cocoa and seafood, while they import wheat, rice, sugar, vegetable oils, dairy products, meat and fish products. The main export markets of the countries are the European Union, China, India, Middle East and North African countries and the USA, while imports are mostly from Russia, India, China, USA, Brazil and the European Union.

Figure 10. Agricultural Products Trade Balance in the OIC by Sub-Regions, 2023



Source: Estimated from <https://www.fao.org/faostat/en/#data/TCL>

1.6 Land Use

Agriculture is one of the most important components of land use on a global scale. Over the last 50 years, agricultural cropland worldwide has expanded by about 5.15% (FAO, 2021). The near doubling of irrigated areas over the same period accounted for most of the net increase in cultivated land (World Bank, 2020). During this period, agricultural production has increased by a factor of 2.5 to 3, thanks to improvements in the productivity of staple crops (FAO, 2022). However, in some regions, these production gains have coincided with degradation of ecosystem services, such as weakening soil health, loss of biodiversity, and reduced biomass and carbon storage capacity (IPCC, 2019).

The distribution of agricultural land is determined by climatic conditions, soil quality, the availability of water resources and the diversity of production in different geographical regions (IPCC, 2019). According to FAO data for 2023, approximately 4.78 billion hectares, corresponding to 36.8% of the world's land surface, are used for agriculture (Table 6). Protecting these areas in terms of both quantity and quality is critical for the sustainability of agricultural activities (World Bank, 2020). However, demographic pressures, climate change and increasing competition for land are deepening food insecurity, especially in Africa and Asia (HLPE, 2020). Natural resource management is at the center of food security policies, and agriculture is the focal point of both global environmental goals and socioeconomic development objectives (FAO, 2022). Responsible management of natural resources requires adequate food and water supply, sustainable rural development and securing livelihoods for current and future generations (UNEP, 2021). In this context, conservation and effective management of resources in OIC member countries stand out as a strategic imperative for agricultural sustainability and food security.

To improve nutritional conditions, reduce food insecurity and combat malnutrition on a global scale, future agricultural production needs to exceed the rate of population growth (FAO, 2021). Since this increase must be achieved largely on existing agricultural land, it is critical that productivity gains come from sustainable intensification methods without harming soil resources (Tilman et al., 2011). However, according to FAO estimates, about 5-7 million hectares of agricultural land are lost each year due to land degradation and urbanization (FAO, 2022). The main causes of these losses include water and wind erosion, reduced soil fertility and the use of agricultural land for different purposes such as industry, settlements and infrastructure (IPCC, 2019; UNEP, 2021). Therefore, sustainable land management stands out as a strategic imperative for OIC member countries, where food insecurity is widespread and population growth rate is above the world average.

Table 6 Land Use in the OIC and its Share in the World (2023)

	Land Area	Agricultural Land	Arable land	Permanent Crops	Permanent Meadows and Pastures
OIC (million ha)	3.137	1417	318	77	1.022
Share in Total Agr. Area (%)	-	100.0	22,44	45,43	72.12
World (million ha)	13.016	4799	1.380	191	3.229
Share of OIC in the World (%)	24.10	29.53	23.04	40.27	31.65

Source: Estimated from <https://www.fao.org/faostat/en/#data/RL>

Table 6 presents data on total land, agricultural land, permanent cropland, permanent cropland and permanent pastures and rangelands in OIC Member Countries and the world. The total area of the OIC Member Countries is 3.137 billion hectares, which corresponds to 24.10 percent of the total area of the world. Approximately 1.42 billion hectares, corresponding to 45.43 percent of this total land area, is used as agricultural land by OIC Member Countries. The share of agricultural land in the total land area of the OIC is above the world average of 31.65 percent.

OIC member countries have a total of about 1.42 billion hectares of agricultural land, of which 318 million hectares are arable land. While the area allocated for permanent crops is 77 million hectares, about 1,022 million hectares are used as permanent meadows and pastures. This distribution reveals that 72.12% of the agricultural land in OIC countries consists of permanent meadows and pastures. This ratio is broadly in line with the global trend where 67% of agricultural land is permanent meadows and pastures (Table 6). However, a different picture is seen when compared with the European Union (EU) countries: In the EU, about 60% of agricultural land is arable, 31% permanent pasture and rangeland and 5% permanent crops (Eurostat, 2022). Therefore, when OIC countries are evaluated as a whole, the share of permanent meadows and pastures is quite high, while the proportion of arable land is relatively low. This situation shows both a limitation in the agricultural production potential of OIC countries and an orientation towards different forms of production.

Table 7 reveals that the Arab and Asian Groups account for 41.75 percent and 33.77 percent of the OIC's total agricultural area. These two groups are followed by the African Group with 24.48

percent. The Arab Group has the highest share of the OIC's permanent grasslands and pastures with 44.49 percent. Within arable and permanent crops, the Asian Group has the highest share with 44.22 percent and 55.51 percent, respectively.

Table 7 The Shares of Land Use in OIC Sub-Regions (2023)

OIC Sub-region (%)	Land Area	Agricultural Land	Arable land	Permanent Crops	Permanent Meadows and Pastures
African Group	24,48	25,48	37,20	32,65	21,30
Arab Group	41,75	36,90	18,59	11,84	44,49
Asian Group	33,77	37,62	44,22	55,51	34,22
OIC Total	100,00	100,00	100,00	100,00	100,00

Source: Estimated from <https://www.fao.org/faostat/en/#data/RL>

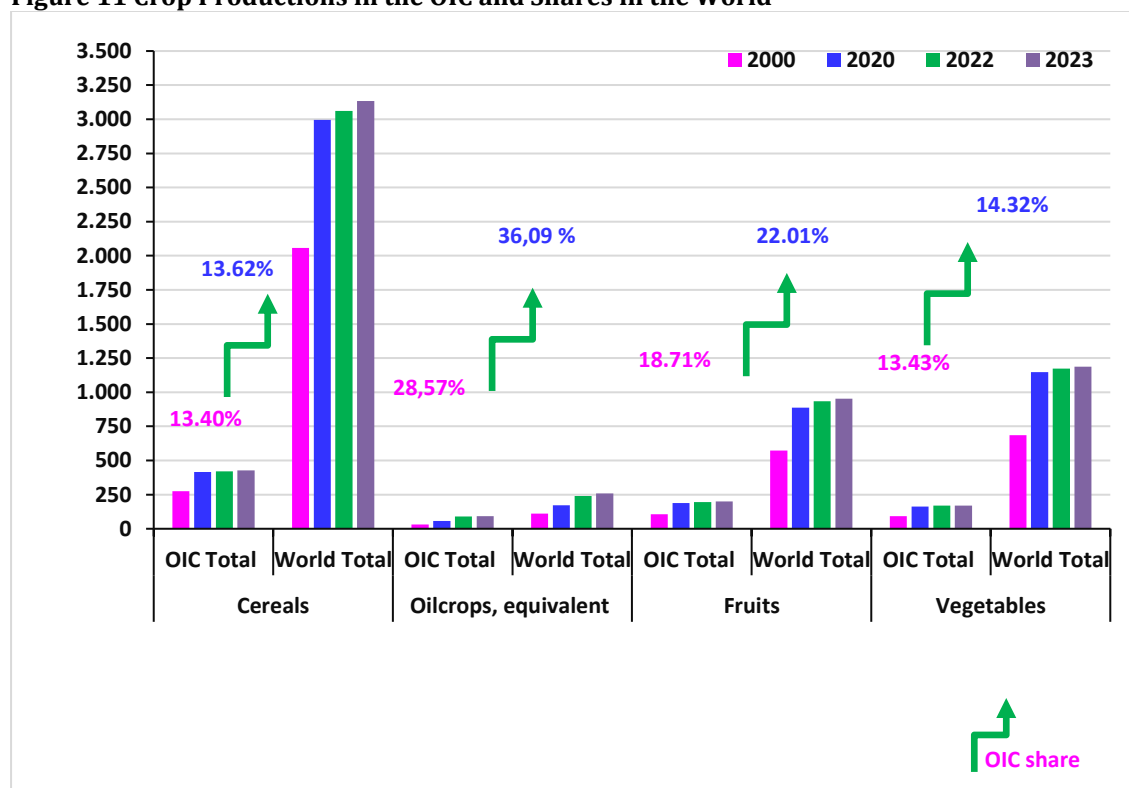
At the country level, Kazakhstan ranks first in agricultural land with 15.11 percent, followed by Nigeria with 11.5 percent in cultivated area, Indonesia with 35.4 percent in permanent plant area and Kazakhstan with 18.0 percent in meadows and pastures.

1.7 Crop and Livestock Production

OIC member countries have highly differentiated crop production and livestock production systems due to their location in different agro-ecological zones, differences in agricultural infrastructure capacities and diversity in production and consumption patterns. This diversity makes it possible to grow a wide range of agricultural products in the OIC geography.

In terms of agricultural production volume, Figure 11 shows that by 2023, OIC member countries contribute 427 million tons to world cereal production, representing 13.73 percent of total world cereal production. Although cereal production increased by 54.71 percent in the period 2000-2023, the share of OIC member countries in world cereal production increased only slightly (from 13.40 percent to 13.62 percent). Oil crops (oil equivalent) production in the OIC, which was 32 million tons in 2000, reached 93 million tons by 2023. This significant amount of oil crops production in the OIC has significantly increased the share of OIC member countries in world oil crops production, from 28.57 percent to 36.0 percent in the 2000-2023 period. Among the commodity groups in the OIC, oil crops have the highest share in the world. This can be explained by the climatic diversity of these countries, which favors the production of both tropical (e.g. palm oil, coconut oil) and temperate oil crops (e.g. sunflower, rapeseed, olive).

Figure 11 Crop Productions in the OIC and Shares in the World

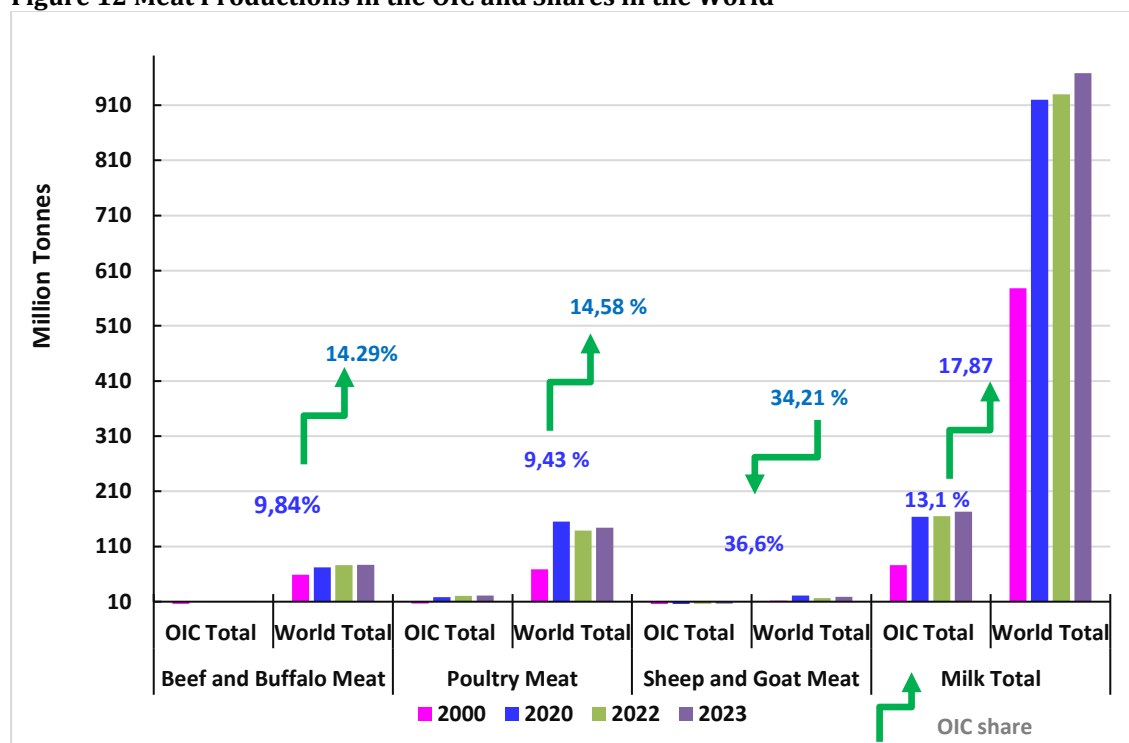


Source: Estimated From <https://www.fao.org/faostat/en/#data/QCL>

The share of OIC member countries in world fruit production, which was 18.71 per cent in 2000, was 22.01 per cent in 2022. While the share of OIC member countries in the world total vegetable production was around 13.43 per cent in 2000, it increased to 14.32 per cent in 2023. The upward trend continued in both product groups. While technological advances and policy support offer a strong potential to increase vegetable and fruit production, problems such as climate change, water scarcity and infrastructure deficiencies are obstacles to this potential. However, if necessary, investments and policy changes are made, fruit and vegetable production in these countries can increase sustainably.

Figure 12 shows the developments in meat production in OIC member countries and their share in the world. The OIC produced 11.1 million tons of beef and buffalo meat in 2023. This significant increase in beef and buffalo meat production was mainly driven by supply-side factors such as technological change and gains in scale efficiency of some groups. The significant increase in beef and buffalo meat production has also led to an increase in the share of OIC member countries in world production from 9.84 percent in 2000 to 14.29 percent in 2023.

Figure 12 Meat Productions in the OIC and Shares in the World

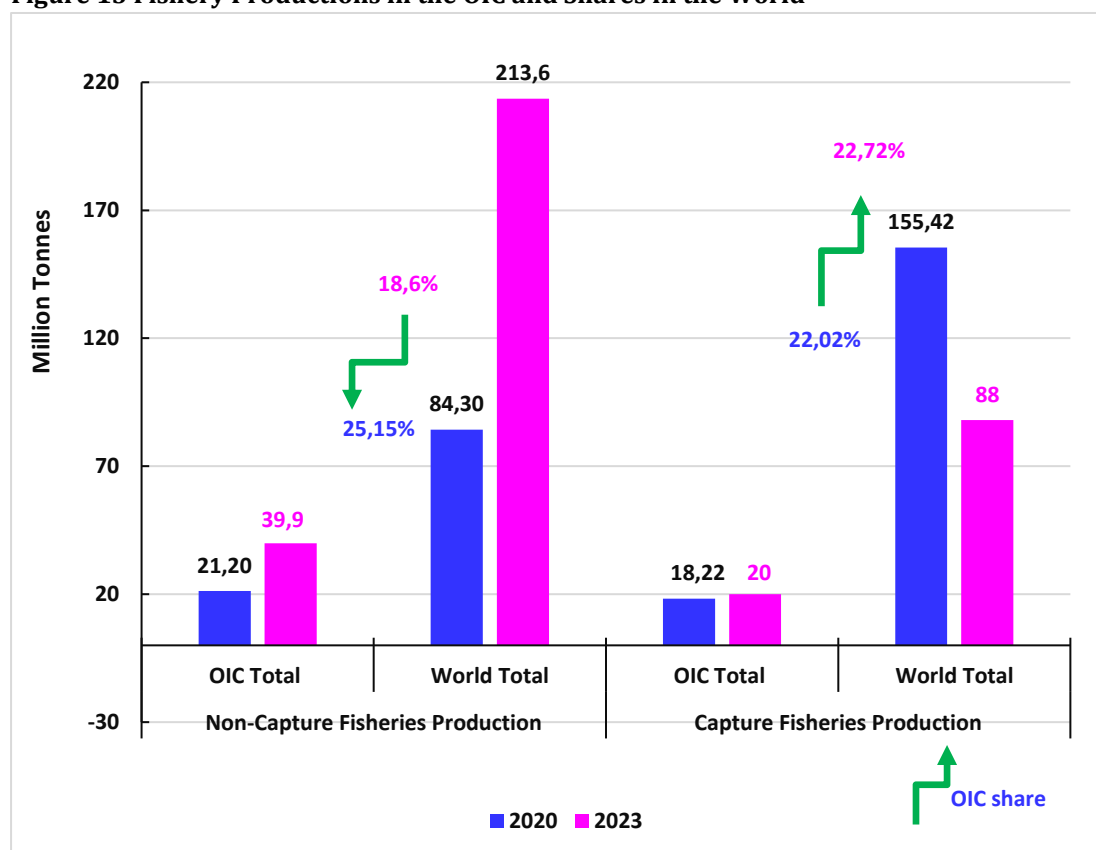


Source: Estimated from <https://www.fao.org/faostat/en/#data/QCL>

Similarly, there has been a dramatic increase in poultry meat production over the same period. It almost more than tripled from 6 million tons at the turn of the century to 21.3 million tons in 2023. Likewise, due to the high growth rate in the poultry meat sector worldwide, the increase in the share of OIC poultry meat production in the world has been dramatic. The contribution of OIC member countries' poultry meat production to world poultry meat production increased from 9.43 percent in 2020 to 14.58 percent in 2023. During this period, milk production increased from 13.1% to 17.87%, while sheep and goat meat production decreased slightly. In fact, sheep and goat farming forms the basis of traditional production systems in OIC countries and accounts for an average of 40% of the world's small livestock (FAO 2023). However, the potential of the sector will not be fully utilized unless productivity problems are overcome, sustainable resource management and value chain integration are achieved.

Fisheries production is undergoing a dramatic structural shift in favor of capacity expansion in fish farming practices, while the global capture fisheries production level remains stable (Figure 13). In OIC, the share of non-fishing fisheries production decreases from 25.15 percent in 2020 to 18.60 percent in 2023, while the share of capture fisheries production increases from 22.02 percent in 2020 to 22.72 percent in 2023. However, in addition to overfishing, climatic changes and environmental factors can negatively affect fisheries in OIC countries. Changes in ocean and sea temperatures affect the distribution and migration routes of fish species. For this reason, some countries are trying to develop national policies for the conservation of marine resources and sustainable fishing.

Figure 13 Fishery Productions in the OIC and Shares in the World



Source: Estimated from <https://databank.worldbank.org/source/world-development-indicators#>

1.8 Agricultural Productivity

Agricultural productivity is a comprehensive and multidimensional concept that cannot be defined by a single criterion. It is used as a basic measure of enterprise performance at the micro level and as an indicator of agricultural development at the macro level (OECD 2023). In general, agricultural productivity is defined as the proportional relationship between agricultural outputs and agricultural inputs. However, depending on the type of outputs and inputs used and the aggregation methods, different productivity measures such as single output-single input, productivity per acre, product value in production value, total factor productivity emerge. In these measures, aggregations are usually made by weighting with prices, and different indexing methods are also used (FAO 2021).

In the agricultural production process, land and labor are among the most basic inputs to production efficiency. Therefore, two main indicators are mostly used to measure productivity at the sector level:

1. Land productivity: The ratio of total agricultural value added to total arable land.
2. Labor productivity: The ratio of total agricultural value added to total labor employed in the agricultural sector.

At the crop and enterprise level, crop yield is one of the most widely used measures of

agricultural productivity. Crop yield is calculated as the ratio of the output of a given crop to the cultivated area. For OIC member countries, productivity indicators for strategic crops such as wheat, cotton and maize are critical for assessing both production structure and food security (World Bank, 2022; SESRIC, 2022).

1.8.1. Product Productivity: Crop and Livestock Yields

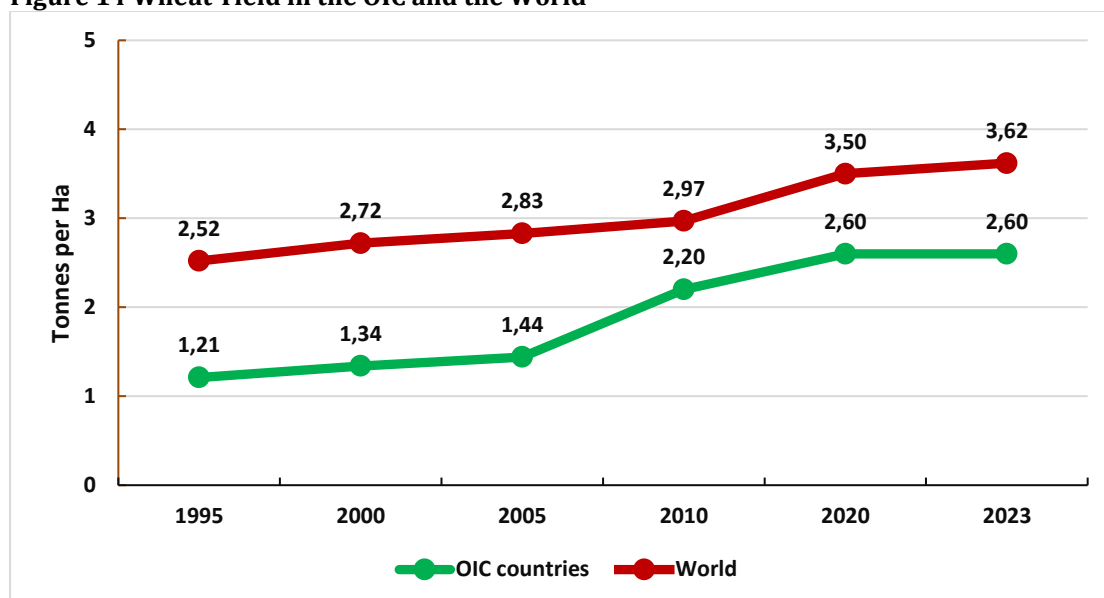
"Crop productivity" refers to the ratio of output to inputs used in the production of a particular agricultural product or commodity. It is usually calculated based on the amount of output per cultivated area and is both a practical and widely used indicator for analyzing agricultural productivity. Therefore, crop productivity plays a critical role not only in statistical assessments but also in monitoring agricultural development, food security and sustainability policies (FAO 2021; OECD 2023).

Although crop yields can be calculated for every agricultural product, in most cases, it is sufficient to make analyses and policy recommendations to increase productivity, especially for strategically important and widely produced products. Accordingly, in this section, productivity indicators will be examined by considering wheat, maize, cottonseed and meat production, which are the main agricultural products that have key positions in the production, consumption and trade structures of OIC member countries.

Figure 14 shows the yield of wheat, one of the most common crops in the OIC. The average wheat yield of OIC member countries increased from 1.21 tons/hectare in 1995 to 2.60 tons/hectare in 2023. Wheat yields have generally increased both in the OIC and in the world over the last two decades. By 2023, the world average wheat yield is close to 1.4 times that of the OIC. Drought, water scarcity and poor-quality soils are the main factors preventing further increases in wheat yields. To increase wheat productivity, OIC countries need to focus on climate change adaptation, sustainable practices in agriculture, water management, technology transfer and infrastructure development. In some OIC countries, the goal of reducing external dependence on wheat production can be supported by policies to increase productivity.

Another key crop for OIC member countries is maize which is used for both human consumption and livestock feed. It is considered as a staple food with a high nutritional value for many millions of people in developing countries, especially sub-Saharan Africa. Furthermore, its stalks can be used to provide fodder for livestock in rural areas where farmers have difficulties to reach compound feed.

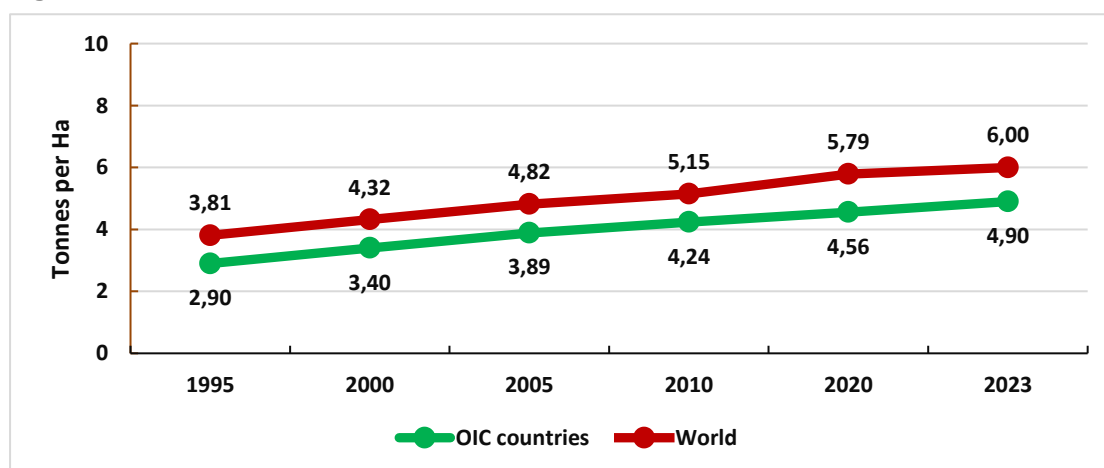
Figure 14 Wheat Yield in the OIC and the World



Source: <https://www.fao.org/faostat/en/#data/QCL>

Another important crop for OIC member countries is maize, which is used for both human consumption and animal feed. It is considered a staple food with high nutritional value for millions of people in developing countries, especially in sub-Saharan Africa. In addition, the stalks can be used to provide feed for livestock in rural areas where farmers have difficulty accessing compound feeds. Figure 15 shows maize yields in the OIC and the world. The average maize yield of OIC member countries increased from 2.9 tons/hectare in 1995 to 4.90 tons/hectare in 2023. In general, the increase in maize yields in the OIC member countries is in line with the increase in the world. However, maize yields in the OIC are below the world average. This is mainly due to countries in Africa where productivity rates are low.

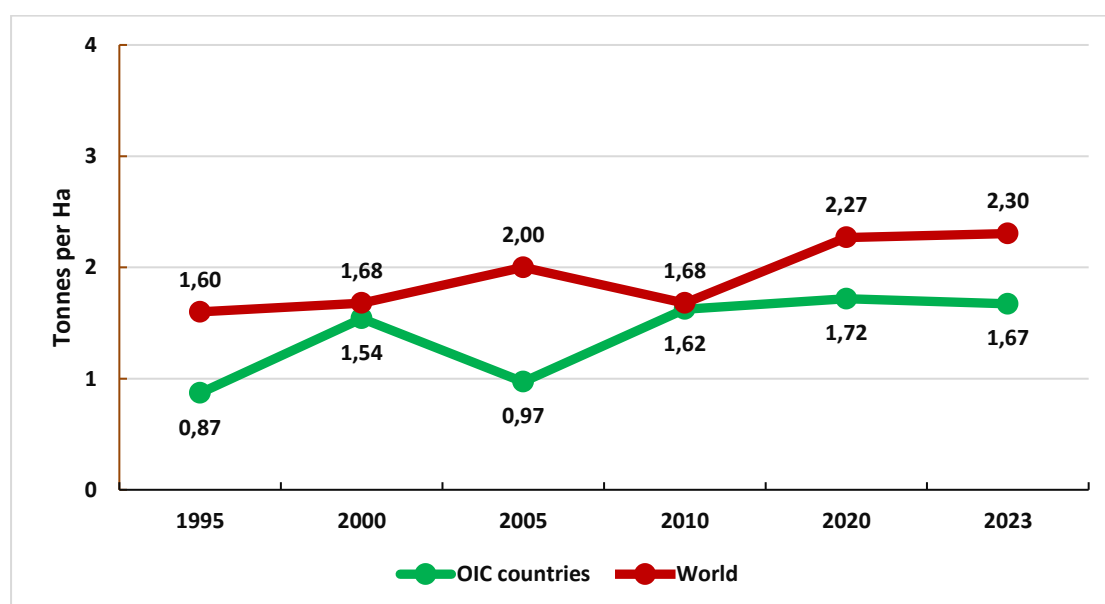
Figure 15 Maize Yield in the OIC and the World



Source: <https://www.fao.org/faostat/en/#data/QCL>

Finally, one of the agricultural products widely produced in OIC member countries is cotton, which provides a major source of raw materials for the textile industry. It is also an important cash crop for millions of farmers, providing income to rural households. It therefore enhances farmers' food security in terms of food accessibility, especially in poor areas. Cottonseed yields in the OIC and the world for the period 1995-2020 are shown in Figure 16. As can be seen in the figure, yields in OIC member countries have been underperforming the world average over the last two decades. While it was 0.87 tons/hectare in 1995, it increased to 1.72 tons/hectare in 2020 but decreased to 1.67 tons/hectare in 2023. During these periods, the world average cotton yield has always been higher than the OIC figures and by 2023 the world average cotton yield is 1.4 times higher than the OIC.

Figure 16 Cotton seed Yield in the OIC and the World

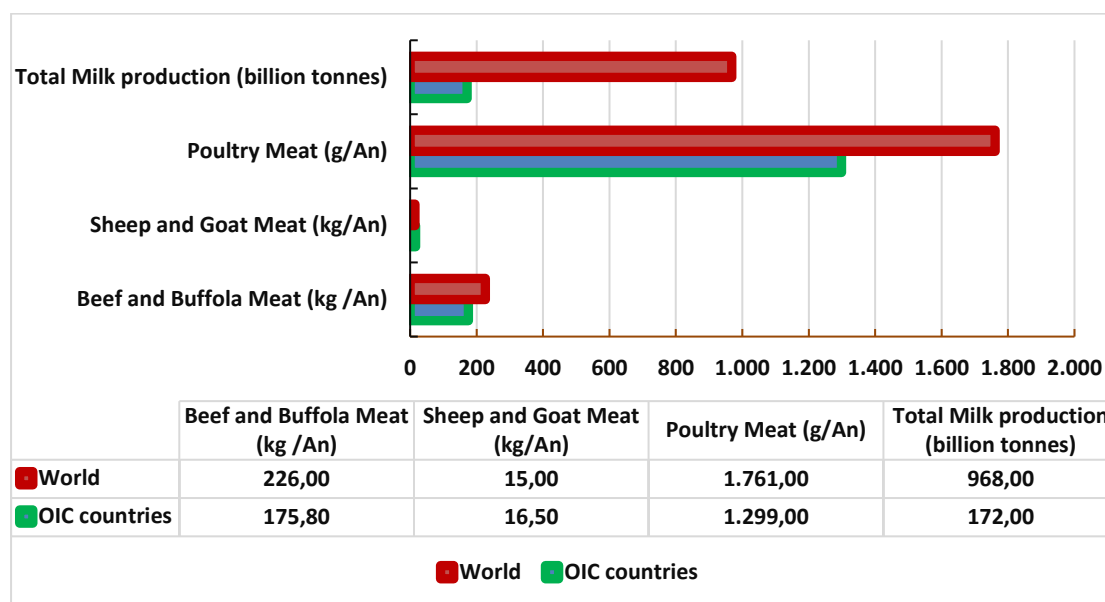


Source: <https://www.fao.org/faostat/en/#data/QCL>

In OIC Member Countries, the livestock sector is one of the main components of the agricultural economy and constitutes one of the main sources of livelihood, especially for rural populations. The sector is of strategic importance in terms of food security, income generation and improving the quality of nutrition. However, while livestock productivity varies across countries, it generally lags levels in developed countries. This is due to structural inadequacies in production systems, limited use of technology and problems in resource management.

Figure 17 shows that OIC countries are generally lower in average meat productivity in 2023 compared to the world average. Accordingly, goat, sheep, buffalo and chicken meat yields are below the world average. The reasons for this difference are based on factors such as insufficient technological infrastructure, low genetic quality, inadequate nutrition and animal health services.

Figure 17 Meat and Milk Yield in the OIC and the World (2023)



Source: <https://www.fao.org/faostat/en/#data/QCL>

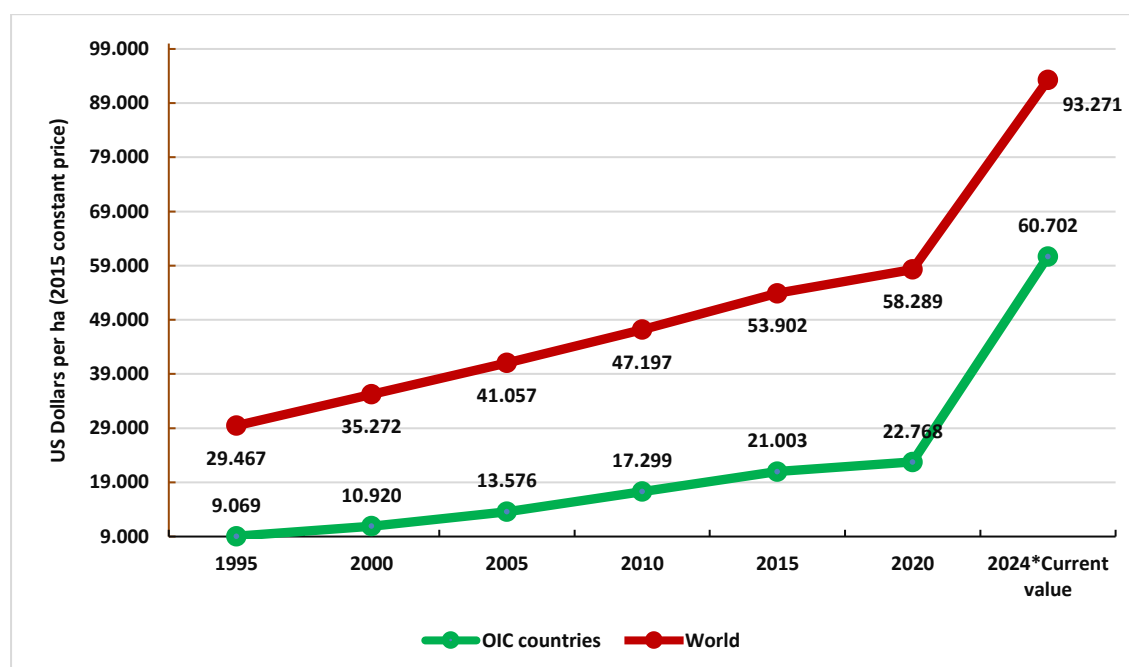
In animal production, the OIC value of milk quantity per country is below the world average. In productivity, OIC countries are also lower than the world average. While the world average is 2.2 tons/animal in 2023, this value is 2 tons/animal in OIC countries. However, this value is significantly higher in some countries and for some local products (<https://ourworldindata.org/grapher/milk-yields-per-animal>).

1.8.2 Land Productivity

Land productivity refers to the agricultural value added per hectare and is a critical indicator of the productivity level of agricultural production resources. Land productivity in agriculture typically refers to the output or value produced per unit of agricultural land, such as per hectare, and it is a critical indicator of how efficiently land is being used in farming. In the context of OIC countries, the land productivity can vary greatly due to differences in climate, soil quality, water availability, and farming practices.

Agricultural land productivity is measured by the ratio of total agricultural value added to the arable area in a country. Therefore, it shows the agricultural value added per hectare of arable land. Figure 18 illustrates agricultural land productivity in the OIC and in the World during the period 1995-2024 using the real agricultural GDP at 2015 prices out of 2024 year.

Figure 18 Land Productivity in the OIC and World (Agr. GDP at 2015 constant prices, US Dollar per hectare)



Source: <https://www.fao.org/faostat/en/#data/QCL>

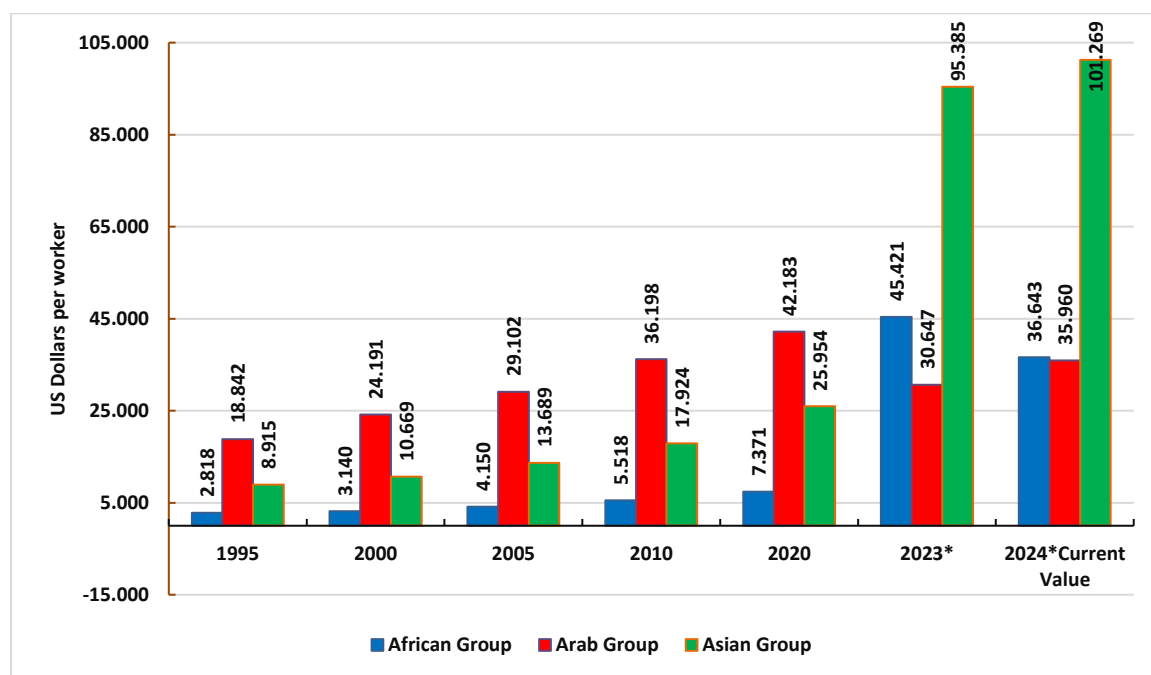
The average agricultural land productivity of the OIC member countries increased from USD 9,069/ha in 1995 to USD 22,768/ha in 2020. Compared to the world, the growth in agricultural land productivity in OIC member countries remained below the world average. While the world's agricultural land productivity increased by 251 percent in the 1995-2020 period, this rate is 197 percent in OIC member countries. The significant growth rates realized in both the OIC and the world between 1995 and 2020 can be explained by dramatic increases in real agricultural value added, while arable land area remained almost the same. For 2024, the same increases are observed in parallel according to current values and OIC countries have values below the world average. Average land productivity in OIC countries is below the world average, meaning that the agricultural value per hectare is lower than in other countries (600 USD/ha vs. 700 USD/ha) (SESRI 2023). This productivity gap underscores the need to increase agricultural yields, disseminate improved production methods and optimize resource use.

According to the SESRIC (2023) outlook reports, countries like Turkey, Indonesia, and Malaysia show higher land productivity, with values typically ranging from \$900 to \$1,400 per hectare due to the use of modern farming technologies and effective irrigation. However, in many Sub-Saharan OIC countries, productivity remains low due to factors like limited access to technology and water scarcity. Improving the land productivity across OIC countries involves addressing these key challenges by promoting sustainable farming practices, improving access to modern agricultural technologies, enhancing water management, and mitigating the impacts of climate change and land degradation.

At the sub-regional level, Arab Group had the highest level of agricultural land productivity in the OIC with 42.183 US Dollars per hectare in 2020 (Figure 19). The Asian Group was followed

by Asian Group with 25.954 US Dollars per hectare in 2020. The low level of arable land in the Arab Group (one third of Asian Group and half of African Group), results in its land productivity to be relatively high, even though it's agricultural GDP is the lowest among the OIC sub-regions. Among the three sub- regions, African Group generally had the lowest level of agricultural land productivity during the period 1995-2024.

Figure 19 Land Productivity in the OIC by Sub-Regions (Agr. GDP at 2015 constant prices, US Dollar per hectare)



Source: <https://www.fao.org/faostat/en/#data/QCL>

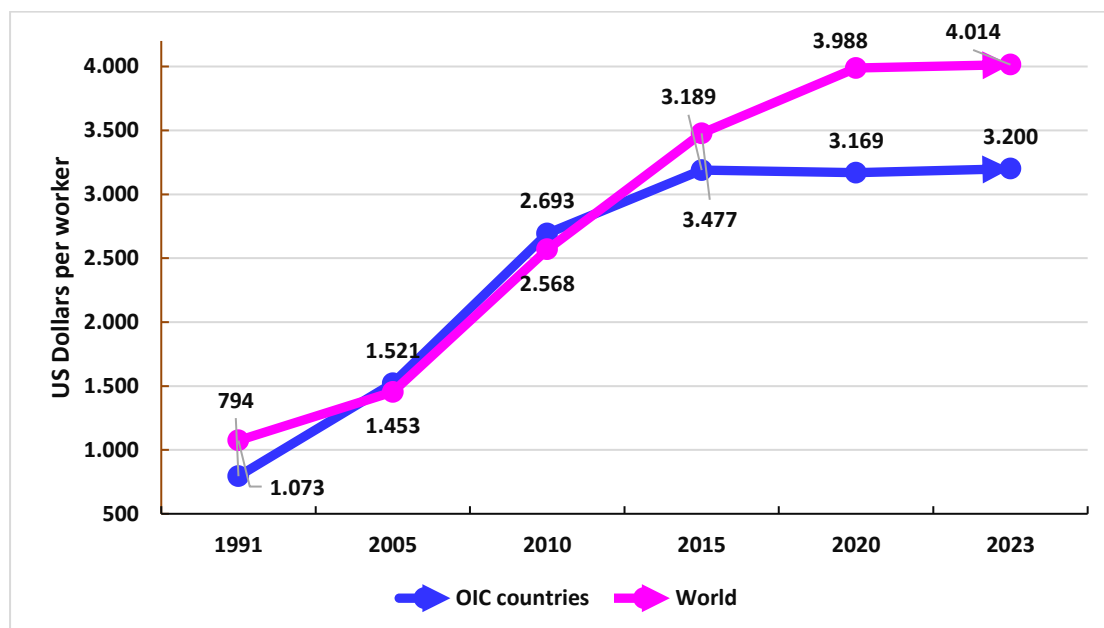
Land productivity is one of the most critical indicators of agricultural development and Figure 19 clearly reveals regional differences among OIC countries. While the Asian Group is converging more closely to world trends in productivity growth, the African Group remains at a low level. The Arab Group, on the other hand, performs at a moderate level due to natural resource constraints. This calls for accelerated modernization in Africa, investments in water efficiency in Arab countries, and strengthening sustainability-oriented policies in Asia.

1.8.3. Labor Productivity/ Agricultural Value Added Per Worker

Agricultural labor productivity is measured by the ratio of total agricultural value added to the number of agricultural employments. Hence, it tells the average performance of total labor employed in agriculture sector.

Agricultural labor productivity in OIC countries varies significantly due to differences in technological adoption, capital investment, infrastructure, and access to resources. Figure 20 shows the agricultural labor productivity in the OIC and in the World between 2000 and 2022 using real agricultural GDP at 2015 prices as the measure of agricultural value added.

Figure 20 Agricultural Labor Productivity in the OIC and World (US Dollars Per Worker (2015 constant Prices US Dollar)



Source: World Development Indicator

<https://ourworldindata.org/grapher/agriculture-value-added-per-worker-wdi>

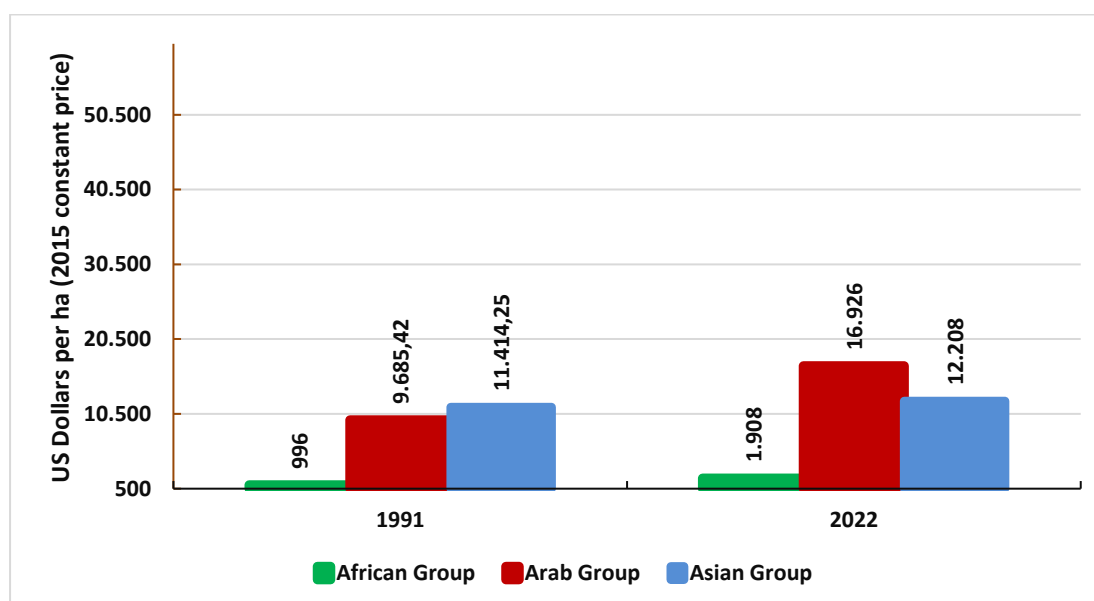
Labor productivity is started to be below the world average in the OIC in 2000. In 2020, average agricultural labor productivity of OIC member countries reached 3,169 US dollars/person, compared to 3,988 US dollars/person in 2000. This difference continues in 2023.

On the other hand, as shown in Figure 21, agricultural labor productivity in Arap and Asian countries is higher than African groups. According to WB data, labor productivity in agriculture in 2023 was highest in countries such as Malaysia and Indonesia at US\$ 7,000-9,000/person and lowest in Africa at US\$ 1,000/person in countries such as Mali, Niger and Chad. The main reasons for low labor productivity are dependence on manual labor, poor infrastructure and environmental challenges such as drought and desertification^{1,2}.

¹ <https://data.worldbank.org/indicator/SL.GDP.PCAP.EM.KD>

² <https://ourworldindata.org/grapher/agriculture-value-added-per-worker-wdi>

Figure 21 Agricultural Labor Productivity in the OIC by Sub-Regions (US Dollars Per Worker (2015 constant Prices US Dollar))



Source: World Development Indicator

<https://ourworldindata.org/grapher/agriculture-value-added-per-worker-wdi>

Agricultural labor productivity in OIC countries is characterized by stark differences between technologically advanced nations like Türkiye and Malaysia and less developed countries in Sub-Saharan Africa and South Asia. Addressing issues such as mechanization, access to education, and infrastructure development will be key to improving productivity across the OIC region.

1.9 Selected Agricultural Input Usage

1.9.1 Water

Water is one of the most critical inputs for agricultural production. It is not only indispensable for production; when used in combination with other inputs such as improved seeds and fertilizers, it creates a synergistic effect and increases productivity. Indeed, it is estimated that more than 70% of global increases in crop yields are due to increased irrigation and fertilizer use (FAO, 2011). The total volume of water on Earth is about 1.4 billion km³, of which only 2.5% (about 35 million km³) is freshwater resources (Shiklomanov, 1993; FAO, 2020). This highlights the strategic importance of freshwater for food security and agricultural productivity.

Freshwater is the focus of competing demands across multiple sectors, including drinking, irrigation, hydropower generation, waste disposal, industrial processes, transportation, recreation and ecosystem services. Among these demands, the agriculture sector is the highest user globally, consuming about 70% of total freshwater use (FAO, 2020). In OIC countries, the proportion is even higher, with the agricultural sector using about 86% of total freshwater resources, significantly higher than the world average (SESRI, 2022). The reason for the high share of agriculture in developing countries in Africa and Asia is the high dependence on rainfall,

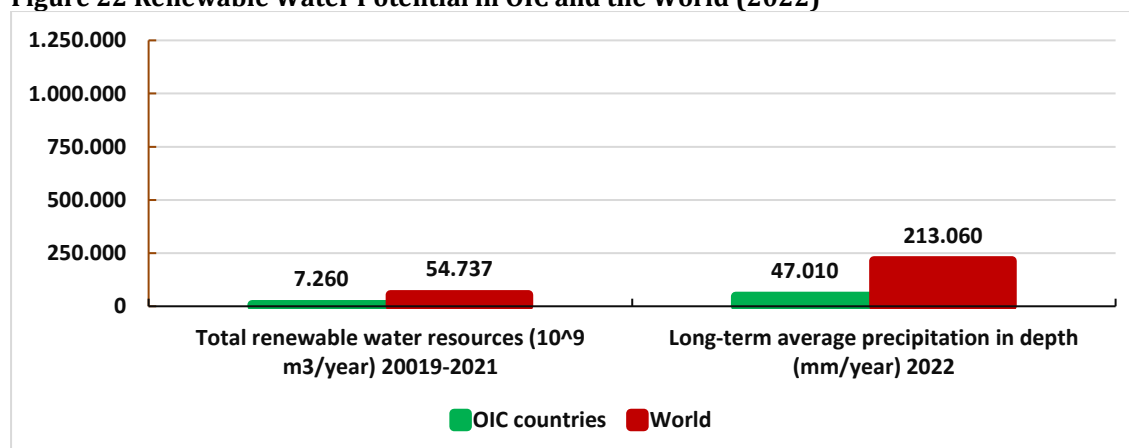
limited use of modern irrigation technologies, and water-intensive production systems. In contrast, the share of agriculture in total water consumption is lower in regions with high rainfall than in arid and semi-arid areas.

The importance of water becomes even more evident in OIC countries. **Most of these countries are in semi-arid and arid climatic zones and therefore have limited freshwater resources.** For example, many countries in North Africa and the Middle East are well below the world average in terms of per capita water availability. Moreover, rapid population growth, urbanization and rising food demand are putting additional pressures on available water resources. In addition, low irrigation efficiency and water losses in agricultural production are one of the main obstacles to productivity growth in OIC countries. **Sustainable management of water in OIC countries is therefore a strategic priority not only for agricultural productivity, but also for food security, rural development, social stability and the maintenance of ecosystem services.**

According to FAO data, total renewable water resources in the world have been declining, and it is calculated as 54,737 km³/year in 2019-2021 in Figure 22. The continental distribution of total renewable water resources that America has 25,203 km³/year total renewable water resources constituting 46.1 percent of the world. Following to America, Asia and Europe comprise 15,242 km³/year and 7,736 km³/year total renewable water resources, respectively (FAO 2020). Except for Asia, OIC countries have low values in this respect. As an Asian country, Turkey, Pakistan, Bangladesh, Iran, Indonesia, Malaysia, Kazakhstan, Uzbekistan and other countries have an important share in this.

It shows another meaningful indicator called renewable water resources per hectare of agricultural land. It provides the adequacy ratio of a region's total renewable water resources relative to its agricultural land. According to this indicator, America, which has a quarter of the world's total agricultural area, has the most renewable water resources per hectare with 20,580 m³/ha, which can be explained by its rich water potential. Following America, Europe, which has 9.5 percent of the world's total agricultural area, has 16,531 m³/ha of renewable water for agricultural land per hectare (FAO 2022).

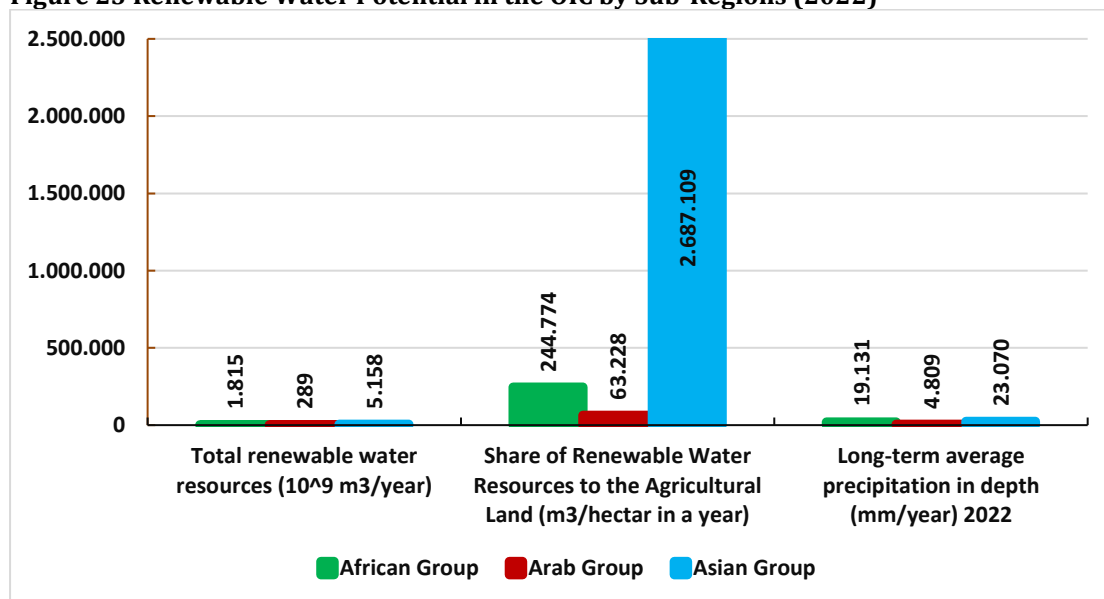
Figure 22 Renewable Water Potential in OIC and the World (2022)



Source: <https://data.apps.fao.org/aquastat/?lang=en&share=f-f8046cee-bff4-450a-9ce3-f5ee40bf5ffd>

Meanwhile, Africa and Asia, which include most OIC member countries, have very low levels of renewable freshwater per hectare compared to the American, European and world average (Figure 23).

Figure 23 Renewable Water Potential in the OIC by Sub-Regions (2022)



Source: <https://data.apps.fao.org/aquastat/?lang=en&share=f-f8046cee-bff4-450a-9ce3-f5ee40bf5ffd>
(These values are the same in 2019 and 2020 and 2021).

OIC member countries have 2,421 km³/year of renewable water resources for the period 2022 that accounts for 4.42 percent of the world's total. Considering the fact that OIC member countries have 28 percent of world's total agricultural area, we can say that the majority of the Member Countries face water scarcity. Average renewable water resources per hectare of agricultural land in the OIC is 5,158 m³/ha, which is lower than half of the World's average.

At the sub-regional level, renewable water resources disperse unequally in the OIC. Moreover, the share of renewable water resources to the agricultural land varies considerably among its sub-regions. While Asian Group has 71 percent of the renewable water resources in the OIC, it possesses 5,158 m³/ha renewable water per hectare of agricultural land, Arab Group owns 4 percent of renewable water resources with 289 m³/ha renewable water per hectare of agricultural land. Among the Asian countries, Suriname is a very small country, but it has raised the average for this region considerably due to excessive rainfall.

Since OIC member countries are dispersed over a large geographical region, on four continents and have wide range of climate conditions, big differences are seen at the country level regarding amount of renewable water resources. In terms of their renewable water resources per hectare of agricultural land, some OIC member countries are very rich while most of them are face water-scarcity.

Table 8 and 9 indicate renewable water-rich OIC member countries and renewable water- rich and poor OIC member countries, respectively. Analyzing Table 8, it is seen that Indonesia, Bangladesh and Malaysia have relatively high levels of water resources per hectare of

agricultural land. They are followed by Guyana, Cameroon, Nigeria,

Table 8 Renewable Water-Rich OIC Member Countries (2022)

Renewable Water-Rich Country (Top 10)		Renewable Water Resources Per Hectare (m ³ /ha)
1	Indonesia	2.018,70
2	Bangladesh	1.227,03
3	Malaysia	580,00
4	Guyana	271,00
5	Cameroon	283,15
6	Nigeria	286,20
7	Pakistan	246,00
8	Guinea	226,00
9	Mozambique	217,00
10	Türkiye	211,60

Source: <https://data.apps.fao.org/aquastat/?lang=en&share=f-61599cf1-510f-4087-94a8-5f00e36866bc>

On the other hand, 19 countries have less than 1,000 m³/ha renewable water per hectare of agricultural land. Table 9 shows that Kuwait, Maldives, Qatar, United Arab Emirates and Bahrain are the top five Renewable Water-Poor Countries.

Table 9 Renewable Water-Poor OIC Member Countries (2022)

Renewable Water-poor Country (Top 10)		Renewable Water Resources Per Hectare (m ³ /ha)
1	Kuwait	0,02
2	Maldives	0,03
3	Qatar	0,06
4	United Arab Emirates	0,15
5	Bahrain	0,12
6	Djibouti	0,30
7	Libya	0,70
8	Palestine	0,84
9	Jordan	0,94
10	Comoros	1,20

Source: <https://data.apps.fao.org/aquastat/?lang=en&share=f-61599cf1-510f-4087-94a8-5f00e36866bc>

In addition to current water potential, the other important water resource is precipitation. Precipitation provides soil with moisture that is a crucial factor for productivity in agriculture. Looking at precipitation in OIC member countries, it is understood that most of them have average precipitation less than 500 mm per year implying high prevalence of aridity. Especially, most of the 20 countries in the Arab Group have less than 500 mm precipitation level except for Comoros and Lebanon. On the other hand, 19 countries possess more than 1,000 mm average long-term precipitation annually. Of these countries, Malaysia, Brunei, Indonesia, Bangladesh, Sierra Leone, Guyana and Suriname receive over 2,000 mm.

When discussing irrigation, it is not sufficient to know only the water potential. Additionally, we need to look at the utilization of this potential in agriculture. Large part of the OIC member countries is located in arid and semi-arid regions geographically. Hence, widespread and modern irrigation systems, including water storage facilities are required.

In the OIC member countries traditional way of irrigation are widely used. Therefore, the efficient use of water in agriculture is not adequately addressed by most of the countries of the region where sustainability of the existing irrigation systems is at stake. While surface irrigation is by far the most widely used system in irrigation (practiced on 82.1 percent of the total full and partial controlled irrigation area), the most water-saving system through micro-irrigation techniques is only practiced on a mere 1.7 percent of the total irrigation area.

The table 10 reveals that the pressure of agriculture on water resources in OIC countries is much higher than the world average. Especially in Arab countries, water scarcity is critical. Therefore, water efficiency policies, irrigation infrastructure investments and regional cooperation should be the priority strategies for sustainable agricultural development in OIC countries.

The data in the table 10 shows the pressure of agriculture on water resources and productivity levels in OIC countries in comparison with the global average. Comparison of Agricultural Water Withdrawal and Renewable Water Resources Ratio in OIC Countries and Worldwide.

Table 10. Agricultural Water Withdrawal and Renewable Water Resources Ratio in OIC Countries by Sub Region

	Agricultural water withdrawal as % of total renewable water resources (%)			Irrigated Agriculture Water Use Efficiency (US /m3)			Agricultural Sector Contribution to Water Stress (%)		
	2020	2021	2022	2020	2021	2022	2020	2021	2022
African Group	1,69	1,69	1,69	0,35	0,36	0,37	3,32	3,31	3,31
Arap Group	388,00	385,56	391,75	1,53	1,42	1,43	258,84	261,03	263,99
Asian Group	26,47	25,63	25,88	0,79	0,84	0,80	41,38	42,78	42,62
OIC Total	138,72	137,62	139,77	0,89	0,87	0,87	101,18	102,37	103,30
World Total	6,70	6,66	6,67	0,62	0,68	0,70	12,97	12,91	12,90

Sources: Estimated From <https://data.apps.fao.org/aquastat/?lang=en>

In the OIC, agriculture uses about 86% of total freshwater, well above the global average (70%), and is a major source of water stress. In the African Group, agricultural water

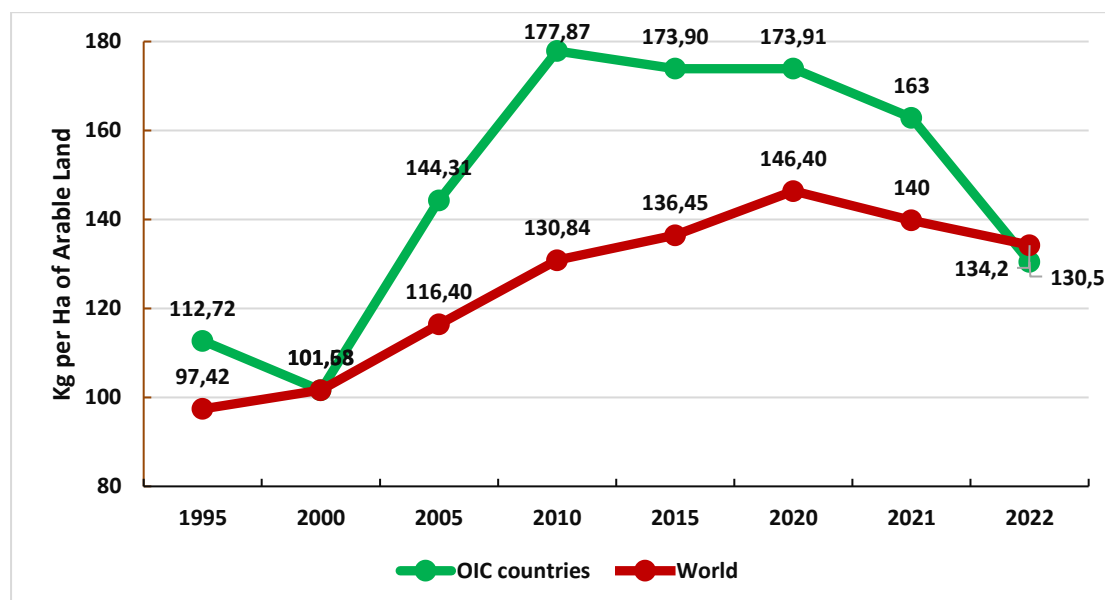
withdrawals account for only 1.7% of renewable resources and water use remains inefficient due to poor irrigation infrastructure. In contrast, in the Arab Group, agriculture consumes about four times (385-392%) of annual renewable water resources, explaining excessive groundwater use and high-water stress.

In the table, the Asian Group appears more balanced with moderate water withdrawals (25-26%) but contributes over 40% to water stress due to dense population and high share of agricultural production. It shows that water scarcity has reached critical levels, especially in Arab countries, infrastructure deficiencies limit productivity in Africa, and population pressure poses a major challenge to water management in Asia. Therefore, sustainable management of water in OIC countries is a strategic priority in terms of disseminating modern irrigation techniques, increasing water use efficiency and adopting water-saving policies in cropping patterns.

1.9.2 Fertilizer

Figure 24 compares fertilizer use per hectare in OIC countries and the world average for the period 1995-2022. In 1995, fertilizer use in OIC countries was above the world average, while in 2000 both groups declined to about the same level (about 101 kg/ha).

Figure 24 Fertilizer Consumption in the OIC and World



Source: <https://databank.worldbank.org/source/world-development-indicators#>

In the period 2000-2010, there was a rapid increase in OIC countries and fertilizer use per hectare in 2010 reached 177.9 kg, well above the world average (130.8 kg/ha). During this period, increasing food demand and productivity pressures, especially in OIC members in Asia, encouraged the use of fertilizers.

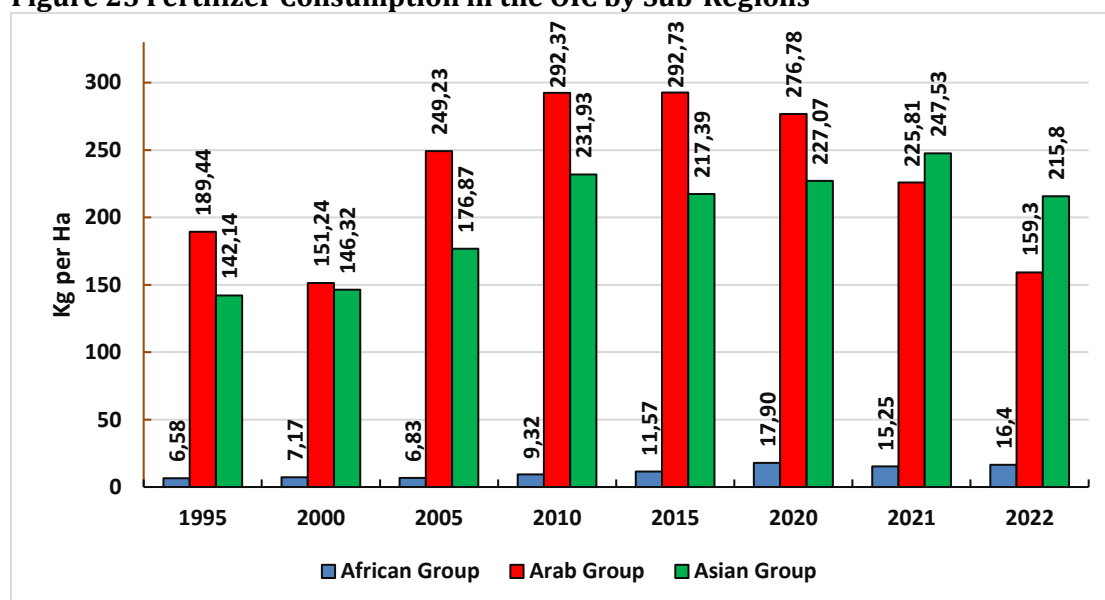
Between 2010 and 2020, fertilizer use in OIC countries stabilized at a high level, while the world average rose more steadily. However, after 2020, there was a sharp decline in fertilizer use in

OIC countries, falling to 130.5 kg/ha in 2022, in line with the world average (134.2 kg/ha). The main reasons for this decline include disruptions in supply chains during the COVID-19 pandemic, higher fertilizer costs due to rising energy prices, and farmers being forced to reduce their use due to economic constraints.

In conclusion, it can be said that fertilizer use in OIC countries follows a more volatile and fragile course compared to the world average, therefore, increasing fertilizer efficiency and strengthening domestic production capacity is a strategic priority for sustainable agricultural production.

At the subregional level, fertilizer use in the African Group Countries is very low at 16.4 kg/hectare in 2022. On the other hand, fertilizer use in Arab Group Countries and Asian Group Countries is 159.3 kg/ha and 215.8 kg/ha, respectively (Figure 25).

Figure 25 Fertilizer Consumption in the OIC by Sub-Regions



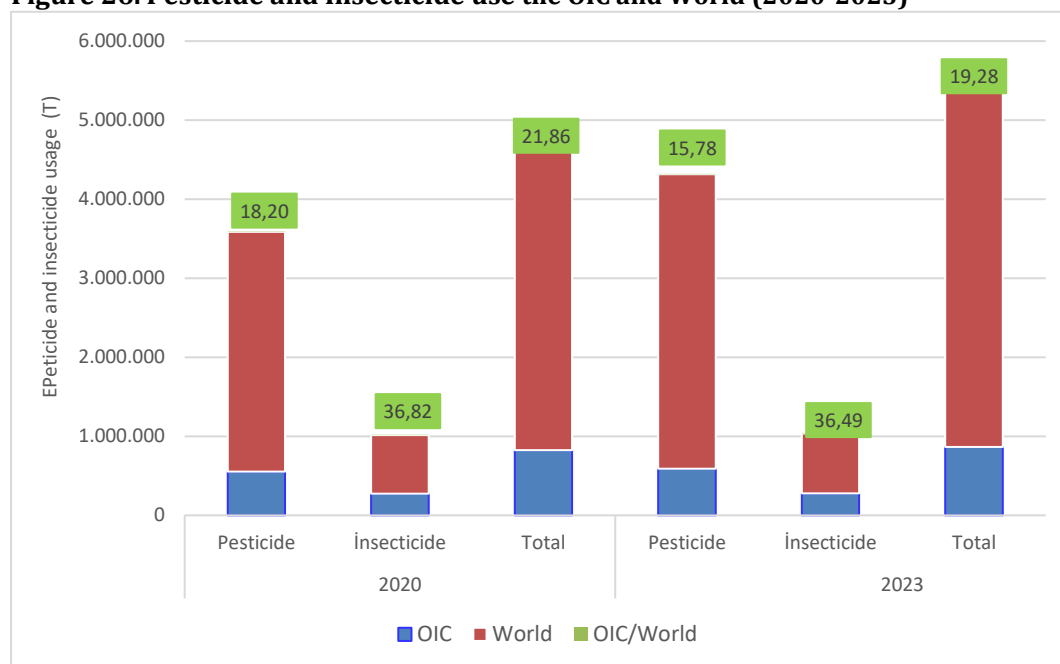
Source: <https://databank.worldbank.org/source/world-development-indicators#>

1.9.3 Pesticide and Insecticide

Pesticide and insecticide use in OIC countries varies considerably due to differences in agricultural practices, climate and the structure of agricultural sectors in these countries. In general, some industrialized countries have high rates of pesticide use in their farming systems. On the other hand, countries with predominantly subsistence or low-intensity agricultural practices have lower levels of utilization.

The graph shows the pesticide and insecticide use of OIC countries in 2020 and 2023 in comparison to the world total. According to the data, the share of OIC countries in world pesticide use declined from 18.2% in 2020 to 15.8% in 2023. In contrast, the situation is different for insecticides, where OIC countries used more than one-third of the world total during this period, with their share remaining at 36.8% in 2020 and 36.5% in 2023.

Figure 26. Pesticide and Insecticide use the OIC and World (2020-2023)



Source: <https://www.fao.org/faostat/en/#data/QCL>

This result indicates that the density of pests in OIC countries with tropical and subtropical climates increases insecticide use.

On the other hand, the main reasons for the decline in pesticide use include the increase in global input costs in recent years, disruptions in supply chains and economic constraints faced by farmers. Thus, while OIC countries have a relatively low share in global pesticide use, they remain highly dependent on insecticides. This situation reveals both the sensitivity of agricultural production to climatic conditions and the economic vulnerabilities in access to agricultural inputs.

Many OIC countries are improving their monitoring of pesticide usage through international cooperation and agricultural policies. For example, the FAO works with many of these countries to track pesticide consumption and encourage safer alternatives.

The data in Table 11 shows the distribution of pesticide and insecticide use in the OIC by sub-region in 2020-2023.

Table 11. Pesticide and insecticide use (1000 tons) by region in OIC countries

Sub Region	2020			2023			Total Change 2020-2023 (%)
	Pesticide	Insecticide	Total	Pesticide	Insecticide	Total	
African Group	39.798	12.729	52.527	86.032	26.183	112.215	214
Arab Group	51.453	22.789	74.242	55.715	19.497	75.212	101
Asian Group	460.886	237.567	698.453	446.492	231.411	677.903	97

Source: <https://www.fao.org/faostat/en/#data/QCL>

Accordingly, the Africa Group showed the most notable increase, with total use rising 214%, from 52.5 thousand tons to 112.2 thousand tons. This can be explained by increasing agricultural production pressure and the need for pest control on the continent, as well as expanding access to modern inputs.

In the Arab Group, total use showed a relatively limited increase, from 74.2 thousand tons to 75.2 thousand tons, remaining stable at 101%, reflecting the impact of water scarcity, economic constraints and cropping patterns in the region.

Although the Asia Group had the highest absolute consumption value, total utilization decreased from 698.4 thousand tons to 677.9 thousand tons, down to 97%. This shows that rising fertilizer and pesticide prices and input costs, especially in the post-pandemic period, put more pressure on producers in Asia.

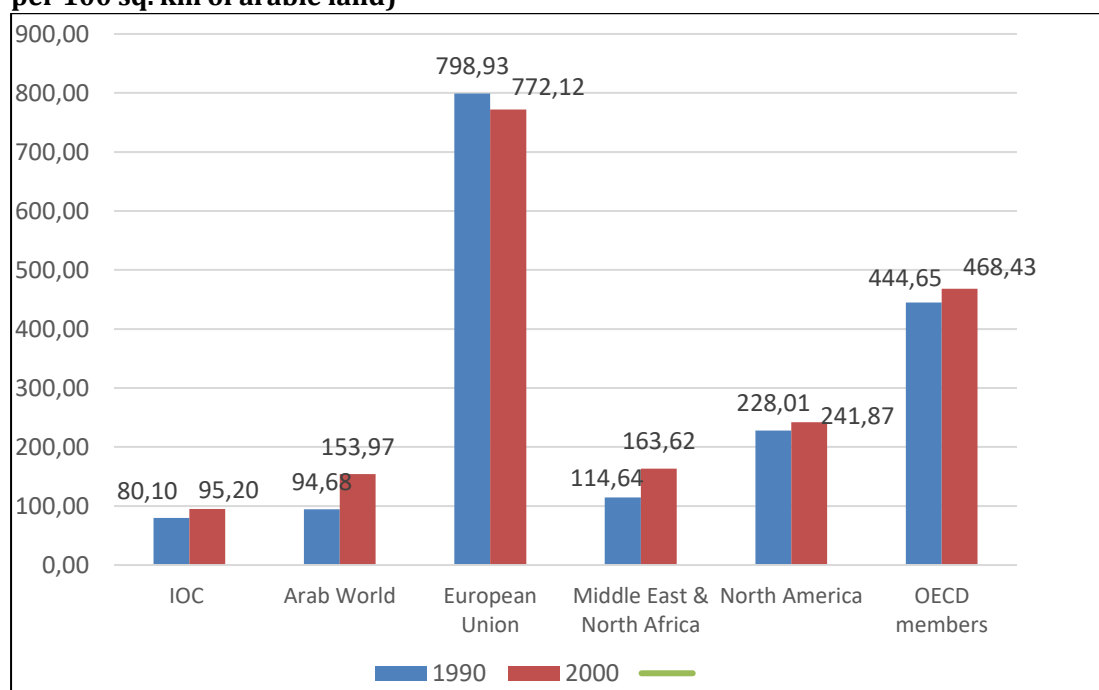
Overall, the table shows a rapid rise in Africa, stagnation in Arab countries and a relative decline in Asia, thus highlighting regional differences in pesticide and insecticide use within the OIC.

1.9.4 Mechanization

In general, the level of agricultural mechanization in most OIC countries is lower than in developed countries, but modern agricultural techniques and mechanization practices are developing rapidly in some countries. Especially OIC countries such as Turkey, Malaysia and Indonesia have started to use modern agricultural machinery and technologies.

The number of tractors per arable land in OIC countries varies greatly from country to country. These differences vary according to agricultural mechanization, economic structure and government incentives. In general, the number of tractors per arable land in the OIC is considerably lower than in other OECD and EU countries (Figure 27). The low number of tractors per arable land in OIC countries is due to factors such as economic inadequacies, small-scale agriculture, infrastructure problems and dependence on traditional farming methods. However, in many countries with relatively high levels of mechanization in agriculture, such as Turkey, Malaysia and Saudi Arabia, the number of tractors per arable land is higher.

Figure 27 The use of Agricultural machinery in OIC and Other Group Countries (Tractors per 100 sq. km of arable land)



Sources: <https://databank.worldbank.org/source/world-development-indicators/Series/AG.LND.TRAC.ZS#>

2. The State of Food Security

Food security is defined as the set of policies, strategies and procedures implemented to ensure that individuals have continuous access to safe, sufficient, nutritious and affordable food. One of the most critical determinants of food security on a global scale is income level and income distribution, as low per capita income levels increase the risk of food insecurity by limiting household access to food (World Bank, 2022; FAO, 2021).

According to the Food and Agriculture Organization of the United Nations (FAO, 2006), food security is defined as "the situation in which all people have physical, social and economic access at all times to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life". Adapting this definition to the household level has led to the concept of household food security, where individuals' access to food and consumption patterns are at the center of the analysis (FAO, IFAD, UNICEF, WFP & WHO, 2022).

Although food security is clearly defined at the concept level, its measurement is a multidimensional and complex process. To overcome this challenge, different experts and international organizations have developed food security indicators that allow for global comparisons. In this context, the Committee on World Food Security (CFS), which met at FAO Headquarters in 2011, defined a set of indicators covering different aspects of food insecurity. In the selection of indicators, particular attention was paid to the availability of data that would allow for cross-regional and temporal comparisons (CFS, 2012).

Today, these indicators, published by organizations such as FAO, WFP, the World Bank and the

World Health Organization, are used to monitor food insecurity trends and provide a baseline reference for policy makers.

As stated in FAO's 2006 report, food security is assessed through four main dimensions:

1. Availability: Adequate food production and supply.
2. Access: Households' economic and physical access to food.
3. Utilization: The effective consumption of food under hygienic and sanitary conditions as well as its nutritional value.
4. Stability: Ensuring continuity in food supply and access over time.

This framework allows to assess the food security situation of OIC member countries in comparison with the world and to develop policies. In particular, food security indicators are of critical importance in OIC countries due to income distribution, demographic pressures, climate change and agricultural production capacity, hence the need to develop recommendations at the regional level.

2.1 Availability

According to FAO (1996), availability refers to the physical availability of food and refers to the supply side of food security. This size is mainly determined by food production levels, stock quantities and net trade balance. Therefore, the availability dimension of food safety; It concerns whether adequate food is consistently and consistently provided for all at the household, community, national and international levels (FAO, 2008; Clapp, 2017).

The utilization dimension is directly related to the quality of human nutrition. The adequacy of the average dietary energy supply is assessed on indicators such as the average value of food production, the share of dietary energy from cereals and tubers, the average protein supply, and the proportion of protein of animal origin (FAO, IFAD, UNICEF, WFP & WHO, 2022). Here, average energy and protein supply and undernourishment indicators were taken into account to evaluate the usability dimension.

Although many Organizations of Islamic Cooperation (OIC) member countries have an economic structure based on agricultural production, they face significant challenges, especially at the level of self-sufficiency. In the OIC countries on the African continent, limited water resources stand out as one of the main threats to agricultural production (World Bank, 2021). In contrast, countries with stronger agricultural infrastructure have a relative advantage in food supply but face serious risks due to climate change, land degradation, and environmental sustainability issues (Al-Riffai, Breisinger & Mondal, 2010; FAO, 2021).

As a result, the availability and availability dimensions of food security are closely related not only to production capacities, but also to natural resource management, trade balances and climatic vulnerabilities. In order to ensure food security in a sustainable manner, OIC countries need to develop both infrastructure investments and climate adaptation policies simultaneously.

2.1.1. Dietary Energy Supply Adequacy

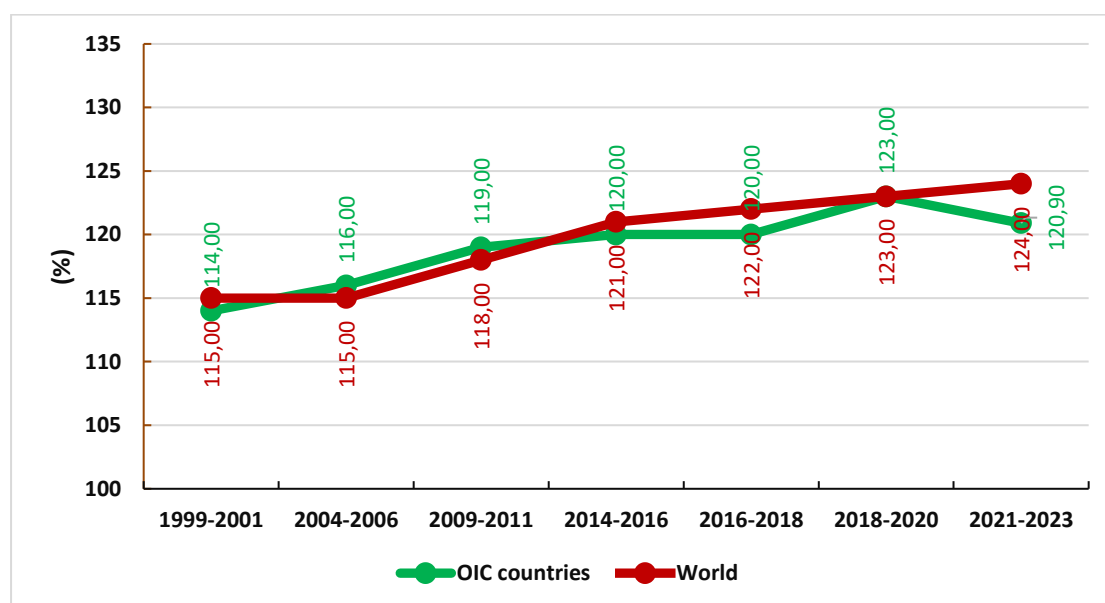
It shows improvements in the adequacy of average dietary energy supply in the OIC member countries and globally. The caloric adequacy index of the food supply was calculated as three-

year averages from 1999-2001 to 2021-2023 (Figure 28).

The average dietary energy supply worldwide increased from 115% in 1999–2001 to 124% in 2021–2023. This represents an increase of about 9 points. In OIC countries, the rate peaked at 123% in 2018–2020, up from 114% in 1999–2001, but declined slightly to 120.9% in 2021–2023. In terms of average dietary energy supply adequacy until the 2018-2023 period, there has been an improvement in parallel OIC countries, except for the 2016-2018 period and 2021-2023.

The average dietary energy supply adequacy in the OIC has recently become lower than in the world. After 2020, global shocks such as the COVID-19 pandemic, supply chain disruptions, climate change impacts (especially drought), and the Russia-Ukraine war may have affected OIC countries more than the world average (FAO et al., 2022). A significant part of the OIC countries face the problems of water scarcity, low productivity and foreign dependency in agricultural production (World Bank, 2021). Therefore, the adequacy of energy supply is more prone to fluctuation in the long run.

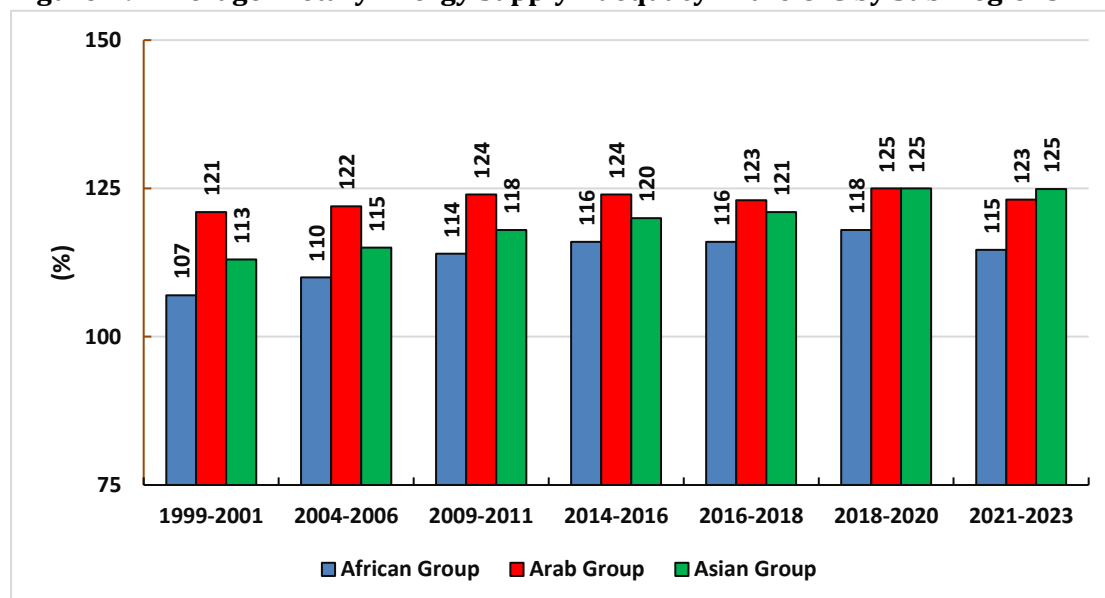
Figure 28. Average Dietary Energy Supply Adequacy in the OIC and the World



Source: <https://www.fao.org/faostat/en/#data/FS>

At the subregional level, the average dietary energy supply adequacy was highest in both the Arab Group and the Asian Group, at 121-113 percent in 1999-2001. When the adequacy rate of developed countries is evaluated as 123 percent, between 2018 and 2023, the Arab Group and the Asian Group have the same level of energy supply adequacy at a moderate level with 125 compared to developed countries. On the other hand, although the rate of increase in the average dietary energy supply adequacy is higher in the African Group, it is still below the OIC average. In the 2021-2023 period, all regions experienced energy supply adequacy problems together (Figure 29).

Figure 29. Average Dietary Energy Supply Adequacy in the OIC by Sub-Regions



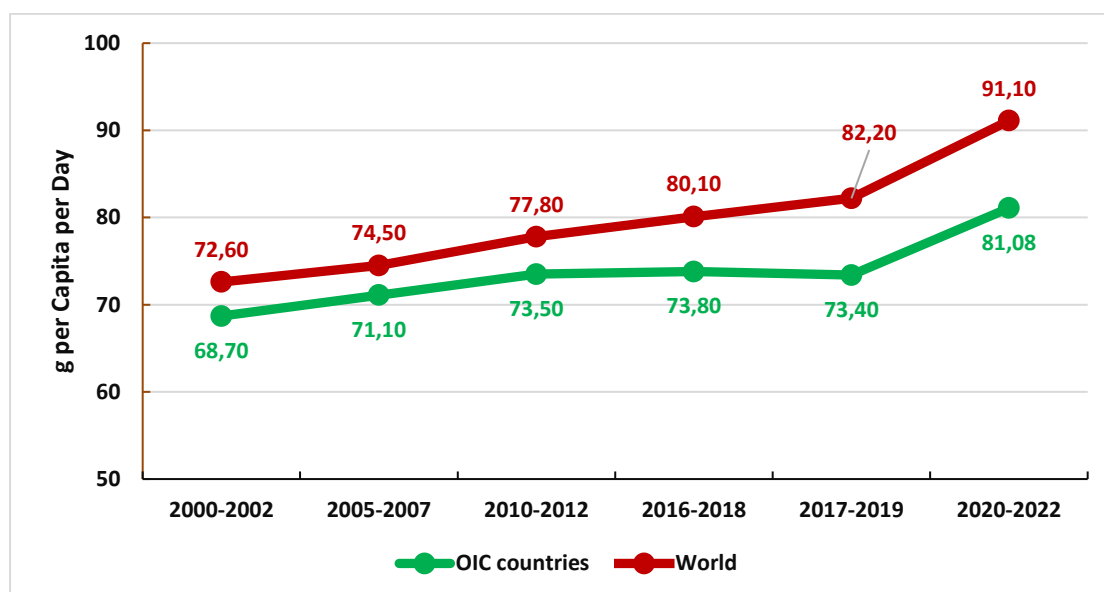
Source: <https://www.fao.org/faostat/en/#data/FS>

2.1.2. Average Protein Supply

Another important indicator considered within the scope of the availability dimension of food safety is the average protein supply. Proteins are an indispensable nutrient in the human diet and are considered the basic building blocks of the body. It plays a critical role in the development and functionality of cells, muscles and organs (FAO/WHO/UN, 2007). Therefore, the average daily supply of protein per capita is closely related not only to the level of adequate and balanced nutrition of individuals, but also to the food security capacity of a country or region (FAO, 2013; UNICEF, 2019). Thus, the indicator of average protein supply is used as one of the main references in assessing the nutritional security of countries and in policy development.

According to Figure 30, the change in the supply of pleasing protin increased from 72.6 g/person/day in 2000–2002 to 91.1 g/person/day in 2020–2022. This represents an increase of about 25%. In OIC countries, the average increased from 68.7 g/person/day in 2000–2002 to 81.08 g/person/day in 2020–2022. The rate of increase remained around 18%. In the 2020–2022 period, OIC countries saw a marked jump (81.08 g), but still lagging around 10 grams behind the world average (91.1 g).

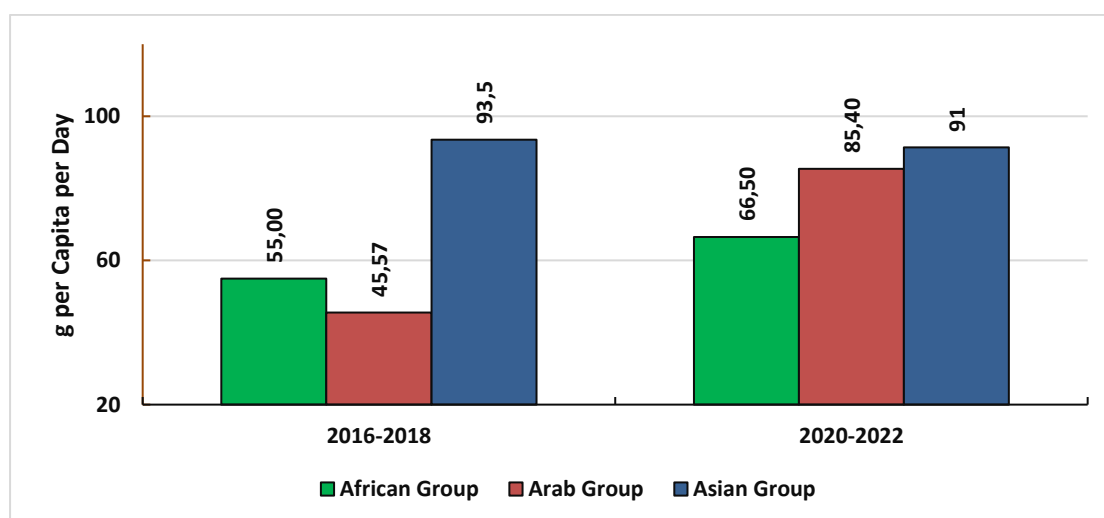
Figure 30 Average Protein Supply in the OIC and the World



Source: <https://www.fao.org/faostat/en/#data/FS>

At the sub-regional level, the Asian Group has the highest average daily supply of protein per capita over the period 2016-2020. The Asian Group was followed by the Arab and African group in 2020-2022. In very few countries, such as Kuwait, the Maldives, the United Arab Emirates and Turkey, the supply of protein is sufficient. In most African Group countries, only half of the required amount of protein has been supplied (Figure 31). In all countries in the region, these rates have almost decreased due to the increasing pandemic and global problems, and then they have entered the recovery process.

Figure 31 Average Protein Supply in the OIC Sub-Regions



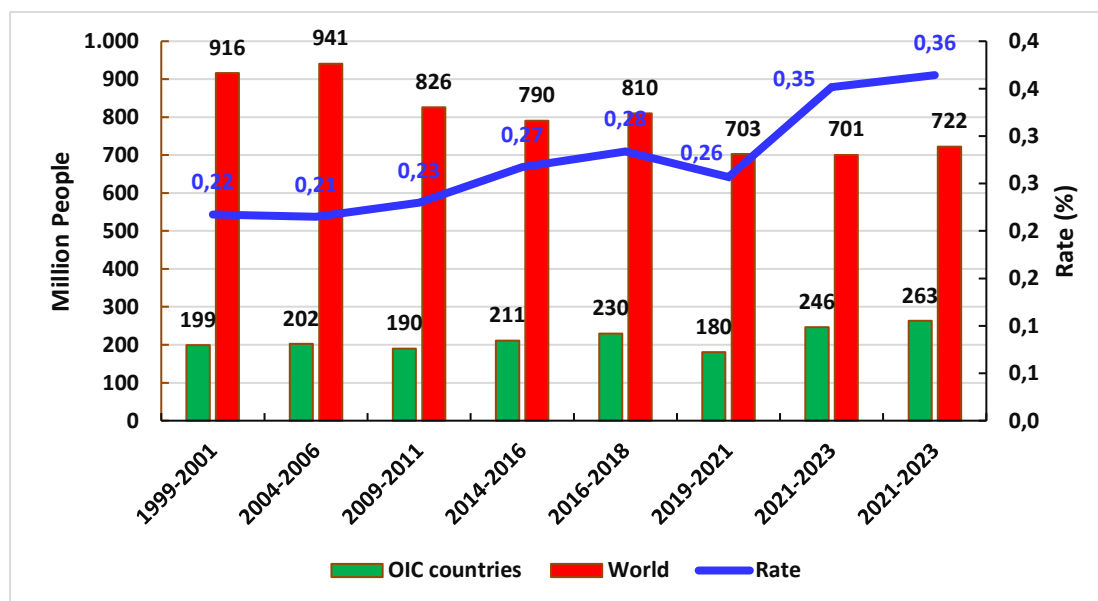
Source: <https://www.fao.org/faostat/en/#data/FS>

2.1.3. Undernourished people

Furthermore, number of people at risk of undernourishment is a broad indicator. According to FAO definition, undernourishment means that a person is not able to acquire enough food to meet the daily minimum dietary energy requirements, over a period of one year. The number of undernourished people in the OIC is calculated by applying the estimated prevalence of undernourishment to total population³.

Figure 32 illustrates that in the period 2021–2023, approximately **263 million people in OIC member countries are projected to be undernourished**, representing **36 percent of the global undernourished population**. Over the past two decades, while the total number of undernourished people worldwide has shown a steady decline, this figure has remained largely unchanged within OIC countries. Consequently, the proportion of undernourished individuals in OIC member states relative to the world total has increased, rising from **22 percent in 1999–2001 to 26 percent in 2019–2021**. This trend can be attributed to the escalation of food insecurity, particularly following the **2006–2008 global food crisis**, which created profound socioeconomic challenges for both households and policymakers in developing regions. These regions—**Asia and the Pacific, Sub-Saharan Africa, and Latin America and the Caribbean**—encompass the majority of OIC member states, thereby amplifying the impact on their food security conditions.

Figure 32 Undernourished People in the OIC and its Share in the World



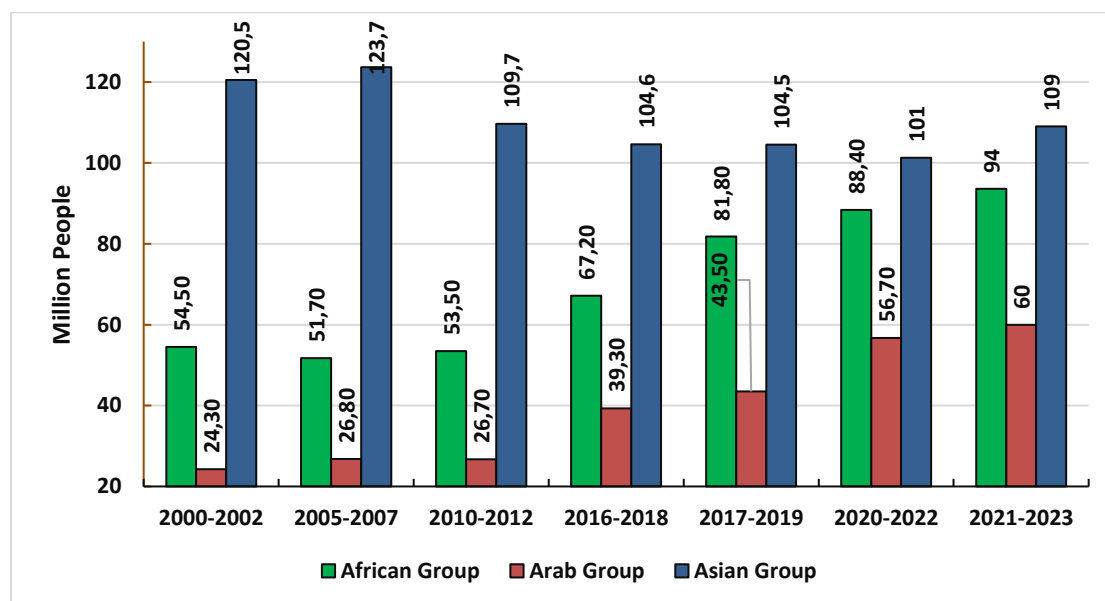
Sources: <https://www.fao.org/faostat/en/#data/FS>

At the subregional level, even though the rate of malnutrition is higher in the African Group, the Asian Group has almost half of the total undernourished people in the OIC member countries

³ FAO, IFAD, UNICEF, WFP and WHO. 2024. The State of Food Security and Nutrition in the World 2024 – Financing to end hunger, food insecurity and malnutrition in all its forms. Rome. <https://doi.org/10.4060/cd1254en>

due to its high population. Figure 33 shows that by 2021-2023, 109 million undernourished people are expected to live in the Asian Group, which accounts for close to 40 percent of the undernourished population in the OIC.

Figure 33 Undernourished People in the OIC by Sub-Regions



Sources: <https://www.fao.org/faostat/en/#data/FS>

2.2 Access

World Health Organization defines the food access as having sufficient resources to obtain appropriate foods for a nutritious diet (WHO 2015). Access dimension of food security is fully met when all people in a country have all adequate resources needed to acquire sufficient nutritious and safe food. Therefore, the concept of food accessibility encompasses several issues such as affordability of individuals to purchase foods, distribution of income and consumption, existence of nutritious goods in nearby grocery stores, sufficient and convenient transportation nets to reach local food retailers.

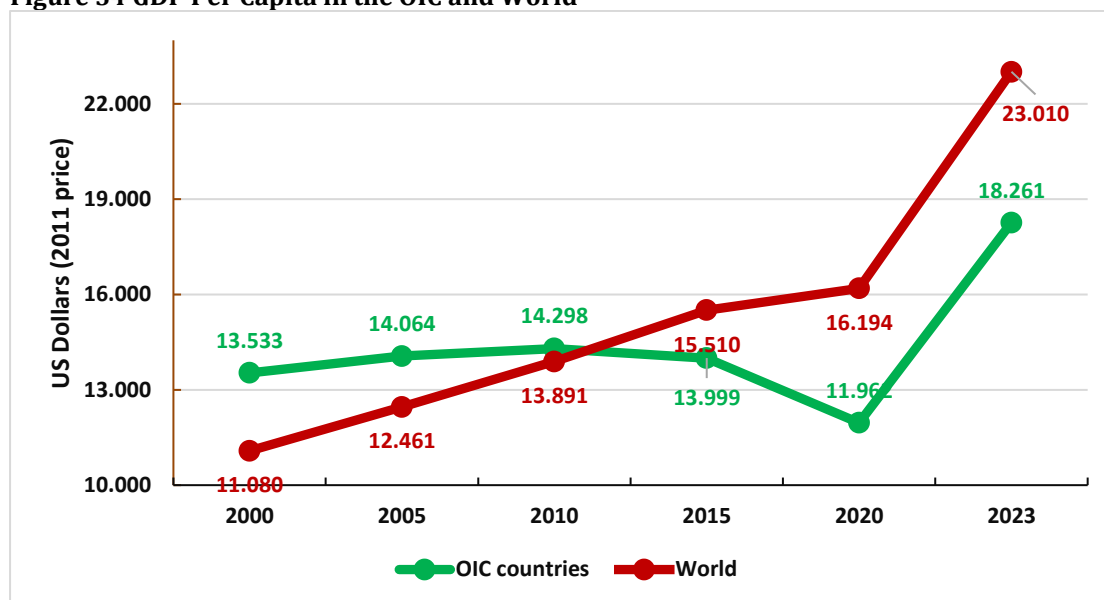
In the FAO study of food security indicators, the access dimension of food security is measured by various indicators such as percent of paved roads over total roads, road density, rail lines density, gross domestic product per capita, domestic food price index, prevalence of undernourishment, share of food expenditure of the poor, depth of the food deficit, distribution of consumption and prevalence of food inadequacy (FAO 2015).

One of the biggest challenges to food security in many OIC countries is people's economic access to food. Income inequality and poverty make access to food difficult in most OIC countries. Especially in low-income countries (e.g. Yemen, Somalia and Afghanistan), food security depends heavily on foreign aid. The urban-rural divide is an important factor in access to food. People living in rural areas have more difficult access to food due to lack of infrastructure and inadequate supply chains.

2.2.1. GDP Per Capita

One of the most important indicators of access are the average level of income and the distribution of the income in a country. GDP per capita and its distribution within the whole group is important in this respect (Figure 34).

Figure 34 GDP Per Capita in the OIC and World

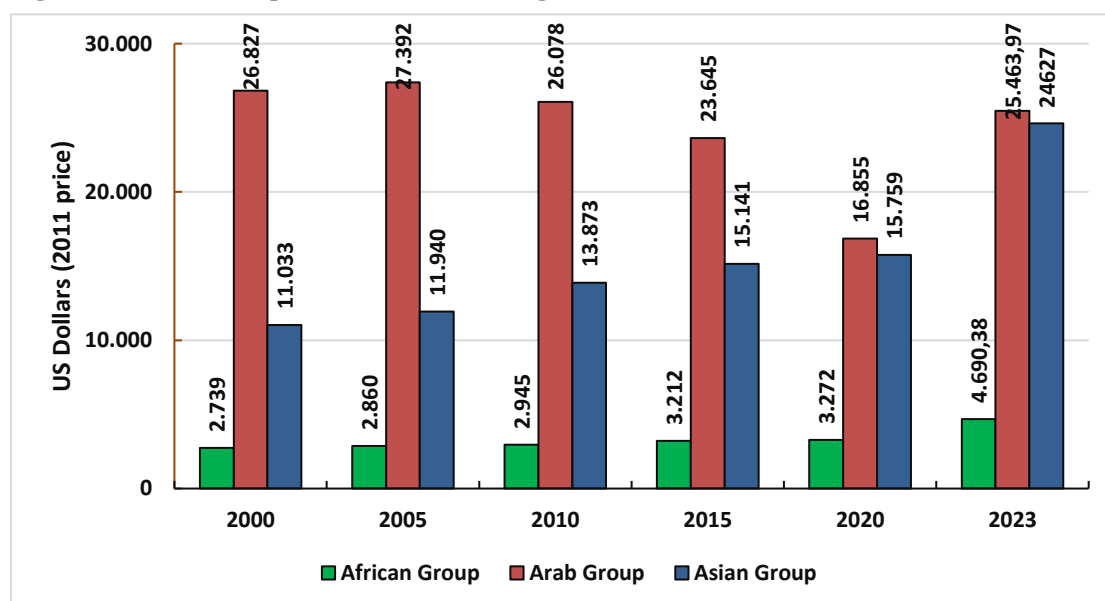


Sources: <https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD>

Figure 34 shows the developments in GDP per capita in the OIC and the World using purchasing power parity ratios and weighted population averages, evaluated in constant 2011 International Dollars. Therefore, this indicator provides information on the possibility of economic access to markets given the purchasing power of the regions. As shown in Figure 34, the average GDP per capita of the OIC member countries has increased from 13,533 International Dollars in 2000s to 18,261 dollars in 2023. Compared to the world, the average GDP per capita was slightly above the world average in 2010 but continued to decline after 2010. However, the GDP per capita of OIC member countries decreased by 11.6 percent in the period 2000-2020, while it increased by 52.6 percent in the period 2020-2023.

At the sub-regional level, the average GDP per capita of the Arab Group in 2023 is the highest at USD 25.463. It is followed by the Asian Group and the African Group with 24.627 and 4.690 dollars. Figure 35 shows that the decline in GDP is driven by the Arab group. The main reason for these decreases is the decline in oil revenues of Arab countries, especially in 2015-2020.

Figure 35 GDP Per Capita in the OIC Sub-Regions



Source: <https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD>

2.3 Utilization

According to the FAO (1996, 2008), **utilization** refers to the effective use and consumption of food through an adequate diet, access to clean water, proper sanitation, and health care, with the ultimate aim of achieving a state of nutritional well-being in which all physiological needs are met. Within this dimension, the emphasis is placed not only on the availability of food but also on **non-food factors** that directly influence the body's ability to absorb and metabolize nutrients. Thus, issues such as general hygiene and sanitation, water quality, health care practices, and food safety and quality emerge as fundamental determinants of food utilization (FAO, 2013).

In the FAO framework of food security indicators, the utilization dimension is evaluated through a broad range of variables, including **access to improved water sources, access to improved sanitation facilities, the prevalence of stunting and underweight among children under five years of age, adult underweight prevalence, anemia among pregnant women and children under five, as well as vitamin A and iodine deficiencies** (FAO et al., 2022).

Ensuring the availability of **nutritious and safe food** remains a critical challenge, particularly in many OIC member countries where malnutrition and micronutrient deficiencies are widespread. Such deficiencies often result in **stunted growth, reduced immunity, and long-term health consequences in children**, with countries such as **Niger, Bangladesh, and Pakistan** being notable examples (UNICEF, 2019). In addition, limited awareness regarding food hygiene and sanitation practices contributes to unsafe storage and consumption patterns, further exacerbating health risks.

Given these circumstances, **improved access to water resources** has been selected as a key proxy indicator to represent the utilization dimension of food security in OIC member states. This reflects the central role of water not only in ensuring food safety and hygiene but also in

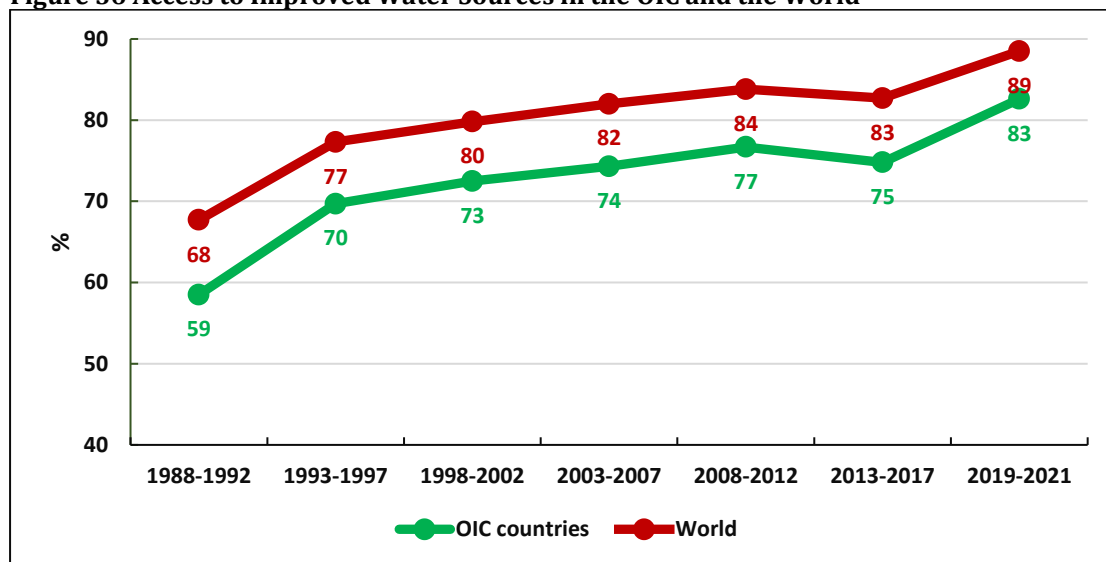
supporting adequate nutrition and overall health.

Figure 36 depicts the share of the population with access to improved drinking water sources in OIC member countries compared to the global average. As of **2013-2017**, about **75 percent** of the population in OIC countries had access to at least basic drinking water services—a marked improvement from earlier decades as 83 percent, yet still trailing global benchmarks (SESRIC, 2019). By **2022**, **29 OIC countries** had raised this coverage to **more than 91 percent** of their population; several—including Kuwait, the UAE, Qatar, Bahrain, Brunei, Libya, and the Maldives—achieved **universal access (100 percent)** (COMCEC, 2024).

Globally, **73 percent** of the world population had access to **safely managed drinking water services** by **2022**, defined as improved water sources available on premises, available when needed, and free from contamination (WHO, 2022). Moreover, between **2015 and 2024**, global access to safely managed drinking water rose from **68 percent to 74 percent**, highlighting ongoing progress but underscoring persistent gaps in universal access (UNICEF & WHO, 2024).

Despite significant improvements within many OIC countries, access to improved drinking water in the OIC region **remains below** the global average and continues to vary widely across countries.

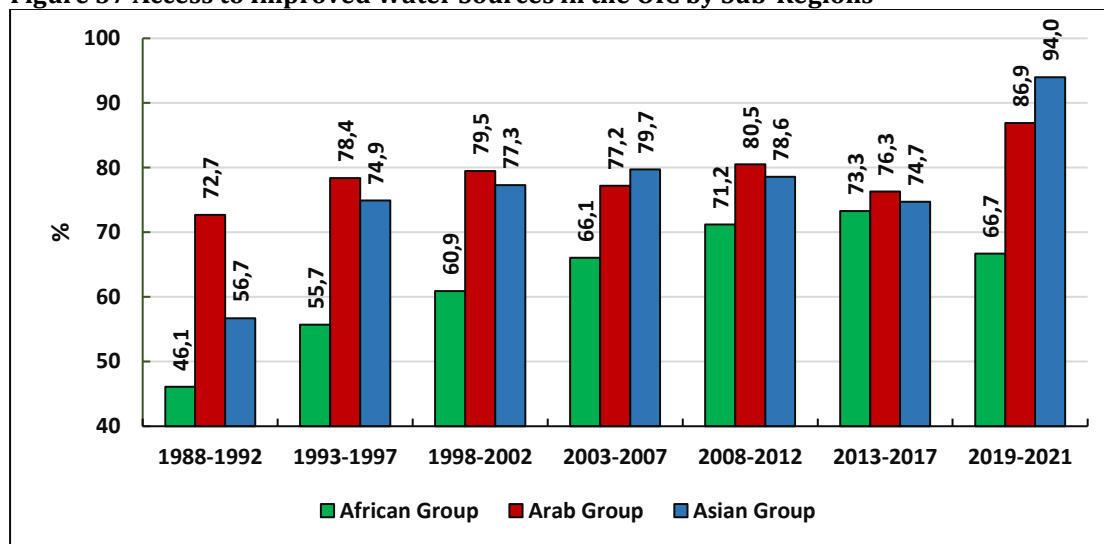
Figure 36 Access to Improved Water Sources in the OIC and the World



Sources: <https://www.fao.org/faostat/en/#data/FS>

At the subregional level, there appears to be no serious problem of access to improved water resources in the Asian and Arab Groups (Figure 37). In general, except for Arab and Asian countries, the imbalance in Africa causes the permanent difference between the world average to persist.

Figure 37 Access to Improved Water Sources in the OIC by Sub-Regions



Sources: <https://www.fao.org/faostat/en/#data/FS>

In the period of 1990-2000, African Group countries were quite below the other countries average. In 2019-2021 period, the percentage of population having access to improved drinking water sources has reached 87 percent in the Arab Group 94 percent in the Asian Group, and 67 percent in the African Group. Yet, fragile and conflict-affected countries such as Yemen and Sudan lag significantly behind, pulling down the regional average. Even though great extent of progress has been achieved from the 1990s to the present in terms of population having access to improve drinking water sources, it is still a concern in the OIC Member Countries.

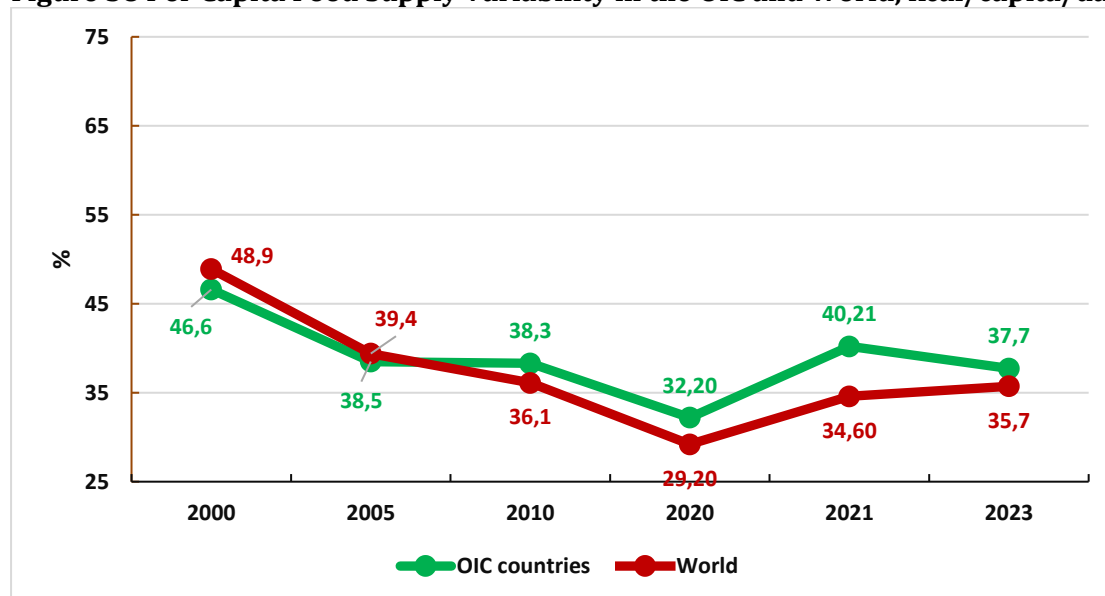
2.4 Stability

According to the FAO, food security is the state in which "all people, at all times, have physical, social and economic access to safe and nutritious food for an active and healthy life" (FAO, 2008). This definition emphasizes the **temporal-spatial dimension** of food safety and necessitates not only instantaneous but also continuous access. The definition includes four basic dimensions of food security – availability, access, use and stability – and emphasizes the importance of the stability dimension in terms of reducing the negative effects on the other three dimensions. Therefore, these dimensions need to be as stable and independent as possible of natural disasters (droughts, floods), social problems (unemployment), economic fluctuations (rising food prices) or political instabilities (conflicts, unrest) (FAO, 2013).

According to FAO's study of food safety indicators, the stability dimension; The dependency rate on grain imports is evaluated by measures such as the percentage of arable land suitable for irrigation, the share of food imports in total exports of goods, political stability and violence/terrorism risks, volatility in food prices, and per capita food supply variability (FAO, 2021). Among these indicators, the variability of food supply per capita is considered the most useful indicator in assessing the stability dimension of food security, especially in the Organization of Islamic Cooperation (OIC) countries, as it allows the comparison of changes between countries and time (OIC-SESRTCIC, 2022).

The stability of food supply in the OIC member countries is often threatened by external shocks. In many countries in Africa and the Middle East, droughts, floods, extreme temperatures and climate change limit agricultural production capacity. In addition, political instability and armed conflicts directly threaten food security. Ongoing conflicts, especially in countries such as Syria, Yemen, and Sudan, seriously disrupt both agricultural production and food supply chains (World Bank, 2023; FAO, 2022). Therefore, it is imperative that food security policies in the OIC countries focus not only on increasing production capacity, but also on strengthening resilience to crises.

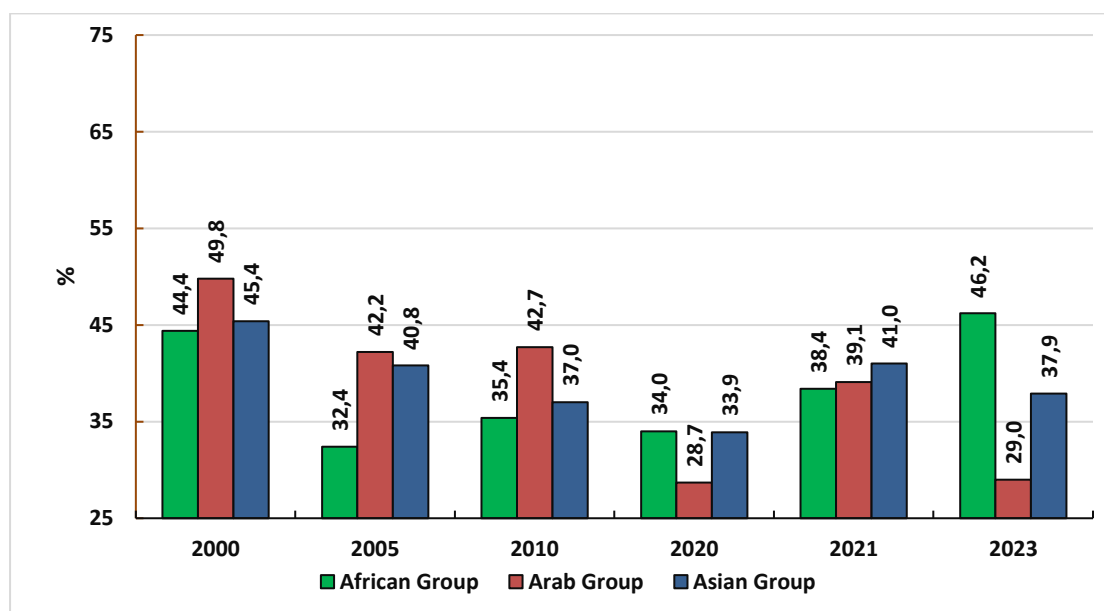
Figure 38 Per Capita Food Supply Variability in the OIC and World, kcal/capita/day



Source: <https://inddex.nutrition.tufts.edu/data4diets/data-sources-and-methods>

Figures 38 and 39 show the index of domestic food price volatility corresponding to the variability of "food supply in kcal/kaput/day" in the world and OIC member countries, respectively. The series of variability index is calculated by fitting a cubic spline trend to the series with ordinary least squares. The difference between the cubic fit and the actual values is then calculated, and then the index for a given year is defined as the standard deviation of these differences over the previous five years. In fact, it does not seem possible to talk about an upward trend for the OIC countries after 2010. As a matter of fact, the OIC countries are below the world average when looking at the change in the three-year average protein supply for 2020-2023 (Figure 38).

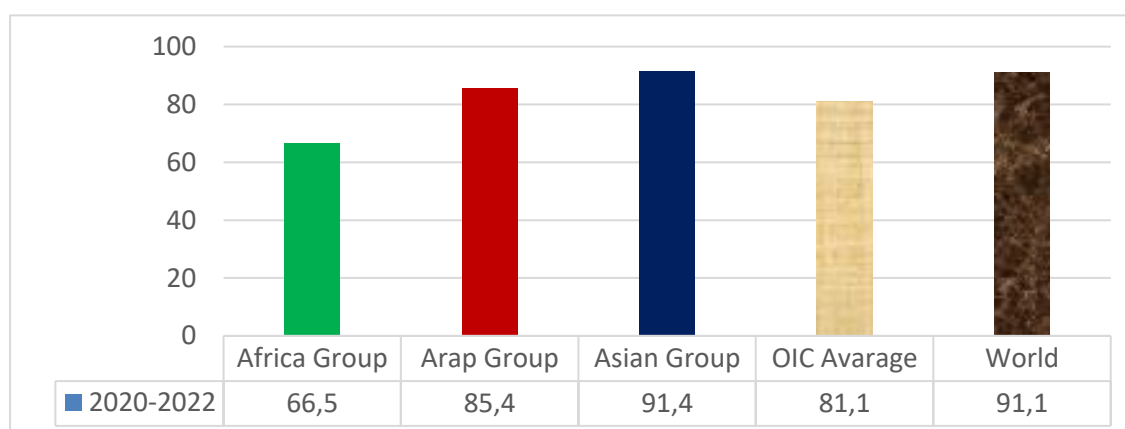
Figure 39 Per Capita Food Supply Variability in the OIC by Sub-Regions, kcal/caput/day



Source: <https://index.nutrition.tufts.edu/data4diets/data-sources-and-methods>

At the subregional level, there seems to be a serious problem for each group, but this is constantly changing depending on changing conditions and crises (Figure 39). This value, which was previously seen as severe for the African Group, has now emerged as severe for the Arab countries group. In 2020, food supply variability decreased by 28.7 percent in the Arab Group, followed by 33.9 percent and 34 percent in the Asian and African Groups, respectively. As of 2021, it is seen that the variability of food supply per capita is quite high for the Arab Countries Group. It is considered that this situation has not changed mostly in 2023, and that deep food crises and regional political instabilities in countries such as Lebanon, Somalia, and Sudan have a direct impact on this picture (FAO, 2022; OIC-SESRIC, 2023).

Figure 40 Average Protein Supply in the OIC by Sub-Regions and world average, (g/cap/day)



Sources: <https://www.fao.org/faostat/en/#data/FS>

In the graph, the variability of food supply per capita for the period 2020–2022 is presented in comparison with the OIC subgroups and the world average (Figure 40). When the data is examined, it is seen that the African Group is at the lowest level with 66.5 points, which reflects the instability in the food supply on the continent. Drought, floods and production fluctuations due to climate change are among the main reasons for the poor performance of African countries. Although the Arab Group is below the world average with a score of 85.4, it has a higher value than Africa; however, food crises in countries such as Lebanon, Somalia, and Sudan in 2021 and 2023, as well as regional political instability, led to a low indicator of this group.

The Asian Group, on the other hand, shows stability close to the world average (91.1) with a score of 91.4 and constitutes the highest level in the OIC. This shows that many countries in Asia have a relatively strong structure in terms of agricultural production capacity and supply chains. Some OIC countries (e.g. Malaysia, Turkey, Indonesia) are in a relatively good position in terms of food security in this chapter. Sustainable food security in countries with low production capacity and limited economic power largely depends on benefiting from the experience of stronger countries, increasing local agricultural production capacity, and strengthening solidarity, aid and cooperation between countries. In this context, technology transfer, information sharing, joint research and development activities, and the activation of effective humanitarian aid mechanisms in times of crisis are of critical importance. In addition, food security programs carried out within the framework of regional and international cooperation play a fundamental role in both managing short-term supply shocks and building resilience of local systems in the long term.

Overall, the OIC average is significantly below the world average of 81.1, which reveals that OIC countries are more vulnerable to food supply security than the global level. Therefore, vulnerability, especially in African and Arab subgroups, is associated with multidimensional factors such as climate change, natural disasters, economic fluctuations and political instability; this situation shows that policies to ensure food security in OIC countries should be considered from a resilience perspective.

In this process, efforts are being made to promote modernization in agriculture and sustainable agricultural practices in relation to food safety. In many OIC countries, projects supported by FAO, IFAD and other international organizations are being worked on to increase agricultural production and ensure sustainability. Improving food distribution networks and strengthening rural infrastructure are also important strategies aimed at increasing access to food. In order to increase food security, steps to increase cooperation among the OIC countries, to develop agricultural trade and to combat climate change gain importance.

3. Main Agricultural Problems and Recommendations

3.1. Agricultural Problems

Agriculture plays a central role in the economies of many OIC (Organization of Islamic Cooperation) countries, especially those in Africa, Asia, and the Middle East. The main current agricultural problems facing OIC countries are multifaceted, driven by a combination of economic, political, social, and environmental factors. Despite the sector's importance, OIC countries face numerous agricultural challenges that hinder growth, productivity, and sustainability.

Below is a focused items and issued of the major agricultural challenges. These problems have been ordered based on various field and macro studies conducted in the region and many of them should be prepared as the subject of new projects ⁴:

- ✓ **Rapid urbanization, poverty, and high unemployment:** The shift from agriculture to industry and services increases rural unemployment and accelerates rural-to-urban migration (World Bank, 2022).
- ✓ **Underdeveloped infrastructure:** Inadequate irrigation systems, poor storage, logistics, and weak market linkages contribute to major post-harvest losses.
- ✓ **Youth disengagement from agriculture:** Limited profitability and low social prestige discourage young people from participating in agriculture (ILO, 2021).
- ✓ **Food insecurity and import dependency:** Many OIC countries remain heavily dependent on imports for staple foods, making them highly vulnerable to global price volatility (FAO, 2023).
- ✓ **Low agricultural productivity:** Limited adoption of mechanization, technology, and modern farming practices leads to yields far below global averages.
- ✓ **Water scarcity and poor irrigation systems:** Particularly in North Africa and the Middle East, water resources are under severe stress, exacerbated by climate change (IPCC, 2019).
- ✓ **Environmental degradation and land loss:** Soil erosion, desertification, and biodiversity loss undermine long-term agricultural capacity (UNEP, 2021).
- ✓ **Climate change and disaster risks:** Increasing frequency of droughts, floods, and heatwaves causes production instability.
- ✓ **Limited access to finance:** Smallholders face difficulties accessing credit, insurance, and affordable inputs, restricting their capacity to invest (IFAD, 2022).
- ✓ **Conflicts and wars:** Ongoing conflicts in parts of Sub-Saharan Africa and the Middle East disrupt agricultural production and food supply chains.
- ✓ **Weak governance and corruption:** Poor institutional capacity and lack of transparency reduce policy effectiveness and resource allocation.
- ✓ **Slow digital transformation:** Many OIC states lag behind in adopting digital agriculture and data-driven solutions.

3.2. Recommendations to Address Agricultural Problems

The structural problems of agriculture in OIC countries and the measures to be taken against the weaknesses and threats encountered in the current situation are stated in bullet points. These recommendations are summarized by title from various studies, reports and research of the OIC group⁵.

⁴ Nasr, V. (2009), Karbassi, A. R., & Abduli, M. A. (2015), Al-Sudairi, A. A., Al-Shayea, N. A., & Al-Hammad, A. A. (2016)., FAO & IDB. (2017), Ayoob, M. (2014), Kamrava, M. (Ed.) (2013), Qader, M. M. (2015)., Ibrahim, I., & Wahab, M. A. (2016), OIC-SESRI. (2020), Savasan, F. & Ersoy, H. (2017), UNDP & UN-Habitat. (2018), World Bank. (2020), OIC-StatCom. (2019), Mansouri, A. (2020).

⁵ Badr El-Din, A. (2017), Reij, C., et al. (2017), Alqadi, M., & Kumar, A. (2017), Bennis, M. (2018), Murdiyarso, D., et al. (2018), Wolde, A., & Ghebreyesus, G. (2018). Kharbach, A., et al. (2018), Oğuz, A., & Pashayi, F. (2018). Hussain Hasan, M. et al. (2019)., Zainudin, A., et al. (2019), Adeyemo, T., & Adekunle, F. (2019). Islam, A., & Miah, R. (2019), Güven, D., & Demirbaş, N. (2020), Diop, M., & Sy, S.

- **Agricultural infrastructure should be strengthened:** Investments should be made in irrigation systems, rural roads, storage facilities, and cold-chain logistics.
- **Sustainable agricultural practices should be promoted:** Agroecology, organic farming, and resource-efficient production methods should be encouraged.
- **Access to finance, markets, and inputs should be improved:** Agricultural credit schemes, microfinance, and insurance for smallholders should be expanded.
- **Modern technologies should be adopted:** Digital agriculture, precision farming, biotechnology, and climate-smart innovations should be supported.
- **Extension and education services should be reformed:** Farmer training and capacity building should be improved, and policy and institutional frameworks should be strengthened.
- **Agro-processing and value addition should be promoted:** Food processing, packaging, and branding should be enhanced to integrate farmers into higher-value markets.
- **Food losses and waste should be reduced:** Post-harvest handling and distribution systems should be improved.
- **Trade and export capacity should be expanded:** Regional trade agreements should be strengthened, and competitiveness in international markets should be boosted.
- **Climate adaptation measures should be implemented:** Investments should be made in drought-resistant seeds, water-saving irrigation systems, and disaster preparedness.
- **Rural development and poverty alleviation should be prioritized:** Income diversification, cooperatives, and women/ youth entrepreneurship should be supported.
- **Regional and global cooperation should be fostered:** Knowledge exchange, technology transfer, and collaborative projects among OIC states should be enhanced.
- **Biodiversity and ecosystems should be conserved:** Sustainable land management should be implemented, and degraded soils and rangelands should be restored.
- **International financing and resources should be utilized:** Climate finance, development funds, and private-sector investments should be mobilized effectively.

A global and local transformation of food and agriculture systems in this century is imperative for the future. Finally, it has offered lessons, innovations and opportunities that can help make food systems more resilient to future shocks and more inclusive, efficient, sustainable and healthy.

Identifying the most effective measures for sectoral transformation in agriculture can be achieved through research and analysis based on science-based research. Countries have gained important experience from past experiences.

Global cooperation and the dissemination of scientific innovations to the masses are seen as the basic conditions for global success. It is imperative for OIC countries to work together more closely for the rational solution of problems.

(2020), El-Masry, T., & Saleh, A. (2020), Adesina, J., et al. (2020), Al-Tawil, M., & Al-Mutairi, H. (2020).

4. Agricultural Cooperation under the COMCEC

Agriculture is one of the most important cooperation areas of the COMCEC. It has been prioritized by the COMCEC Economic Summit held in November 2009 and 2023 in İstanbul. The COMCEC Strategy, adopted by the 4th Extraordinary Islamic Summit held on 14-15 August 2012 in Makkah, has also determined agriculture as one of the six cooperation areas of the COMCEC.

The COMCEC Strategy sets the “Increasing the productivity of agricultural sector and sustaining food security in the OIC Member Countries” as its strategic objective. The COMCEC Strategy also highlights the common challenges of the agriculture sector in the OIC member countries, among others, as the following:

- Low level of agricultural productivity,
- Lack of appropriate legal and regulatory framework,
- Low agro-industry investments,
- Poor basic infrastructure and related services
- Low level of agricultural mechanization,
- efficiency in the use of agricultural inputs
- Low level of research and development activities,
- Lack of reliable and up-to-date data

In order to address these challenges, the COMCEC Strategy, in its Agriculture Section, identifies four Output Areas (Increasing Productivity, Regulatory Framework and Institutional Capacity, Reliable and Up-to-date Data and Market Performance) as well as specific expected outcomes under them.

With the purpose of realizing the objectives and the expected outcomes of the cooperation areas, Working Groups (WG) have been formed under each cooperation area. The COMCEC Agriculture Working Group (AWG) has been established to achieve the objectives of the COMCEC Strategy in this context. Within the framework of the Strategy, the COMCEC Agriculture Working Group provides a regular platform for the member country experts to discuss their common issues, concerns and problems as well as to share experiences and good practices. Moreover, the AWG serves in developing a common understanding and approximating policies among the member countries in this crucial sector.

In this respect, the 1st meeting of the AWG was held in June 2013 with the theme of “Increasing Agricultural Productivity in the OIC Member Countries: Improving Irrigation Capacity”. The 2nd meeting was held in December 2013 with the theme of "Encouraging Foreign Direct Investments (FDIs) in the OIC Member Countries for Increasing Agricultural Productivity." Furthermore, the 3rd meeting Agriculture WG was held in April 2014 in Ankara with the theme of “Improving the Statistical Capacity of the Agriculture Sector in the OIC Member Countries”. After that, the 4th meeting of the COMCEC Agriculture Working Group was held in September 2014 with the theme of “Facilitating Smallholder Farmers’ Market Access in the OIC Member Countries.” The COMCEC AWG gathered its 5th meeting with the theme of “Improving Institutional Capacity: Strengthening Farmer Organizations in the OIC Member Countries” in March 2015. The sixth Meeting was held in October 2015 with the theme of “Promoting Agricultural Value Chains in the OIC Member Countries.”

Moreover, given the importance of food losses in the Member Countries, the COMCEC AWG devoted its 7th, 8th and 9th Meetings to different dimensions of this subject which are

respectively on-farm food losses, post-harvest food losses and food waste in the OIC Member Countries.

Food security is one of the most important challenges faced by the governments in the World as well as in the OIC Member Countries. In this respect, a well-functioning agricultural market performance is essential to ensure food security in the Member Countries. Given the significance of this issue, the 10th Meeting of the COMCEC AWG was held on September 28th, 2017, in Ankara, Türkiye with the theme of “Improving Agricultural Market Performance: Creation and Development of Market Institutions”. Following this meeting, the 11th Meeting of the AWG was held on February 22nd, 2018, in Ankara with the theme of “Improving Agricultural Market Performance: Developing Agricultural Market Information Systems”.

On the other hand, global trade in agricultural products has grown rapidly in recent decades and is also expected to grow further over the coming decades. International trade promotes economic growth and creates welfare gains. But, many developing countries, including the OIC member countries, face serious difficulties that prevent them from fully reaping the benefits of international trade. To help the OIC member countries formulate effective measures and policies to make greater use of their potential as trading partners in global market as well as within the OIC markets for agricultural products, diverse needs and priorities of the Member Countries need to be examined. In this respect, the 12th Meeting of the COMCEC AWG was held on September 20th, 2018, with the theme of “Analysis of Agri-Food Trade Structures to Promote Agri-Food Trade Networks among the OIC Member Countries”. As a complementary to this meeting, the 13th Meeting of the Agriculture Working Group was held on February 21st, 2019, in Ankara with the theme of “Reviewing Agricultural Trade Policies to Promote Intra-OIC Agricultural Trade” and a research report on the same subject was considered by the WG. 14th AWG was held on 9-10 October 2019, in Ankara, with the theme of “Increasing the Resilience of the Food Systems in Islamic Countries in Face of Future Food Crises.” Based on the COVID 19 pandemic ‘The COMCEC COVID-19 Agriculture Consultative Meeting’ was held on June 30th, 2020, in a virtual-only format. In line with the relevant resolution of the 34th Ministerial Session of the COMCEC, the 14th Meeting of the AWG served as the preparatory platform for the Ministerial Exchange of Views Session of the 35th COMCEC Session that was held on November 27th, 2019, with the theme of “Sustainable Food Systems in the OIC Member Countries. Accordingly, the 15th Meeting of COMCEC Agriculture Working Group was also held on September 17th, 2020, in a virtual-only format, with the theme of “Good Governance for Ensuring Food Security and Nutrition in the OIC Member Countries”. 36th Ministerial Session of COMCEC was held on November 25-26, 2020, in a virtual only format. 37th Ministerial Session of COMCEC was hold on November 24-25, 2021, in a virtual only format. 38th Ministerial Session of COMCEC was hold on November 26-29, 2022, in İstanbul. 39th Ministerial Session of COMCEC was hold on December 2-5, 2023, in İstanbul. Accordingly, the 21th Meeting of COMCEC Agriculture Working Group was also held on October, 2022 in Ankara, with the theme of “Ensuring the Sustainability of Agricultural Inputs to Combat Food Insecurity in the OIC Member Countries”

In each meeting of the AWG, the research report prepared specifically on the theme of the meeting is considered by the AWG. “COMCEC Agriculture Outlook” reports are prepared and submitted to WG Meetings. As the outcome of the meeting, the WG comes up with concrete policy recommendations. In addition, Proceedings of these Working Group Meetings, which reflect the

outcomes of the Meetings, are published by the CCO, following each WG Meeting. All the relevant publications and presentations are available on the COMCEC website⁶.

Furthermore, the Member Countries having registered to the AWG have the chance to propose multilateral cooperation projects within the framework of the COMCEC Project Funding, which is another important implementation instrument of the Strategy. The projects to be financed under the COMCEC Project Funding need to serve multilateral cooperation and be designed in accordance with the objectives and the expected outcomes defined by the Strategy in its agriculture section. The projects also have important role in realization of the policy recommendations formulated by the member countries during the AWG meetings.

Conclusion

Agriculture remains strategically and historically important in the IOC countries. After examining the macro agricultural indicators, sectoral indicators and state of food security, it is evident that agriculture is still one of the prominent sectors in the OIC member countries. Even though agricultural activity in most OIC member countries has been slightly replaced by services and industrial activity over time, the significance of agriculture sector on national economies is still undeniable.

The agricultural sector in OIC member states has shown notable expansion in recent decades, with the value of agricultural production increasing due to both higher output levels and rising global prices. As a result, the share of OIC countries in world agricultural production has followed an upward trend. This performance can largely be attributed to agricultural and economy-wide growth rates that outpaced global averages between 1994 and 2024 (FAO, 2023; SESRIC, 2022). Nevertheless, the sector remains structurally fragile: productivity growth has stagnated, and no significant improvements have been observed in key inputs such as labor, land, and technology utilization.

Despite these weaknesses, the agricultural sector still holds significant untapped potential to enhance value addition and improve food security. Productivity gains are particularly urgent for strategic crops such as wheat, maize, and cotton, which remain central to OIC production, consumption, and trade patterns. Yet, millions of people across member states continue to suffer from undernourishment. COVID-19 pandemic increased the number of poor people globally by about 150 million, 20 percent above pre-pandemic poverty levels in 2021. Food systems, which directly employ over a billion people, lost more than 451 million jobs or 35% of formal employment. These vulnerabilities have been compounded by regional wars, political instability, forced migration, and environmental shocks.

Food insecurity has already become one of the biggest problems in many OIC countries especially after the pandemic situation. The latest FAO data pointed out that on average 47.9% of the total population in OIC countries suffer food insecurity problems, quite higher than the world average of 25.4% (FAO 2023). To make matters worse, several OIC countries in East Africa, are currently fighting their way to control the decade's worst desert locust swarms' outbreak, which threatens food security in the region. The occurrence of the pandemic and regional war could further amplify the deterioration of food security, if not handled with correct policy measures (FAO 2021). Furthermore, after examining the related indicators with respect

⁶ www.comcec.org and ebook.comcec.org

to all dimensions of food security such as availability, access, utilization and stability, it is clear that more efforts are still needed to enhance the state of food security level in member states.

The agricultural sector in OIC countries is structured differently from each other in terms of country differences and resources. While there are countries with well performing agriculture sectors, many countries face considerable structural challenges and problems in their agriculture sector mainly arising from the agro-ecological conditions, lack of a modern agricultural infrastructure and inefficient input utilization. The economic difficulties in these countries have a direct negative impact on the orientation towards agriculture. At the same time, besides the phenomenon of urbanization, the difficulties of life in the countryside and the presence of the elderly population in the countryside negatively affect the application of innovations to agriculture.

Notwithstanding the structural issues mentioned above, the OIC member countries have also a great potential in agriculture especially for cross country investments. On the other hand, as the global demand for quality food is increasing, along with efforts for increasing quantity, quality related issues also need to be addressed adequately. Any efforts to reduce these productivity and market efficiency gaps already appeared between OIC member countries and the rest of the World in different terms at this Publication could serve as a leverage for both food and nutrition security. In particular, exemplary practices can be used to increase resource utilization and land productivity and to disseminate agricultural systems to be applied in these areas.

The significance and severity of the pandemic, and its likely impact on agriculture worldwide, calls for substantial reflection in both the short- and long-term and among OIC member states. The immediate consequences of agricultural and food systems on the world rely so heavily for the global network is still dramatically experienced under pandemic situation. The unexpected risks, weaknesses and systemic shifts to understand post pandemic effects as well as those that may be long-lasting or permanent should be closely tracked. Early warning systems and information sharing need to be practiced taking early action against potential problems.

Continuous monitoring of international developments and advances and determination of application areas are mandatory. With careful planning based on detailed studies and required allocations at national level and enhancing regional cooperation, experience sharing and mobilizing resources at international level, the challenges mentioned throughout the Outlook report can be primarily addressed. In this framework, the COMCEC Project Funding which offers grants for capacity building and experience sharing projects should be used efficiently. Inter-country cooperation and institutional solidarity should be a common goal. In today's technological structure and development, it can now take advantage of the ease of communication and information sharing. It is important not only to monitor developments but also to identify the possibilities and limitations of implementation and to explore the contribution of agriculture and communication in agricultural areas to the implementation process. In this process, strategies and budget plan should be formulated and time planning should be made to mitigate the negative effects of the problems that may arise at a certain stage. Inter-country solidarity, coupled with political stability at the national level, remains indispensable for ensuring that planned strategies can be implemented sustainably.

References

- Adesina, J., et al. (2020). Regional Trade Agreements and Agricultural Trade in ECOWAS: Challenges and Opportunities.
- Adeyemo, T., & Adekunle, F. (2019). The Anchor Borrowers' Program and Rice Self-Sufficiency in Nigeria: Successes and Challenges.
- Alpas, H. (2021). <https://www.comcec.org/agriculture/presentations-of-the-17th-meeting-of-the-comcec-agriculture-working-group/>
- Alqadi, M., & Kumar, A. (2017). Water Scarcity and Irrigation Management in Jordanian Agriculture.
- Al-Riffai, P., Breisinger, C., & Mondal, A. H. (2010). Food security in the Middle East and North Africa (MENA) region. International Food Policy Research Institute (IFPRI).
- Al-Sudairi, A. A., Al-Shayea, N. A., & Al-Hammad, A. A. (2016). Agricultural Development in OIC Countries: Challenges and Opportunities. OIC Journal of Economic and Social Studies.
- Al-Tawil, M., & Al-Mutairi, H. (2020). Food Self-Sufficiency in Saudi Arabia: Wheat and Beyond.
- Artık, N., Güneş, E., Mert, İ. (2022). Turkish Food and Beverage Industry Sector Research, Tugis Press.
- Ayoob, M. (2014). The Many Faces of Political Islam: Religion and Politics in the Muslim World. University of Michigan Press.
- Badr El-Din, A. (2017). Islamic Finance and Agricultural Development in Sudan: The Role of Microfinance.
- Bennis, M. (2018). Sustainable Water Management in Moroccan Agriculture: Lessons from the Green Morocco Plan.
- Clapp, J. (2017). Food self-sufficiency: Making sense of it, and when it makes sense. Food Policy, 66, 88–96. <https://doi.org/10.1016/j.foodpol.2016.12.001>
- COMCEC (2012), COMCEC Strategy, 2012.
- COMCEC (2019) Agriculture Outlook, 2019
- COMCEC (2021). <https://www.comcec.org/wp-content/uploads/2021/10/1.pdf>
- COMCEC. (2023). Agriculture Trade Outlook for OIC Member Countries. Ankara: Standing Committee for Economic and Commercial Cooperation of the Organization of Islamic Cooperation.
- COMCEC. (2024). Monitoring the Implementation of the OIC 2025: Strategic Roadmap for Sustainable Development Goals (SDGs). Standing Committee for Economic and Commercial Cooperation of the Organization of Islamic Cooperation. Retrieved from <https://www.comcec.org>
- COMCEC. (2024). Statistical Yearbook of OIC Member Countries. Ankara: COMCEC Coordination Office.
- Diop, M., & Sy, S. (2020). Agroforestry and Climate-Smart Agriculture in Senegal.
- Dobson et al., (2020). Ecology and Economics for Pandemic Prevention, (2020). Science 369, no. 6502: 379–381.
- El-Masry, T., & Saleh, A. (2020). Agricultural Value Chains and Post-Harvest Losses in Egypt: Solutions for Horticultural Products.
- Eurostat. (2022). Agricultural Land Use Statistics in the European Union. European Commission.
- Fans et. al. (2021) <https://www.annualreviews.org/doi/10.1146/annurev-resource-101520-081337>

- FAO. (1996). Rome Declaration on World Food Security and World Food Summit Plan of Action. Rome: Food and Agriculture Organization of the United Nations.
- FAO (2006). Policy Brief on Food Security, Issue 2, 2006. <http://www.fao.org/forestry/13128-0e6f36f27e0091055bec28ebe830f46b3.pdf>
- FAO/WHO/UN. (2007). Protein and amino acid requirements in human nutrition: Report of a joint WHO/FAO/UN expert consultation. WHO Technical Report Series 935. Geneva: World Health Organization.
- FAO, (2008). Food Security Concepts and Frameworks.
- FAO. (2008). An introduction to the basic concepts of food security. Rome: Food and Agriculture Organization of the United Nations.
- FAO. (2011). The State of the World's Land and Water Resources for Food and Agriculture (SOLAW) – Managing systems at risk. Food and Agriculture Organization of the United Nations.
- FAO. (2013). The State of Food and Agriculture 2013: Food Systems for Better Nutrition. Rome: FAO. <https://www.fao.org/3/i3300e/i3300e.pdf>
- FAO. (2013). The State of Food Insecurity in the World. Rome: Food and Agriculture Organization.
- FAO (2015). Food Security Indicators, 2015. <http://www.fao.org/economic/ess/ess-fs/ess-fadata/en/#.VeKvt03ot3c>
- FAO & IDB. (2017). Strategic Framework for Agriculture Development in OIC Countries.
- FAO (2019), The State of Food Security and Nutrition in the World <http://www.fao.org/state-of-food-security-nutrition>
- FAO, (2019) Global Report on Food Crises. http://www.fsinplatform.org/sites/default/files/resources/files/GRFC_2019-Full_Report.pdf
- FAO (2020), Food Outlook Covid <http://www.fao.org/3/ca9509en/ca9509en.pdf>
- FAO-WFP (2020), <https://www.wfp.org/publications/fao-wfp-early-warning-analysis-acute-food-insecurity-hotspots>
- FAO. (2021). FAOSTAT Statistical Database. Food and Agriculture Organization of the United Nations. <https://www.fao.org/faostat/en/>
- FAO. (2021). The State of Food and Agriculture 2021: Making agrifood systems more resilient to shocks and stresses. Rome: Food and Agriculture Organization of the United Nations. <https://doi.org/10.4060/cb4476en>
- FAO. (2021). The State of Food Security and Nutrition in the World 2021. Food and Agriculture Organization of the United Nations.
- FAO. (2021). FAO Food Security Indicators. Rome: Food and Agriculture Organization.
- FAO-SOFI (2021), The State of Food Security and Nutrition in the World, <http://www.fao.org/publications/sofi/2021/en/>
- FAO, IFAD, UNICEF, WFP, & WHO. (2022). The State of Food Security and Nutrition in the World 2022. Rome: FAO. <https://doi.org/10.4060/cc0639en>
- FAO. (2022). FAOSTAT Statistical Database. Food and Agriculture Organization of the United Nations. <https://www.fao.org/faostat/en/>
- FAO. (2022). The State of Food Security and Nutrition in the World. Rome: Food and Agriculture Organization.
- FAO. (2022). FAO Water Statistics. Food and Agriculture Organization of the United Nations. <https://www.fao.org/>
- FAO. (2023). FAOSTAT Statistical Database. Food and Agriculture Organization of the

United Nations. <https://www.fao.org/faostat/en/>

FAO. (2024). FAO Food Price Index. Rome: FAO.

FAOSTAT (2021) <http://www.fao.org/faostat/en/#data/FS>

FAOSTAT (2021), <https://doi.org/10.4060/cb4477en-fig49>

Glauber et al., (2020). "COVID-19: Trade Restrictions Are Worst Possible Response to Safeguard Food Security," IFPRI COVID-19 Blog, IFPRI, March 27, 2020

Güneş, E. and Turmuş, E. (2020). Evaluation of grain sector in terms of food security in Turkey and the World, Turkish Journal of Bioethics, Vol:7, No:3, 124-143.

Güven, D., & Demirbaş, N. (2020). Mechanization and Agricultural Productivity in Turkey: A Policy Analysis.

Hasan, M. et al. (2019). Climate-Resilient Rice Cultivation in Bangladesh: Innovations and Impacts.

Headey et al. (2020). Impacts of COVID-19 on childhood malnutrition and nutrition-related mortality, *the Lancet*, Volume 396, Issue 10250, 519 - 521
[https://doi.org/10.1016/S0140-6736\(20\)31647-0](https://doi.org/10.1016/S0140-6736(20)31647-0)

HLPE. (2020). Food security and nutrition: Building a global narrative towards 2030. High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food
<https://www.fao.org/3/ca9731en/ca9731en.pdf>

<http://www.comcec.org/en/wp-content/uploads/2020/07/1-Presentation-Maximo-Torero-COMCEC-COVID-19-June-30.pdf>

http://www.comcec.org/en/wp-content/uploads/2020/07/2-A-SESRIC_COVID19-Impacts-on-Agriculture-and-Food-Security-in-OIC.pdf

<http://www.comcec.org/en/wp-content/uploads/2020/07/2-B-IOFS.pdf>

<http://www.comcec.org/en/wp-content/uploads/2020/07/2-C-IsDB.pdf>

http://www.sbb.gov.tr/wp-content/uploads/2019/10/Agriculture_Outlook_2019_October.pdf

<https://data.worldbank.org/indicator/NV.AGR.TOTL.CD?locations=TR>

<https://data.worldbank.org/indicator/NY.GDP.MKTP.KD>

<https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?end=2022&locations=BF-MN&start=1991&view=map>

<https://databank.worldbank.org/source/world-development-indicators>

<https://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/133762/filename/133971.pdf>

<https://ec.europa.eu/eurostat>

https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Farms_and_farmland_in_the_European_Union_-_statistics

<https://genderdata.worldbank.org/en/indicator/sl-empl-zs?gender=total>

https://joint-research-centre.ec.europa.eu/reports-and-technical-documentation/trends-eu-agricultural-land-within-2015-2030_en

<https://ourworldindata.org/grapher/agriculture-value-added-per-worker-wdi>

<https://ourworldindata.org/grapher/milk-yields-per-animal>

<https://www.ers.usda.gov/data-products/chart-gallery/gallery/chart-detail/?chartId=107931>

<https://www.fao.org/4/z5700e/z5700e03.htm>

<https://www.fao.org/faostat/en/#data/TCL>

<https://www.fao.org/newsroom/detail/oecd-fao-agricultural-outlook-2023-32-maps-key-output-consumption-and-trade-trends/en>

<https://www.imf.org/en/Publications/WEO/Issues/2024/04/16/world-economic-outlook-april-2024>
<https://www.sesric.org/publications-detail.php?id=560>
<https://www.sesric.org/publications-detail.php?id=580>
<https://www.fao.org/faostat/en/#data/RL>
 Hussain, A., et al. (2020). Drip Irrigation for Water-Efficient Agriculture in Pakistan.
 Ibrahim, I., & Wahab, M. A. (2016). Climate Change and Food Security in OIC Countries. International Journal of Agricultural Research.
 IDB, (2009). Fostering Intra-OIC FDI in the Agriculture Sector, Areef Suleman Isma'eel Ibrahim Na'iyah, OCCASIONAL PAPER No. 14, May 2009.
 IFAD. (2022). Rural Development Report 2022: Transforming food systems for rural prosperity. International Fund for Agricultural Development.
 IFPRI, (2021). COVID-19 Food Trade Policy Tracker, (2021);
<https://www.iisd.org/system/files/2020-08/food-export-restrictions-worsen-food-crisis.pdf>
 IFPRI. (2024). Global Food Policy Report. Washington, DC: International Food Policy Research Institute.
 ILO (2025). <https://databank.worldbank.org/source/world-development-indicators/Type/TABLE/preview/on#>
 ILO. (2021). Rural youth and employment in agriculture. International Labour Organization.
 IMF. (2023). World Economic Outlook: Inflation Dynamics. Washington, DC: International Monetary Fund.
 IOFS (2020) <http://www.comcec.org/en/wp-content/uploads/2020/07/2-B-IOFS.pdf>
 IPCC 2020, <https://www.ipcc.ch>
 IPCC. (2019). Climate Change and Land: Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems. Intergovernmental Panel on Climate Change.
 IPCC. (2023). Climate Change 2023: Synthesis Report. Geneva: Intergovernmental Panel on Climate Change.
 IsDB (2020) <http://www.comcec.org/en/wp-content/uploads/2020/07/2-C-IsDB.pdf>
 Islam, A., & Miah, R. (2019). Rice Disease Management through Early Warning Systems in Bangladesh.
 Kalantaryan S. and S. McMahon. (2020) Covid-19 and Remittances in Africa, JRC Technical Report (Luxembourg: European Union, 2020).
 Kamrava, M. (Ed.) (2013). The Political Economy of the Persian Gulf. Hurst Publishers.
 Karbassi, A. R., & Abdul, M. A. (2015). Energy, Environment, and Sustainable Development in OIC Countries. Renewable and Sustainable Energy Reviews.
 Kharbach, A., et al. (2018). Integrated Pest Management for Tomato Production in Morocco.
 Laborde Debucquet D., W. Martin, and R. Vos, (2020) "Impacts of COVID-19 on Global Poverty, Food Security and Diets," IFPRI Discussion Paper 1993 (IFPRI, Washington, DC, 2020).
 Madgavkar et al. (2020). <https://www.mckinsey.com/featured-insights/future-of-work/covid-19-and-gender-equality-countering-the-regressive-effects>
 Mansouri, A. (2020). Institutional Reform in the OIC: Governance, Transparency, and Accountability. Journal of Islamic Governance.
 Murdiyarso, D., et al. (2018). Rural Infrastructure Development and Market Access for Farmers in Indonesia.

- Nasr, V. (2009). *Forces of Fortune: The Rise of the New Muslim Middle Class and What It Will Mean for Our World*. Free Press.
- Nayak, P. and Bhattacharjee, P.R., (2005). *Agricultural Growth and Price Fluctuation Luctuations: A Case Study of Production and Prices of Potato in Tripura*, General Economics and Teaching, EconWPA, 2005.
- Nellemann, C., MacDevette, M., Manders, T., Eickhout, B., Svihus, B., & Prins, A. G., *The enviromental food crisis*, 2009.
http://www.grida.no/files/publications/FoodCrisis_lores.pdf
- OECD (2021). <https://www.oecd.org/economic-outlook/may-2021/>
- OECD. (2023). *COVID-19, Global Supply Chains and Food Security*. Paris: Organization for Economic Co-operation and Development.
- OECD. (2023). *Agricultural Policy Monitoring and Evaluation 2023*. Organization for Economic Co-operation and Development.
- Oğuz, A., & Pashayi, F. (2018). *Enhancing Agricultural Trade between Turkey and Iran: A Bilateral Perspective*.
- OIC-SESRIC. (2020). *OIC Economic Outlook: Trade and Investment in OIC Countries*. SESRIC.
- OIC-SESRTCIC. (2022). *OIC Statistical Outlook on Agriculture and Food Security*. Ankara: Statistical, Economic and Social Research and Training Centre for Islamic Countries.
- OIC-SESRTCIC. (2023). *Agriculture and Food Security in OIC Member States*. Ankara: Statistical, Economic and Social Research and Training Centre for Islamic Countries.
- OIC-StatCom. (2019). *Sustainable Energy in OIC Countries: Prospects and Challenges*. SESRIC.
- Qader, M. M. (2015). *Environmental Issues in OIC Countries and the Role of Islamic Ethics*. International Journal of Islamic Thought.
- Reij, C., et al. (2017). *Farmer-Managed Natural Regeneration: A Sustainable Land Rehabilitation Approach in Niger*.
- Reuter 2024. *Nigerian farmers abandon farms after attacks, sending food prices higher*. Reuters. <https://www.reuters.com/world/africa/nigerian-farmers-abandon-farms-after-attacks-sending-food-prices-higher-2024-06-25>
- Savasan, F. & Ersoy, H. (2017). *Trade and Economic Cooperation in OIC Countries: A Comparative Analysis*. OIC Economic Studies Journal.
- Schmidhuber, J. Pound & B. Qiao. (2020). *COVID-19: Channels of transmission to food and agriculture*. Rome, FAO. <https://doi.org/10.4060/ca8430en>
- SESRIC, (2014), *Agriculture and Food Security in OIC Member Countries: Opportunities for Cooperation* <https://www.sesric.org/files/article/483.pdf>
- SESRIC, (2015). *OIC Economic Outlook, 2015* <https://www.sesric.org/files/article/517.pdf>
- SESRIC, (2016). *Agriculture and Food Security in OIC Member Countries: Opportunities for Cooperation, 2016*. <https://www.sesric.org/files/article/537.pdf>
- SESRIC. (2019). *OIC Water Report 2019*. Statistical, Economic and Social Research and Training Centre for Islamic Countries. Retrieved from <https://sesricdiag.blob.core.windows.net>
- SESRIC. (2022). *Agriculture and Food Security in OIC Member States 2022*. Statistical, Economic and Social Research and Training Centre for Islamic Countries.
- SESRIC. (2023). *Agriculture and Food Security in OIC Member States 2023*. Statistical, Economic and Social Research and Training Centre for Islamic Countries. Retrieved from https://www.sesric.org/dloads/agriculture/2023/reports/AgricultureProductionReport_EN.pdf

- Shiklomanov, I. A. (1993). *World freshwater resources*. In P. H. Gleick (Ed.), *Water in Crisis: A Guide to the World's Fresh Water Resources* (pp. 13–24). Oxford University Press.
- Swinnen j. McDermott J, and Yosef S. (2021). 'Beyond the Pandemic: Transforming Food Systems after COVID-19'. In 'Transforming Food Systems after COVID 19, IFPRI, 2021.
- Swinnen j. and J. McDermott, (2020). "Covid-19 and Global Food Security," *Euro Choices* 19, no. 3 (2020): 26–33.
- Tilman, D., Balzer, C., Hill, J., & Befort, B. L. (2011). Global food demand and the sustainable intensification of agriculture. *Proceedings of the National Academy of Sciences*, 108(50), 20260–20264. <https://doi.org/10.1073/pnas.1116437108>
- UNCTAD. (2023). *Trade and Development Report 2023*. Geneva: United Nations Conference on Trade and Development.
- UNDP & UN-Habitat. (2018). *Urbanization and Development in the Islamic World*. UN-Habitat.
- UNDP. (2023). *Human Development Report 2023*. New York: United Nations Development Programme.
- UNEP (2002) (United Nations Environment Programme), *Global Environment Outlook (GEO-3), State of The Environment And Policy Retrospective: 1972–2002*, 2002. http://www.unep.org/geo/GEO3/english/pdfs/chapter2-5_Freshwater.pdf
- UNEP. (2021). *Global Environment Outlook – GEO-6: Healthy Planet, Healthy People*. United Nations Environment Programme.
- UNICEF. (2019). *The State of the World's Children 2019: Children, Food and Nutrition*. New York: United Nations Children's Fund. <https://www.unicef.org/reports/state-of-worlds-children-2019>
- UNICEF & WHO. (2024). *Progress on household drinking water, sanitation and hygiene 2000–2022: Special focus on gender*. New York: United Nations Children's Fund (UNICEF) and World Health Organization. Retrieved from <https://data.unicef.org>
- WHO (World Health Organization), (2015). *Food Security*.
- Wolde, A., & Ghebreyesus, G. (2018). *Reforestation and Sustainable Land Management in Ethiopia*.
- World Bank. (2020). *Harnessing Urbanization to End Poverty and Boost Prosperity in the Muslim World*.
- World Bank. (2020). *World Development Indicators: Agricultural land and irrigation*. World Bank. <https://data.worldbank.org>
- World Bank. (2021). *Water in agriculture*. Retrieved from <https://www.worldbank.org>
- World Bank. (2022). *World Development Indicators: Agriculture & Rural Development*. World Bank.
- World Health Organization (WHO). (2022). *Drinking-water: Key facts*. World Health Organization. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/drinking-water>
- World Bank. (2023). *Food Security Update: World Bank Response to Rising Food Insecurity*. Washington, D.C.: World Bank.
- World Bank. (2024). *World Development Indicators*. Washington, DC: World Bank.
- WorldBank, *Food Security and COVID 19*, <https://www.worldbank.org/en/topic/agriculture/brief/food-security-and-covid-19>

- Wourterse F., S. Murphy, and J. Porciello, (2020). "Social Protection to Combat Hunger," *Nature Food* 1: 517–518.
- Zainudin, A., et al. (2019). Microfinance and Agricultural Development in Malaysia: A Policy Review.