Agriculture and Food Security

in OIC Member Countries

2023

ORGANISATION OF ISLAMIC COOPERATION

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Agriculture and Food Security in OIC Member Countries 2023

Enhancing Resilience of Agricultural and Food Systems

Organization of Islamic Cooperation

Statistical, Economic and Social Research and Training Centre for Islamic Countries

Kudüs Cad. No: 9, Diplomatik Site, 06450 Oran, Ankara –Türkiye

Telephone +90–312–468 6172

Internet www.sesric.org

E-mail pubs@sesric.org

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For additional information, contact Research Department, SESRIC through: research@sesric.org

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ACRONYMS

Agri-CaB	Agriculture and Food Security Capacity Building Programme of SESRIC
ARC	Egypt's Agricultural Research Center
CDB	Cotton Development Board of Bangladesh
CO2	Carbon Dioxide
COMCEC	OIC Standing Committee for Economic and Commercial Cooperation
COMSTECH	Standing Committee for Scientific and Technological Cooperation
Cotton-CaB	Cotton Capacity Building Programme of SESRIC
COVID-19	Coronavirus Disease of 2019
CRED	Centre for Research on the Epidemiology of Disasters
CRI	Nazilli Cotton Research Institute of Türkiye
EIU	Economist Intelligence Unit
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	FAO Statistics Division
GDP	Gross Domestic Product
GFSI	Global Food Security Index
IAARD	Indonesian Agency for Agricultural Research and Development
ICESCO	Islamic Educational, Scientific and Cultural Organization
ILO	International Labour Organisation
IOD	Indian Ocean Dipole
IOFS	Islamic Organization for Food Security
IPC	Integrated Food Security Phase Classification
IPCC	Intergovernmental Panel on Climate Change
IR	Intensity Ratio
IsDB	Islamic Development Bank
KACST	King Abdulaziz City for Science and Technology
LIFDCs	Low-income Food-deficit Countries
MARDI	Malaysian Agricultural Research and Development Institute
MENA	Middle East and North Africa
NSOs	National Statistical Offices
NSSs	National Statistical Systems
OECD	Organisation for Economic Co-operation and Development
OIC	Organisation of Islamic Cooperation
OICStat	OIC Statistics Database
PA	Precision Agriculture

PoA	OIC Plan of Action
R&D	Research and Development
SDGs	Sustainable Development Goals
SESRIC	Statistical, Economic and Social Research and Training Centre for Islamic Countries
SIDA	Swedish International Development Cooperation Agency
SRI	System of Rice Intensification
SSA	Sub-Saharan Africa
TIKA	Turkish Cooperation and Coordination Agency
TRWR	Total Renewable Water Resources
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNICEF	United Nations International Children's Emergency Fund
USDA	United States Department of Agriculture
VRT	Variable Rate Technology
WASH	Water, Sanitation, and Hygiene
Water-CaB	Water Resources Management Capacity Building Programme of SESRIC
WFP	World Food Programme
WGI	World Bank's Worldwide Governance Indicators
WHO	World Health Organization

FOREWORD

In a world where diverse challenges demand our attention, agriculture emerges as a vital sector holding the key to addressing pressing issues such as food security, poverty, and economic development. Within the OIC member countries, agriculture plays an exceptionally significant role, providing food, income, and employment to millions of people. At the moment, the agriculture sector accounts for 10.4% of GDP in OIC countries, which is much larger than the world average of 4.3%. Additionally, 216 million people in OIC countries are working in agriculture sector, equivalent to 32% of their total employment. Despite its crucial role, the challenges and opportunities associated with agriculture in our member countries are diverse and complex, demanding a comprehensive understanding of the issues at hand and the formulation of effective policies and strategies.

With great pleasure, I present the report on "*Agriculture and Food Security in OIC Member Countries: Enhancing Resilience of Agricultural and Food Systems.*" This report sheds light on the challenges faced by OIC countries in achieving sustainable agricultural development and ensuring food security for their populations. It provides a detailed overview of the current state of agriculture, identifies key drivers of food security trends, and offers valuable policy recommendations to enhance resilience in agricultural and food systems.

The report highlights the evolving dynamics of employment preferences and labour force participation, underscoring the significant shift away from the agriculture sector in OIC countries. While the proportion of employment in agriculture has decreased in the past decade, it is noteworthy that about 1.4 billion hectares of land in OIC countries, amounting to one-third of the world's total agriculture land, is still dedicated to agriculture sector. This presents opportunities to enhance productivity through the use of modern machinery, fertilizers, and efficient irrigation techniques. The report encourages member countries to seize these opportunities and unlock the full potential of the agriculture sector.

Furthermore, the report examines the global and regional trade dynamics of OIC countries in food and agricultural products. While some OIC countries have trade surpluses, most face deficits in this area. To make the most of international trade, it is crucial to improve intra-OIC trade by further enhancing cooperation among member countries. Cooperation holds the key to unlocking our collective potential and

securing a prosperous future for our people and the development of competitive food and agricultural industries.

On the other hand, food security remains a persistent challenge for many OIC countries, exacerbated by the far-reaching effects of the COVID-19 pandemic, fluctuating food prices, and geopolitical instability. The report found that 203 million people in OIC countries, accounting for 11.2% of their total population, were undernourished in 2020. This highlights the urgent issues of hunger, malnutrition, and access to clean water, sanitation, and hygiene services. It underscores the imperative for concerted efforts to overcome these complex challenges and achieve sustainable food security. This is a call to action, urging OIC countries to prioritize the well-being of their populations and embrace sustainable agricultural practices that nourish both people and the planet.

As we navigate the intricate and interconnected challenges of advancing agricultural development and safeguarding food security, it becomes imperative to cultivate an enabling environment that nurtures competitive agriculture, fosters a vibrant food industry, and stimulates overall economic growth in OIC member countries. The report brings into sharp focus the critical importance of good governance, enhanced access to finance, increased investment in research and data, and the pursuit of capacity development. Sustainable rural development is also crucial for strengthening our agricultural and food systems. This involves empowering farmers through education and training, improving rural infrastructure, and protecting our natural resources.

Last but not least, it is my firm belief that this report will serve as an invaluable resource for policymakers, researchers, and stakeholders, guiding their efforts to strengthen the resilience of agricultural and food systems in OIC countries. Let us seize this opportunity and work together, united in purpose, to realize our vision of a prosperous, sustainable, and food-secure future for all.

Zehra Zümrüt SELÇUK
Director General
SESRIC

EXECUTIVE SUMMARY

PART I: State of Agriculture Development

Overview of Resources and Inputs

There have been shifts in employment preferences and labour force participation due to factors such as urbanization. The proportion of employment in the agriculture sector has decreased from 37.8% in 2011 to 31.9% in 2021 among OIC countries, while globally it dropped from 31.8% to 26.6% during the same period. Despite this, a significant portion of land in OIC countries is still dedicated to agriculture, with some countries exceeding 70% agricultural land in 2020.

Productivity in agriculture is partly linked to the use of machinery and fertilizers. While the use of fertilizers per hectare of arable land has increased in OIC countries, it remains significantly lower compared to non-OIC developing countries and global averages. Similarly, machinery use per unit of cropland in OIC countries is considerably lower than other country groups.

Water resource management is crucial for agricultural development, especially in water-stressed regions where many OIC countries are located. Some OIC countries face high or extremely high levels of water stress. Surface irrigation is the most commonly used technique in OIC countries, resulting in substantial water wastage, while more efficient techniques like sprinkler and localized irrigation are employed to a lesser extent.

Despite all of the challenges, there is room for improvement in enhancing employment opportunities, increasing productivity through machinery and fertilizer use, and implementing efficient irrigation techniques in OIC countries to promote sustainable agriculture and address water stress challenges.

Current Status of Agriculture Production

The contribution of agriculture to the GDP in OIC member countries and other regions has experienced a decline due to various factors. One significant factor is the process of structural transformation, where economies transition from being predominantly agrarian to becoming more focused on industry and services. However, it is important to highlight that despite this overall decline, certain OIC countries have made noteworthy advancements in their agricultural sectors over the past two decades. Specifically, Chad,

Jordan, Tajikistan, Iraq, Qatar, Iran, Mali, Nigeria, Niger, and Kazakhstan have exhibited the highest annual growth rates in agricultural value-added between 2000 and 2021.

OIC countries have demonstrated improvement in their agricultural production performance compared to other regions. Since 2016, the agricultural production in OIC countries has witnessed an increase of 13.2%, surpassing that of non-OIC developing countries (10.8%), developed countries (0.1%), and the global average (9.9%). Overall, the production of primary crops, livestock products, and fisheries in OIC countries has displayed positive growth over the past decade, with certain commodities and sectors experiencing more significant increases than others.

Analysing the global production of primary crops, such as cereals, fruits, vegetables, and roots and tubers, there has been an absolute increase over the past decade. However, the share of cereals in global production has decreased in OIC countries from 14.6% in 2011 to 13.2% in 2021, despite remaining the largest group of crops produced. On the other hand, fruits, vegetables, and roots and tubers, while constituting a smaller portion of production in OIC countries, have exhibited notable growth, increasing their share in global production between 2011 and 2021. Additionally, OIC countries hold a significant share in the global production of specific commodities such as dates (97%), oil palm fruit (88%), cocoa beans (64%), cassava (37%), and millet (35%).

In the livestock and fisheries sector, OIC countries have witnessed substantial growth in meat, milk, and egg production between 2011 and 2021. Meat production has surged by 40.5%, rising from 28.1 million tonnes to 39.4 million tonnes. Likewise, milk production has increased by 30.8%, rising from 122.7 million tonnes to 160.5 million tonnes, while egg production has experienced significant and the highest growth among these products, nearly doubling from 7.6 million tonnes to 14.4 million tonnes. Similarly, fisheries production has also progressed positively. Fisheries production in OIC has significantly grown from 15.5 million tonnes in 2010 to 19.9 million tonnes in 2020, representing 21.7% of the global fisheries production in 2020.

Global and Regional Trade

OIC countries have experienced growth in their international trade capacities in food and agricultural products. However, continue to be a net-importer region with imports exceeding exports. The value of exports increased from $141.7 billion in 2011 to $188.1 billion in 2021, and imports grew from $218.6 billion in 2011 to $292.9 billion in 2021. Intra-OIC trade in agriculture has also shown positive growth, with the value of intra-OIC agricultural trade increasing by about 85% from 2011 to 2021. However, this trade is concentrated in a few OIC countries, limiting the broader benefits of intra-OIC trade.

There are disparities among OIC countries in terms of international trade in food and agricultural products, with some countries having trade surpluses while the majority record deficits. These disparities present an opportunity to enhance intra-OIC trade and promote cooperation among member countries.

In terms of commodity composition, OIC countries have trade deficits in 'cereals and preparations', 'other food', 'dairy products and eggs', and 'sugar and honey'. However, OIC countries have trade surpluses in 'fruits and vegetables', as well as 'fats and oils (excluding butter)'. These commodity groups play a significant role in OIC food and agricultural exports.

PART II: Trends and Patterns of Food Security

State of Food Security

The eradication of hunger and food insecurity challenges persist due to the COVID-19 pandemic, rising food prices associated with the Russia-Ukraine war, conflicts and insecurities, and other factors, leading to ongoing food insecurity and socio-economic difficulties. Among OIC countries, the United Arab Emirates ranks highest in the Global Food Security Index, followed by Qatar, Kazakhstan, Oman, and Bahrain. While progress has been made in some areas, negative developments in food security conditions have been observed in certain OIC countries.

In terms of undernourishment, OIC countries accounted for a significant portion of the global undernourished population. In 2020, around 203 million people in OIC countries were undernourished, accounting for 28% of the global undernourished population and 11.2% of the total OIC population. Although the prevalence of undernourishment in OIC countries remains higher than the global average, there has been a downward trend over the past decade. Several OIC member countries are classified as low-income food-deficit countries and are in crisis, requiring external food assistance. These countries face a double burden of food insecurity and require concerted efforts to address their complex challenges and achieve food security.

Nutrition Trends

The average dietary energy supply adequacy, which considers both food availability and quality, has shown an overall increase globally, including in OIC countries. Between 2010 and 2020, the average dietary energy supply adequacy significantly increased in the OIC countries group, from 116% to 123%, more than the increase at the global level from 119% to 123%. However, some OIC countries still face challenges in achieving adequate energy supply, particularly Mozambique, Iraq, Yemen, and Somalia.

The cost of a healthy diet increased globally, with the highest increase observed in the OIC countries group by 7.7%, from 3.10 US$/person/day in 2017 to 3.34 US$/person/day in 2020. Affordability of nutritious diets remains a concern, as populations in several OIC countries, including Nigeria, Sudan, Mozambique, and Pakistan, are unable to afford a healthy diet.

Consequently, malnutrition becomes a significant issue in many OIC countries, with stunting, wasting, and overweight affecting children under five. Prevalence rates of these conditions are high in countries like Libya, Niger, Sudan, Yemen, and Pakistan.

Access to water, sanitation, and hygiene (WASH) services is crucial for improving nutritional well-being, but disparities exist among OIC countries, with lower-income countries facing greater challenges. Access to basic sanitation and drinking water services is inadequate in several OIC countries, such as Cameroon, Nigeria, Comoros, and Burkina Faso. Urgent action is needed to ensure access to clean water and sanitation facilities for all individuals in OIC countries to mitigate risks to food safety and public health.

Drivers of Food Security Trends

The rapid population expansion requires increased food production, which is challenging considering many OIC countries heavily rely on food imports, and a significant portion of the population cannot afford a healthy diet. Climate change exacerbates the difficulties in finding natural resources for agriculture. Meeting these challenges requires changes in food production and consumption while ensuring sustainability.

The COVID-19 pandemic and geopolitical instability contribute to an economic downturn and inflationary pressure on food prices. The conflict in Ukraine disrupts supply chains and global food markets, leading to higher prices of staple commodities. Sanctions and disruptions in the oil supply also contribute to rising food costs. Economic decline and increased food prices pose a threat to food security, especially in OIC countries heavily reliant on food imports.

Climate change affects food availability by negatively impacting agricultural production, such as reduced crop yields and failures. It also affects access to food, particularly for vulnerable populations and those working in the agriculture sector. Extreme weather events and natural disasters disrupt agricultural trade and transportation infrastructure, further endangering food security. Climate change also disrupts food stability and utilization, leading to supply disruptions and changes in dietary habits that may affect nutritional status.

There is a need for comprehensive approaches in OIC countries to address food security, considering population growth, changes in food prices and availability, and

the impact of climate change. In this context, it is important to pursue a sustainable agricultural systems, adaptation measures to climate change, and equitable access to food in order to achieve long-term food security.

PART III: Improving Resilience of Agricultural and Food Systems

Enabling Environment for Agricultural Development

Creating an enabling environment is crucial for fostering competitive agrifood industry and overall economic development in OIC member countries. To achieve this, importance should be given to enhancing governance, improving access to finance, investing in research & data collection, and capacity development.

Good governance is a key for enhancing the efficiency, productivity, and sustainability of the agriculture sector. It is identified as a fundamental factor contributing to the underperformance of many developing countries. Strengthening the governance infrastructure, including the rule of law, control of corruption, government effectiveness, regulatory quality, voice and accountability, and political stability, is necessary for positive reforms in agriculture.

Access to finance plays a vital role in facilitating agricultural production. However, many small farmers and SMEs in the agrifood industry face challenges in accessing financial services, particularly in rural areas. Weak land tenure and property rights further hinder investment in beneficial technologies, reducing agricultural productivity and long-term development. Measures such as capacity building, financial backing, and guarantees can help improve access to finance for farmers.

Research and development (R&D) are essential for driving growth in agricultural productivity. Governments, private industries, and international organizations are investing in R&D to develop new technologies and innovations. However, agricultural research spending falls short of the recommended target globally. OIC countries have made progress, but their average intensity ratio (agricultural research spending as a percentage of agricultural GDP) remains below the global average. Collaboration between countries with similar characteristics can foster the development of agricultural research systems.

Sustainable Rural Development

Enhancing resilience in agricultural and food systems involves a strong emphasis on sustainable rural development which consists of physical and human development, as well as the sustainable management of natural resources. A particular focus should be placed on addressing the challenges faced by smallholder farmers, who constitute

the majority in OIC countries (76% of total farms). These farmers often rely on traditional, labour-intensive methods, resulting in low productivity. However, it is crucial to recognize the potential for small farms to become efficient producers and contribute to economic growth. Achieving success in this regard requires enhancing agricultural productivity, promoting the development of rural nonfarm sectors, and diversifying crops.

Education emerges as a key factor in improving agricultural labour efficiency. Implementing training programs that cover modern agricultural technologies, sustainable land management practices, and financial management can bring substantial benefits to rural populations. Furthermore, infrastructure development, including the establishment of reliable road networks, provision of electricity, and improvement of communication networks, plays a pivotal role in enhancing access to markets and resources for farmers and the agrifood industry.

Improving the quality of natural resources, such as water, land, and soil, is also of paramount importance for agricultural production. Adopting modern techniques like crop rotation and precision agriculture can significantly enhance land productivity, while conservation practices serve to safeguard its sustainability. Ensuring adequate water availability is indispensable for promoting crop growth, and striking a balance is crucial. Soil quality, with its capacity to provide nutrients and physical support, plays a vital role in agricultural systems. Consequently, preventing soil degradation resulting from erosion, overuse, or poor management is imperative to maintain fertility and sustain productivity levels.

Conclusions and Policy Recommendations

The agriculture sector in OIC countries is crucial for employment, livelihoods, and food security. However, it faces challenges such as productivity issues, economic crises, and the impacts of climate change. To strengthen the resilience of the agricultural and food systems, OIC countries should focus on improving the enabling environment, adopting sustainable rural development practices, and implementing the following policy recommendations:

- Support vulnerable and smallholder farmers through training and education programs, timely humanitarian aid, and social protection measures.
- Secure land tenure and property rights to address inequalities, promote agricultural growth, and empower rural households.
- Develop new business models like contract farming to promote sustainable practices, create market opportunities, and improve access to finance and resources.

- Implement effective price policies and trade regulations to balance the interests of farmers, consumers, and the economy, and enhance agrifood trade.
- Improve market and finance access through infrastructure development, strengthening institutions, and promoting inclusive financial services.
- Support the adoption of modern technology and practices, including digitization, to enhance agricultural productivity and sustainability.
- Increase farmers' capacity to implement climate-smart agriculture practices and mitigate and adapt to climate change.
- Enhance public-private partnerships for rural infrastructure development, including roads, water resources, electricity, and WASH services.
- Improve cooperation between OIC member countries through knowledge sharing, education, and training programs, trade agreements, and harmonization of policies and regulations.

Implementing these recommendations and strengthening cooperation can enable OIC countries to increase agricultural and food production, ensuring food security for their populations and promoting overall growth and prosperity.

INTRODUCTION

Agriculture sector continuous to be a vital sector for economies of OIC member countries, serving as a crucial source of food, income, and employment for millions of people. However, OIC member countries face challenges in ensuring agricultural development and food security for their populations. Among these challenges, the escalation of conflict and insecurity within their territories stands as a critical concern. According to Davies et al. (2023), in 2020, 33 of 56 (59%) conflicts recorded worldwide occurred in the OIC countries, of which the overall majority was internal conflicts. Conflict disrupts agricultural production, displaces rural populations, and hampers access to vital resources, resulting in instability that severely impacts overall food production and availability. Consequently, food shortages worsen, leading to increased vulnerability among communities.

Furthermore, volatility in food prices poses another crucial challenge for OIC countries. Fluctuations in global food prices, influenced by factors such as geopolitical instability, weather conditions, trade policies, energy prices, and market speculation, have significant consequences for affordability and accessibility. Vulnerable populations, particularly those with limited purchasing power, bear the brunt of price shocks, which can escalate food insecurity and malnutrition.

Compounding these challenges is the threat of climate change, which poses a significant risk to agricultural systems and food security in OIC countries. Rising temperatures, changing precipitation patterns, and extreme weather events have adverse effects on crop yields, livestock productivity, and fisheries. Smallholder farmers, who form the largest portion of the agricultural workforce, are particularly vulnerable to these climate-related impacts.

In light of these circumstances, this report on *Agriculture and Food Security in OIC Member Countries 2023: Enhancing Resilience of Agricultural and Food Systems* aims to provide a comprehensive analysis of the current state of agriculture and food security in OIC countries, with a specific focus on enhancing the resilience of agricultural and food systems. The report explores the challenges faced by OIC countries in achieving food security and proposes potential solutions and best practices to overcome these obstacles. Additionally, the report aligns the efforts of OIC countries with the OIC Plan of Action (PoA) 2025 and the broader global agenda of Sustainable Development Goals (SDGs).

This report critically examines the current challenges faced by OIC member countries in agricultural development and food security, particularly in the post-COVID-19 era. It emphasizes the need to strengthen efforts to achieve resilient agricultural and food systems in order to minimize future risks to agriculture and food security. The analysis presented in the report draws from a wide range of sources, including statistical data, case studies, and expert insights. It analyses the data of OIC countries as a group, with disaggregation for income levels and individual member countries[1], often in comparison with developed and non-OIC developing countries, as well as global averages.

The report is divided into four parts. Part 1, "State of Agricultural Development," examines the current state of the agriculture sector, including an analysis of agricultural resources, agri-food production, and trade status.

The second part, "Trends and Patterns of Food Security," explores the status and development of critical food security issues in OIC member countries. It also analyses OIC countries' progress towards achieving SDG 2 Zero Hunger targets. Additionally, this section provides an overview of the drivers of food security in OIC countries, encompassing population growth, changes in food prices, and climate change.

Part 3, "Improving Resilience of Agricultural and Food Systems," delves into the important areas that need to be addressed to enhance the resilience of agricultural and food systems. Achieving resilience in these areas requires a dual focus on supporting an enabling environment and promoting sustainable rural development.

Finally, the last part of the report summarizes the findings and offers concise policy recommendations to improve the resilience of agricultural and food systems.

[1] See Annex I for country classifications.

1 STATE OF AGRICULTURE DEVELOPMENT

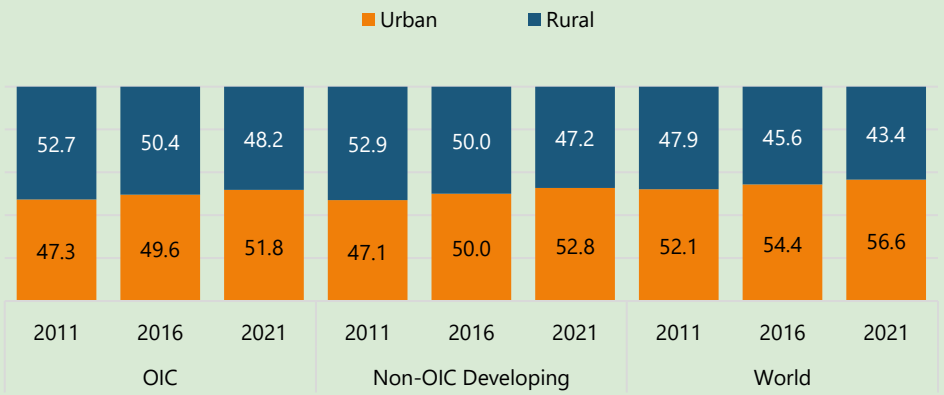
1. Overview of Resources and Inputs

The Organisation of Islamic Cooperation (OIC) is made up of 57 member countries, each with unique agricultural resources and potential. For many OIC countries, agriculture is regarded as a vital sector for their economies, providing food, income, and employment to millions of people. This chapter provides a comparative overview of selected indicators on the availability and use of agricultural resources such as land, labour, water, and other inputs.

1.1. Agricultural Land, Labour, and Other Inputs

With a total population of approximately 2 billion people in 2021, the OIC member countries accounted for a quarter of the world's population. The global rural population has increased from around 3.37 billion people in 2011 to 3.42 billion people in 2021. Similarly, the total rural population in OIC countries has increased from 844 million to 933 million people, over the same period. Whereas, the proportion of rural population in total population has been declining both in the OIC countries and globally.

FIGURE 1.1 Urban and Rural Population (% of total), 2011-2021



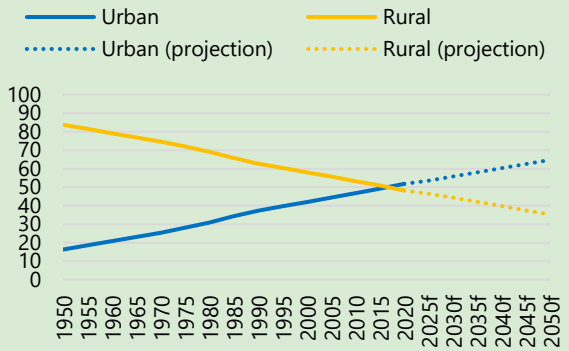
Source: SESRIC Staff calculations based on the data accessed from the United Nations, World Urbanization Prospects 2018.

However, rural population loss has been less acute in the OIC countries compared to non-OIC developing countries and the global average. As of 2021, the rural population in OIC countries accounted for 48.2% of the total population, compared to 47.2% in the non-OIC developing countries and global average of 43.4% (**FIGURE 1.1**).

The proportion of the urban population in total is further expected to rise in the OIC countries and globally. By 2050, urban population in OIC countries is expected to be 65% of the total population (**FIGURE 1.2**). This trend primarily arises from the rural-urban migration, as individuals relocate to urban areas in pursuit of more employment prospects, educational opportunities, and access to quality healthcare services.

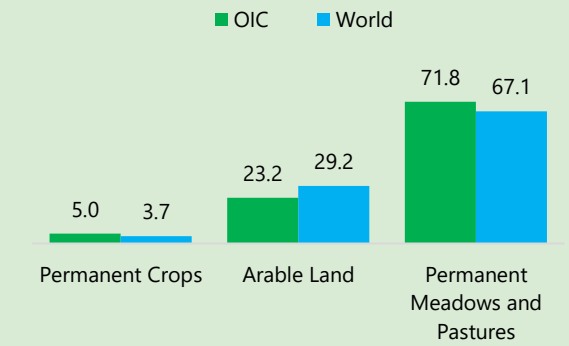
At the same time, with the growing population, cities are expanding towards rural areas. Suburbs have been transformed into cities with the construction of new buildings, factories, the establishment of new industrial activities and relevant infrastructure. It is however important to bear in mind that, the right management and investment towards the automation of agricultural activities can offset the losses in the number of employment and land areas associated with urbanisation (Marinoudi et al., 2019).

FIGURE 1.2 Urban and Rural Population (% of total) in OIC countries, 1950-2050



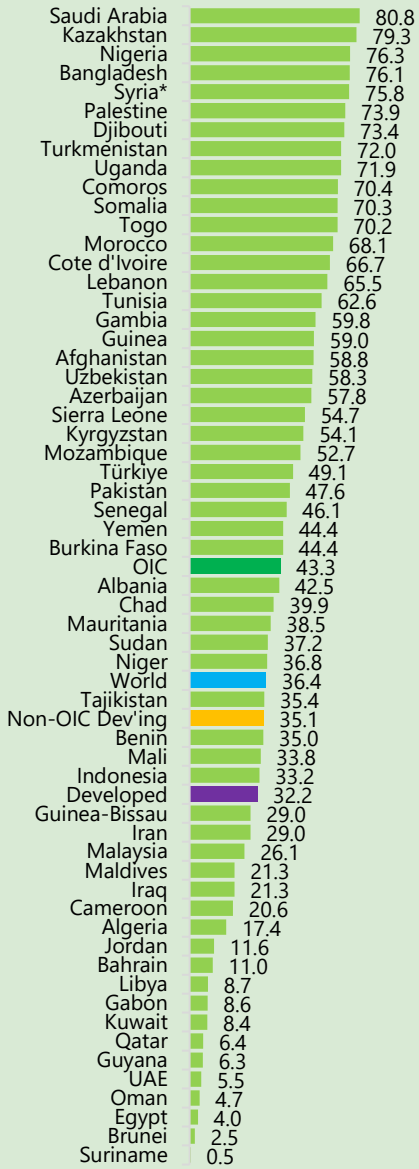
Source: SESRIC Staff calculations based on the data accessed from the United Nations, World Urbanization Prospects 2018.

FIGURE 1.3 Agricultural Land Use (% of Agricultural Land Area) by Type, OIC vs World, 2020



Source: SESRIC staff calculations based on the data accessed from the Food and Agriculture Organisation (FAO), FAOSTAT Online Database.

FIGURE 1.4 Agricultural Land Area (% of Total Land Area) in OIC Countries, 2020



Source: SESRIC staff calculations based on the data accessed from the Food and Agriculture Organisation, FAOSTAT Database.

Agricultural Land Use

Effective and productive use of agricultural land is an essential element in agricultural development. Significant part of countries' land areas are used for agricultural activities. As of 2020, around 36.4 % of the world's land area is used for agriculture. Considering that, the large portion of the total land area is inhabitable; arid and mountain areas, agriculture sector accounts for the biggest chunk of the habitable land area. In this regard, OIC countries have a total agricultural land area of 1.4 billion hectares, corresponding to 28.8% of the world's total agricultural land area.

As shown in **FIGURE 1.3**, in 2020 the majority of agricultural land in OIC countries is dedicated to permanent meadows and pastures (commonly known as pastureland), comprising a substantial 71.8% (982 million hectares) of total agricultural land. Globally, pastureland comprises 67.1% of the total agricultural area. Considering the cultivated area, which is the sum of the arable land and land under permanent crops, it is observed that the percentage of cultivated land area in the total agricultural area in OIC countries was 28.2%, below the global average of 32.9%. The arable land area of the OIC countries amounted to 317 million hectares, corresponding to 23.2% of their total agricultural land area. Furthermore, land under permanent crops of the OIC countries was 67.8 million hectares and accounted for 5% of their total agricultural land area. In comparison, globally 3.7% of the agricultural area is used for permanent crops.

Across the 34 OIC countries, proportion of the total land area attributed to agricultural activities is above the global average. Particularly in 12 OIC countries, it was above 70%. On the other hand, in 10 OIC countries, namely Suriname, Brunei Darussalam, Egypt, Oman, United Arab Emirates, Guyana, Qatar, Kuwait, Gabon, and Libya, agricultural activities use under 10% of the country's total land area (**FIGURE 1.4**).

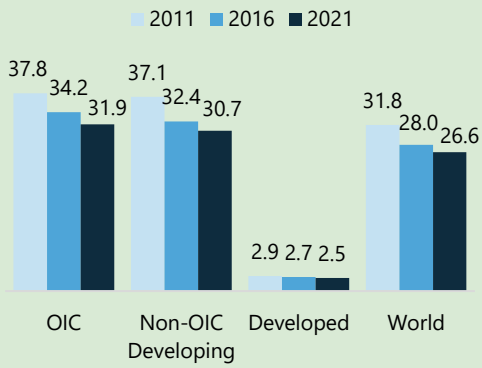
The quality of land is just as crucial as its availability when it comes to agricultural productivity. It is crucial for agriculture as it provides necessary nutrients and support to crops. Various land characteristics, such as texture, structure, organic matter content, and nutrient availability, determine agricultural productivity. Land degradation caused by erosion, overuse, or poor management poses a significant threat to agricultural productivity, affecting about one-fifth of the Earth's vegetated land surface from 2000 to 2015. OIC countries, in particular, have around 500 million hectares of degraded land, with four countries facing alarming levels of land degradation, namely Tajikistan (97%), Bangladesh (65%), Kuwait (64%), and Benin (53%), with the risk of desertification (SESRIC, 2021b).

Land degradation is not solely a result of natural causes; human activity also plays a significant role. Unsustainable agricultural practices, rapid urbanization, weak land governance, and expansion of agricultural areas contribute to uncontrolled land-use changes and land degradation. Therefore, ensuring the effective and sustainable use of agricultural land, such as conservation tillage, cover cropping, and the use of organic matter inputs are essential, is of paramount importance for promoting agricultural development, enhancing productivity, and ultimately securing global food supplies. In contrast, unsustainable land-use may have negative impact on climate and environment as it leads to contraction of areas of wilderness that may threatens biodiversity.

Agricultural Labour

Labour is another important resources in agriculture sector. Employment preferences and participation in the labour force are changing, in part, due to rapid urbanisation and the mechanization of agricultural production activities. Share of the agriculture sector in the total employment is declining globally and across all country groups; OIC, non-OIC developing and developed countries (**FIGURE 1.5**). In 2011 employment in the agriculture sector in the OIC countries as a group comprised 37.8% of the total employment, equivalent to 212.3 million people. In comparison, as of 2021, the agriculture sector was responsible for 31.9% of the total employment around 215.5 million people. In other words, the percentage of total workers that have been involved in agricultural activities were contracted by 6 percentage points, over

FIGURE 1.5 Employment in Agriculture (% of Total), 2021



Source: SESRIC staff calculations based on the data accessed from the International Labour Organisation (ILO), ILOSTAT Database: ILO modelled estimates, Nov. 2022.

the last decade. Similarly, the proportion of the agriculture sector in the total employment has dropped from 37.1% to 30.7% in non-OIC developing countries, over the same period. Also globally, it fell from 31.8% to 26.6%. While, developed countries average declined from 2.9% to 2.5%, between 2011 and 2021.

As the OIC countries are dispersed across different geographical regions and are different in terms of economic and social development, huge discrepancies can be observed among the OIC countries concerning employment in agriculture. Although employment in agriculture has decreased in the majority of OIC countries during the last decade, many OIC economies are still significantly agriculture oriented.

FIGURE 1.6 shows that the proportion of working people employed in the agriculture sector exceeds the global average of 26.6% in 28 OIC member countries. The proportion of labour force employed in agriculture exceeds 50% in 8 low-income countries, as of 2021. Particularly, in Burkina Faso, Niger, and Mozambique, the percentage of working people employed in the agriculture sector even exceeds 70%. In contrast, in 10 OIC countries; mostly high-income countries, the percentage of people employed in the agriculture sector accounted for less than 5% of the total employment in these countries.

As is evident from the above-discussed figures, there is a significant difference in the shares of the population working in the agriculture sector between developed countries and developing countries. While more than 30% of the workforce engaged in agriculture in both OIC and non-OIC developing countries, It is less than 3% in the developed countries as a group.

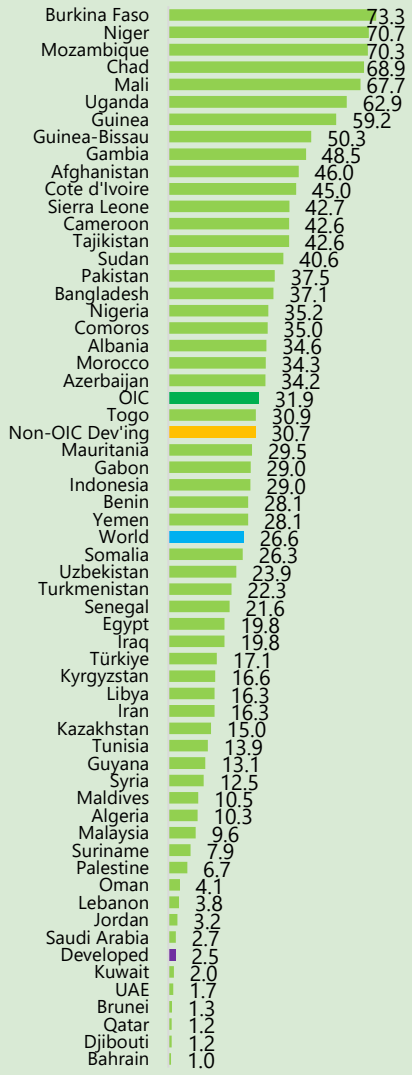
In the academic literature, it is often referred to as a transformation of economies from agriculture-oriented activities towards more industrial activities and services sectors.

To put it simply, technological progress and the automation of farming and other agricultural activities are leading to a significant rise in productivity which makes hiring a physical labour force economically less profitable (Marinoudi et al., 2019).

This has been the case for advanced economies where agriculture sector employment is on average 2-3% of the total labour force. It clearly illustrates that with economic development and a rise in per capita income, employment in agriculture as a percentage of total employment in a country tends to fall because farming and other agricultural activities become more productive – in other words, less labour-intensive, and labour tend to move to industry and services sectors (Marinoudi et al., 2019).

Furthermore, due to climate conditions, availability of arable land and limited freshwater resources, it is less efficient to intensify agricultural production than importing these products and allocating economic resources to other sectors in some high and upper-middle-income member countries. In this regard, In Bahrain, Djibouti, Qatar, Brunei Darussalam, United Arab Emirates and Kuwait percentage of employment in agriculture ranges from 1% to 2%, below the developed countries' average of 2.5%.

FIGURE 1.6 Employment in Agriculture (% of Total) in OIC Countries, 2021



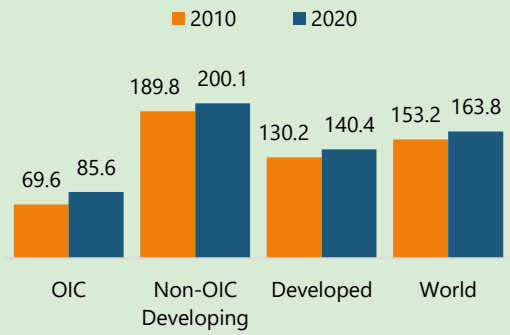
Source: SESRIC staff calculations based on the data accessed from the International Labour Organisation (ILO), ILOSTAT Database: ILO modelled estimates, Nov. 2022.

Fertilizer Use and Mechanization

An increase in the productivity in agriculture is associated with the use of machinery and fertilizers, which leads to food becoming more abundant and affordable despite the population growth. The average use of fertilizer per hectare of arable land in OIC countries climbed from 69.6 kilograms in 2010 to 85.6 kilograms

in 2020. This is a sensible rise of 16 kilograms per hectare of arable land area, which is above the rise observed in other country groups. However, as shown in **FIGURE 1.7** this level of fertilizer use is still significantly low, when compared to the non-OIC developing countries (200.1 kilograms), world (163.8 kilograms) and developed countries (140.4 kilograms) average values in 2020.

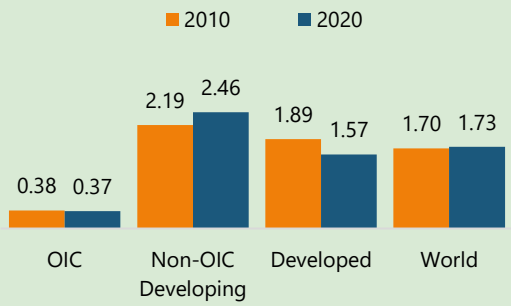
FIGURE 1.7 Fertilizer Use (Kilograms per Hectare), 2010 vs 2020



Source: SESRIC staff calculations based on the data accessed from the Food and Agriculture Organisation (FAO), FAOSTAT Online Database.

In addition, machinery use per unit of cropland in the OIC countries is considerable below the other country groups. Since 2010 OIC countries have made no visible progress in terms of the quantity of agricultural machinery stock per hectare of cropland, it actually slightly declined from 0.38 to 0.37 metric horsepower per hectare of cropland, between 2010 and 2020. However, in terms of total quantity of agricultural machinery stock, it significantly increased significantly from 131.7 million metric horsepower to 153.3 million metric horsepower, over the period in consideration. As of 2020, machinery stock per hectare of cropland of the OIC countries as a group (0.37) was almost 7 times less than non-OIC developing countries (2.46), nearly five times less than the global average (1.73), and it is a quarter of the developed countries (1.57) (**FIGURE 1.8**).

FIGURE 1.8 Machinery Stock per unit of Cropland (metric horsepower per hectare), 2010 vs 2020

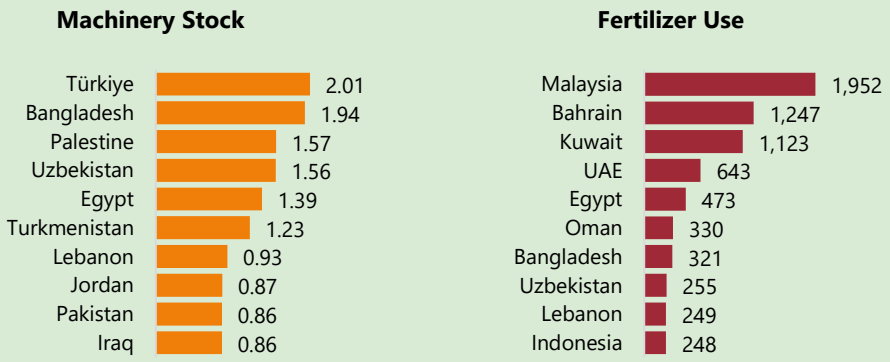


Source: SESRIC staff calculations based on the data accessed from the Economic Research Service of the U.S. Department of Agriculture (USDA). Last updated: Friday, October 07, 2022.

At the individual country level, OIC countries that are most intensively utilising fertilizers in agriculture such as Malaysia, Bahrain and Kuwait recorded 8-10 times more intensive usage of fertilisers per

arable land than the global average, in 2020. Similarly, highest performing OIC countries; Türkiye, Bangladesh, Palestine, Uzbekistan, and Egypt have significant stocks of machinery per available cropland of these countries (**FIGURE 1.9**).

FIGURE 1.9 Top 10 OIC Countries in terms of Machinery Stock per unit of Cropland (horsepower per hectare) and Fertilizer Use (kilograms per hectare), 2020



Source: SESRIC staff calculations based on the data accessed from the Food and Agriculture Organisation, FAOSTAT Database and Economic Research Service of the U.S. Department of Agriculture.

Other important inputs to consider for improving agricultural productivity is quality of seeds. The utilization of quality seeds serves as the foundation of crop production, offering numerous benefits to farmers and the food supply. Farmers can expect improved yields due to the genetic traits and adaptability of the seeds. These seeds are often bred to be resistant to pests and diseases, minimizing crop losses and providing a more stable harvest.

In the face of climate change, the adaptability of quality seeds becomes crucial. They are designed to thrive in varying environmental conditions, ensuring crop performance even in adverse weather scenarios. Furthermore, the uniformity of quality seeds simplifies agricultural practices, making processes like harvesting and irrigation more efficient.

Using quality seeds can also lead to reduced input costs, as higher yields translate to lower per-unit production expenses. Beyond economic benefits, adopting quality seeds promotes sustainable agriculture. With their disease resistance and higher yields, there is less reliance on chemical pesticides and fertilizers, resulting in a reduced environmental impact.

1.2. Water Resources and Irrigation

Considering that the bulk of the world's water resources is used in agriculture and that the global demand for food is increasing rapidly, the role of water resource management, through efficient irrigation systems and techniques, has recently assumed greater importance in agricultural development and food security. Water is a scarce resource in arid and semi-arid regions where many OIC countries are located, particularly in Middle East and North Africa (MENA), Sub-Saharan Africa (SSA), and Western and Central Asia regions. Most of the OIC countries in these regions are facing severe water pressures due to increasing water demand and limited availability of water resources (SESRIC, 2021c). These pressures are expected to increase in the face of increasing populations and the increased level of water use per capita. Therefore, the efficient use of water resources in agriculture, through improving irrigation systems and techniques, is one of the most urgent needs and prerequisites for sustainable agricultural development and food security in OIC countries, particularly those in water-scarce regions.

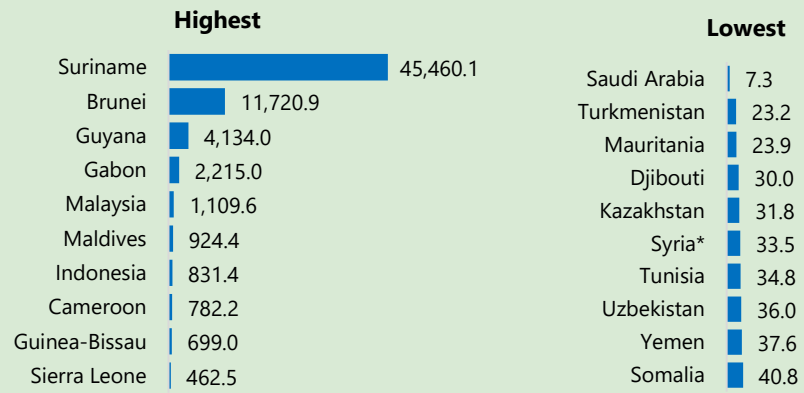
Water Resources

According to the latest estimates, OIC member countries have reported approximately 17,725 km^3 of precipitation in 2020, corresponding to 16.3% of the world's annual precipitation volume of 108,902 km^3. Considering the agricultural land area and the average precipitation at the individual country level, the distribution of average precipitation among OIC countries becomes uneven.

At the individual country level, Suriname, Brunei Darussalam and Guyana are ranked at the top with the highest precipitation level per agricultural land (**FIGURE 1.10, left**). In contrast, many OIC member countries located in the arid regions of Western and Central Asia and SSA have received the lowest volume of precipitation weighted by their agricultural land (**FIGURE 1.10, right**).

The quantity of precipitation received in member countries directly affects the overall availability of renewable water in the region. In 2020, OIC member countries possessed 7,261 km^3 renewable water resources (TRWR), accounted for 13.3% share of the global TRWR of 54,737 km^3. The share of OIC countries remained comparatively lower than the non-OIC developing countries which accounted for more than two-thirds (69.2%) and developed countries with 17.5% of the global TRWR.

FIGURE 1.10 Top 10 OIC Countries with Highest and Lowest Average Annual Precipitation (litre/hectares of agriculture land), 2020



Source: SESRIC staff calculations based on the data accessed from the Food and Agriculture Organisation (FAO), AQUASTAT Online Database. *Membership to OIC is suspended.

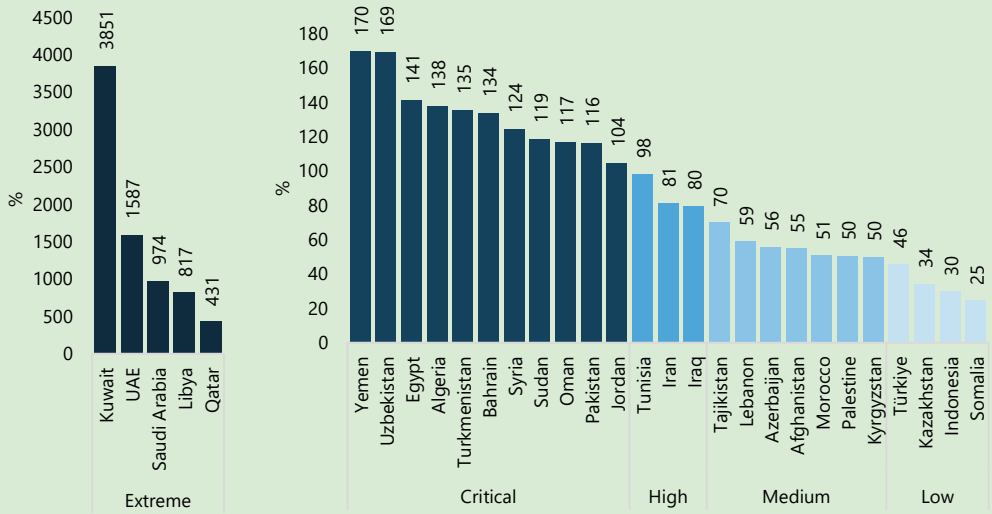
Water Stress and Dependency

The level of water stress measures the amount of water withdrawal by all sectors as a proportion of total freshwater resources while adjusting it for environmental flow requirements, which is a minimum level of the natural flow of water required to sustain a freshwater ecosystem. This indicator is used in tracking the progress towards SDG Target 6.4[2]. A high level of water stress not only hinders the sustainability of the natural environment but also has negative impacts on the economy and society in general and on food security in particular.

However, water stress does not always indicate that a country has a scarcity of water resources, but it indicates whether a country is close to exceeding the available water basin's renewable resources. If the value of water stress is above 100% then a country is either withdrawing freshwater beyond the rate at which aquifers can be refilled naturally, or has desalinisation water facilities to convert seawater into freshwater.

[2] SDG Target 6.4: By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity. FAO and UN Water (2021) defined water stress into five categories: <25% = No stress; 25-50% = Low stress; 50-75% = Medium stress; 75-100% = High stress; >100% = Critical stress. Due to some OIC member countries poses considerably extreme water stress level, we defined new category of 'Extreme stress' at higher than 200% level.

FIGURE 1.11 Water Stress Level in OIC Countries (%), 2020

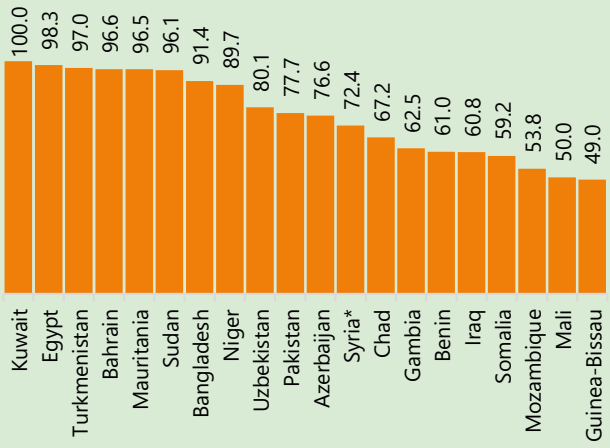


Source: SESRIC staff calculations based on the data accessed from the Food and Agriculture Organisation (FAO), AQUASTAT Online Database. *Membership to OIC is suspended.

Water stress levels are low in four OIC countries, medium in seven OIC countries and high in 3 OIC countries. Furthermore, there are 11 OIC countries experiencing critical levels of stress on freshwater resources while five OIC countries have extreme level of water stress (**FIGURE 1.11**). However, many of these countries with critical and extreme water stress levels have operational water desalination plants to compensate the stress on available freshwater basins. Most of these member countries with water stress are the ones located in arid and semi-arid regions with limited and scarce water resources.

OIC countries face not only significant water stress but also a notable reliance on external sources for their water needs. The term water resources dependency ratio indicates to what extent a country is dependent on an inflow of freshwater from neighbouring countries. **FIGURE 1.12** depicts 20 OIC countries with the highest dependency ratios on the external flow of water resources that make up approximately half of the available freshwater resources in these countries or higher. Among the OIC countries, Kuwait ranks first with 100% dependency on external renewable water resources, followed by Egypt (98.3%), Turkmenistan (97.0%), Bahrain (96.6%), Mauritania (96.5%), and Sudan (96.1%) (**FIGURE 1.12**).

FIGURE 1.12 External Sources Dependency Ratio in Selected OIC Countries (%), 2020



Source: SESRIC staff calculations based on the data accessed from the Food and Agriculture Organisation (FAO), AQUASTAT Online Database. *Membership to OIC is suspended.

Most of these member countries depend on eight main international river basins: the Nile, Niger, Senegal, Lake Chad, and Limpopo River Basins in African Region; Euphrates and Tigris River Basin, Aral Sea Basin (Amu Darya and Syr Darya Rivers), and Ganges River Basin in Asian Region. For example, Kuwait and Bahrain depend heavily on groundwater aquifer flowing from Saudi Arabia while Egypt depends on the Nile River flowing from Ethiopia, Mauritania on Senegal River, and Turkmenistan and Uzbekistan on the Amu Darya and Syr Darya Rivers. On the other hand, dependency on external water resources is non-existent across 15 OIC countries. In another 12 countries, it ranges from 0.8% to 9.1%. These are generally upstream countries in the above-mentioned eight main international river basins.

Given the levels of water stress and dependency of external sources in many OIC countries, the management of water will require improvements in water-use efficiency through calculated use and other water-use reduction measures. The use of water in the OIC continues to be less efficient, despite some improvement in recent years. The OIC as a group has the lower water-use efficiency level at US$6.3 per one m3 of water compared to global average, which is only one-third of the global average level of US$18.9 per m3. In comparison, non-OIC developing and developed countries managed to generate US$11.3 and US$56.2 per m3 of water respectively (SESRIC, 2021b).

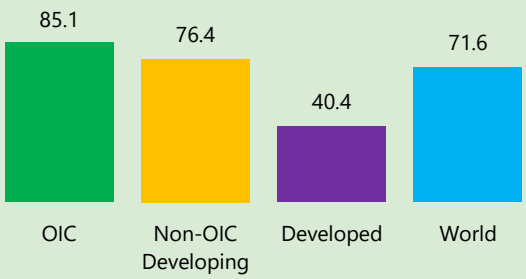
The issue of inefficient water management practices in OIC countries may have a direct and indirect impact on agriculture productivity. Addressing the issue requires a multi-faceted approach that involves a combination of policy changes, investments in infrastructure, and community engagement. Furthermore, it is essential to promote intra-OIC cooperation over water resources as many OIC countries share

transboundary water basins for ensuring sustainable and efficient water resource management as well as to limit tensions over access to transboundary water resources.

Water Use in Agriculture

Considering the rapid growth of their population, many OIC countries are still facing serious challenges in meeting the increasing water demand, particularly in the agricultural sector. In 2020, the total water withdrawal recorded in OIC countries as a group was 1,053 km^3. Around 896 km^3 of which was used in the agriculture sector, accounting for 85% of the total water withdrawal. It is more than two times higher than the developed countries (40%). Agricultural water withdrawal in OIC is significantly high also compared with non-OIC developing countries and the world, where around 76% and 72% of the total water withdrawal is utilised in the agriculture sector (**FIGURE 1.13**).

FIGURE 1.13 Agricultural Water Withdrawal (% of Total), 2020



Source: SESRIC staff calculations based on the data accessed from the Food and Agriculture Organisation (FAO), AQUASTAT Online Database.

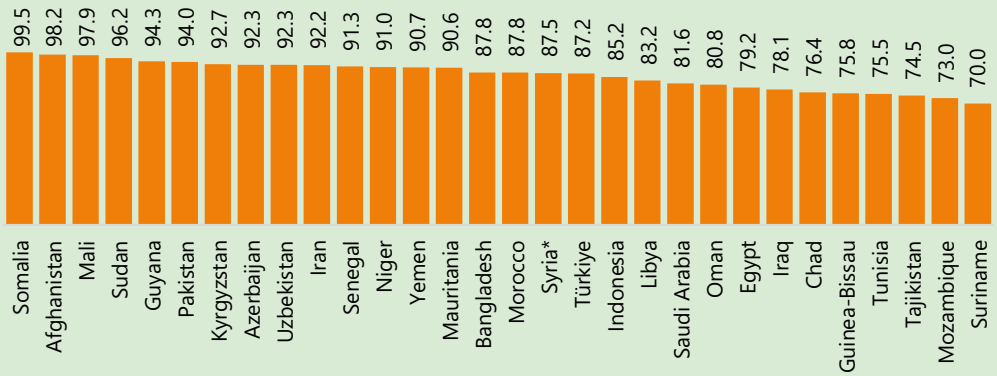
The proportion of agricultural water withdrawal in total water withdrawal is divergent within OIC countries, although, in most of the member countries agricultural water withdrawal is significantly high. In 30 OIC countries, the agriculture sector accounts for over 70% of the total water withdrawal (**FIGURE 1.14**). These high levels of water withdrawal can be attributed to the importance of the agriculture sector, in contrast to the water withdrawals for industrial and municipal use.

In the remaining 27 member countries, it ranges from 69.3% (Albania) to 0% (Maldives). It is below 40%, the average of developed countries, in 11 OIC countries; Maldives, Brunei Darussalam, Djibouti, Sierra Leone, Benin, Gabon, Bahrain, Togo, Qatar, Lebanon, and Gambia.

The bulk of agricultural water withdrawal is used in irrigation. The term "area equipped for irrigation" refers to the land area equipped to provide water to the crops, other than direct rainfall. Agricultural "area equipped for irrigation" in OIC

countries covers 80.2 million hectares accounting for 5.9% of their total agricultural land area, below the world average of 7%.

FIGURE 1.14 Agricultural Water Withdrawal (% of Total), in Selected OIC Countries, 2020



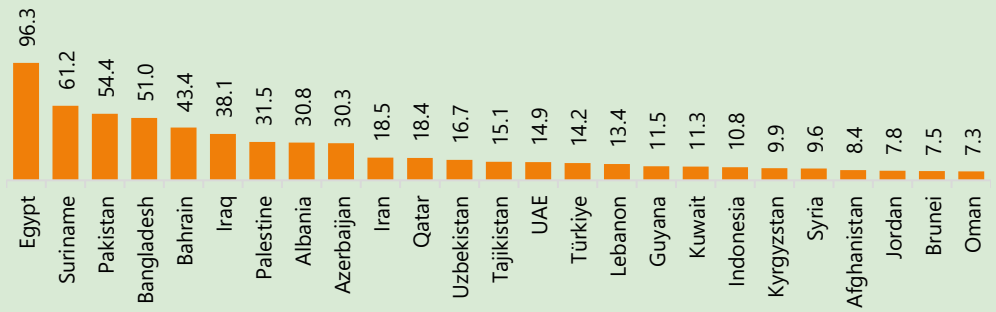
Source: SESRIC staff calculations based on the data accessed from the Food and Agriculture Organisation (FAO), AQUASTAT Online Database. *Membership to OIC is suspended.

The availability of the irrigation area varies across OIC countries. As of 2020, 10 OIC countries accounted for 79% of the total irrigation area of the OIC countries as a group. Pakistan stands out among these OIC countries with its irrigation area of 20 million hectares, which alone accounts for 25% of the total irrigation area of the OIC countries. It is followed by Iran (11%), Indonesia (8%), Türkiye (7%), Bangladesh (6%), Uzbekistan (5%), Egypt (5%), Iraq (4%), Saudi Arabia (4%), and Afghanistan (4%). These OIC countries are among the top 20 countries globally in terms of areas equipped for irrigation except for Afghanistan, which is in 21st place.

FIGURE 1.15 shows that the top 25 OIC countries, in terms of area equipped for irrigation as a percentage of agricultural land, had shares reaching more than the global average of 7%. Almost all agricultural area of Egypt (96.3%) is equipped for irrigation. Egypt is followed by Suriname with 61.2%, Pakistan with 54.4% and Bangladesh with 51% of agricultural land areas equipped for irrigation. On the other hand, less than 1% of the agricultural land area was equipped for irrigation in 21 OIC countries, mostly in the Sub-Saharan Africa region.

Irrigated agriculture and the use of efficient irrigation systems and techniques have a significant role in agricultural development and food production, particularly in countries suffering from critical water stress in arid and semi-arid regions. Surface irrigation, which is the traditional and the least water-saving technique, is by far the

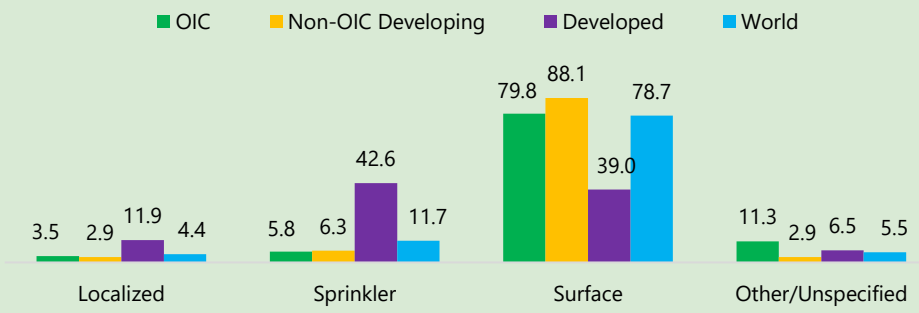
FIGURE 1.15 Selected OIC Countries with the Highest Values of Area Equipped for Irrigation (% of Agricultural Land), 2020



Source: SESRIC staff calculations based on the data accessed from the Food and Agriculture Organisation (FAO), FAOSTAT and AQUASTAT Online Databases.

most widely used technique by OIC countries and globally. This practice is carried out on 79.8% of the total area equipped for irrigation in OIC countries, compared to non-OIC developing countries' level of 88.1% and the global average of 78.7%. 18 OIC countries use surface irrigation as the single technique practised for irrigation. Consequently, massive amounts of water diverted for irrigation in these countries are wasted at the farm level through either deep percolation or surface runoff. In comparison, the surface irrigation technique is employed only in 39% of the irrigated area of developed countries (**FIGURE 1.16**).

FIGURE 1.16 Irrigation Techniques (% of Total Area Equipped for Irrigation), 2020



Source: SESRIC staff calculations based on the data accessed from the Food and Agriculture Organisation (FAO), FAOSTAT and AQUASTAT Online Databases.

Sprinkler and localised irrigation techniques are very efficient irrigation techniques that significantly reduce the waste of water as well as the negative environmental impacts of surface irrigation such as desalination. They are practised in 5.8% and 3.5% of the total area equipped for irrigation in OIC countries. In developed countries, the use of sprinkler and localised irrigation techniques are considerably higher, covering 42.6% and 11.9%, of all irrigation areas, respectively.

At the individual country level, sprinkler technique, in ten OIC countries are employed for over 24% of the total area equipped for irrigation, particularly; Cote d'Ivoire (75.4%), Qatar (44.2%), Azerbaijan (42.6%), Benin (41.6%), Nigeria (35.2%), Algeria (31.2%), Lebanon (27.9%), Togo (27.6%), Turkmenistan (24.8%), and Cameroon (24.2%).

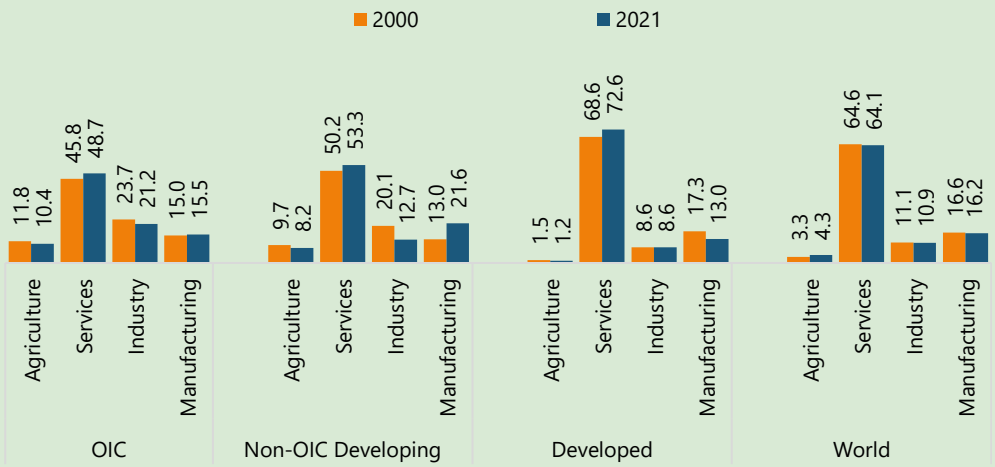
Furthermore, the localized irrigation technique, which is the most water-saving one, is practised on 2.8 million hectares, corresponding to only 3.5% of the total area equipped for irrigation in OIC countries; a ratio which is below the world average of 4.4%. The prevalence of this technique also varies across the OIC countries. Jordan (81.4%), Uganda (80.6%), Pakistan (76.4%), Togo (49.4%), Nigeria (25.4%), Kuwait (24.1%), Algeria (23.4%), Mauritania (19.8%), Egypt (13%), and Benin (12.4%) stand out with their high levels of using localized irrigation. In general, countries found in arid regions choose to develop localized and sprinkler irrigation techniques more intensively to save more water.

2. Current Status of Agriculture Production

Agriculture is one of the primary economic activities and plays a significant role in the economies of developing countries. However, its contribution to the Gross Domestic Product (GDP) is declining in OIC member countries and other regions. Despite having substantial agricultural resources, most developing countries heavily rely on imports to feed their local populations. This chapter aims to address this issue by conducting a detailed analysis of agricultural production in OIC member countries using the latest relevant statistics.

2.1. Overview of Agriculture Production

FIGURE 2.1 Value-added by Sector (% of GDP), 2000 vs 2021



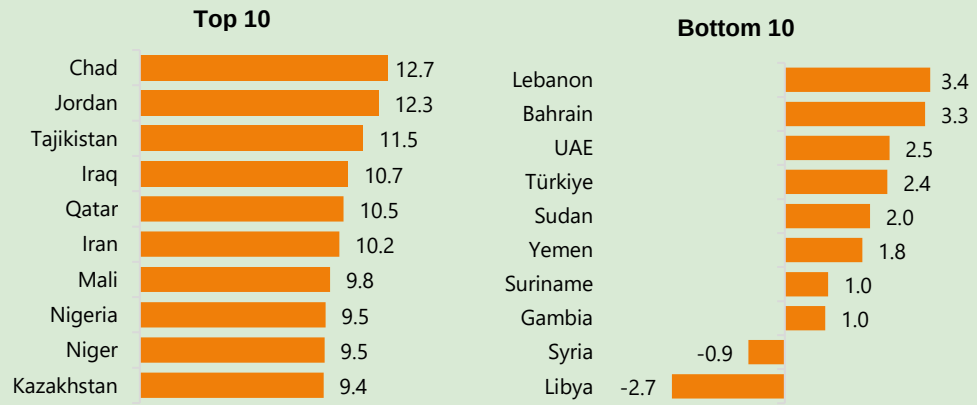
Source: SESRIC Staff calculations based on UN National Accounts Main Aggregates Database.

Over the past two decades, the share of agriculture in the total GDP of OIC countries has gradually decreased from 11.8% in 2000 to 10.4% in 2021, as illustrated in **FIGURE 2.1**. This trend is consistent with the situation in other regions such as developing countries where agriculture as percentage of GDP accounted for 9.7% in 2000 and 8.2% in 2021 and in Developed countries; it was 1.5% in 2000 and 1.2% in 2021. However, at the global level the contribution of agriculture in GDP increased from 3.3% to 4.3% between 2000 and 2021. The relative decline in agricultural value addition to the GDP in the developing world can be attributed to structural

transformation, agricultural market instability, environmental stresses, and depletion or degradation of land and water resources. These factors have collectively contributed to the decline of the agricultural sector's contribution to the economy paving for other sectors such as services, industry, and manufacturing to take more share in the GDP.

At the individual country level, the agriculture sector plays a crucial role in many OIC economies. For example, in 2021, agriculture accounts for more than 25% of GDP of 11 OIC countries namely, Sierra Leone, Somalia, Chad, Comoros, Niger, Mali, Afghanistan, Guinea-Bissau, Benin, Mozambique, and Guinea. The majority of these are low-income countries in Sub-Saharan Africa, with significant proportion of their population engaged in agriculture.

FIGURE 2.2 Compound Annual Growth Rate in the Value-Added of the Agricultural Sector (%), Top and Bottom OIC Countries, 2000-2021

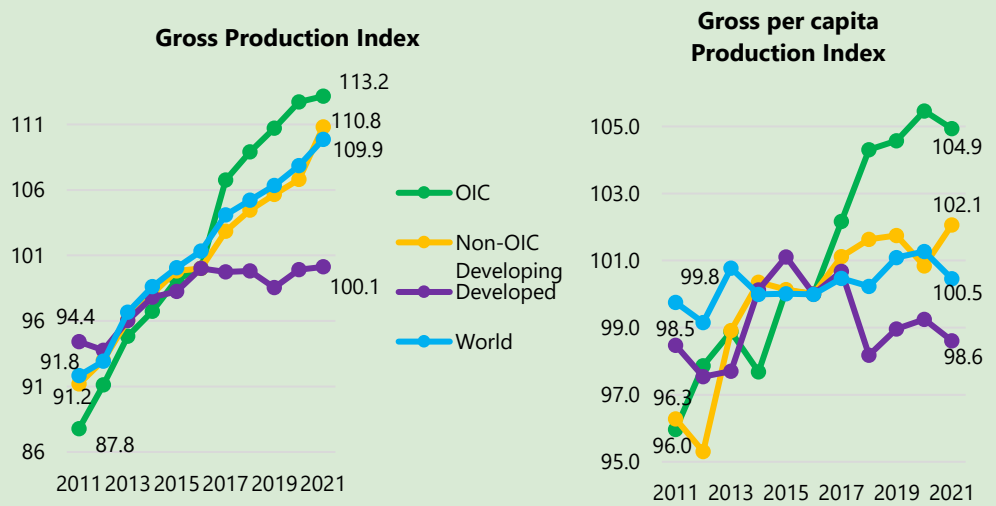


Source: SESRIC Staff calculations based on UN National Accounts Main Aggregates Database.

On the other hand, among the OIC countries, agricultural sector has grown considerably in the past two decades despite its declining share in the GDP. Among them, Chad, Jordan, Tajikistan, Iraq, Qatar, Iran, Mali, Nigeria, Niger, and Kazakhstan experienced the highest compound annual growth rate in the value-added of the agricultural sector, whereas in the bottom 10 were Lebanon, Bahrain, UAE, Türkiye, Sudan, Yemen, Suriname, Gambia, Syria, and Libya (**FIGURE 2.2**). Almost all the OIC countries experienced positive compound annual growth rate in the value-added of the agricultural sector except Libya and Syria whose agricultural sector has been neglected in the past few years due the impact of both climate change and long-lasting political instabilities (Mohammed et al., 2020 and Malak, 2022).

The Agricultural Production Index is an essential measure of a country's agricultural production growth. As it takes into account, the production of crops, livestock, and fisheries, and it is calculated as the ratio of the value of agricultural output in a given year to the value of agricultural output in a base year and it this case 2016 was taken as base year. Based on the analyses, OIC countries, as a group, demonstrated an improvement in their agricultural production performance during the period 2011-2021. In particular, since 2016, OIC countries have exhibited a remarkable growth rate in agriculture production, increasing by 13.2%. This growth surpasses that of non-OIC developing countries (10.8%), developed countries (0.1%), and the global average (9.9%). (**FIGURE 2.3, left**). This improved performance is significant given that agriculture is one of the major sources of income and employment in many OIC countries, particularly in rural areas.

FIGURE 2.3 Agricultural Production Indices (2016=100), 2011-2021



Source: SESRIC Staff calculations based on FAOSTAT Online Database.

Regarding per capita agricultural production index, the average per capita agricultural production in OIC countries experienced a modest increase during the period under review compared to non-OIC developing countries, developed countries and the world as a whole.

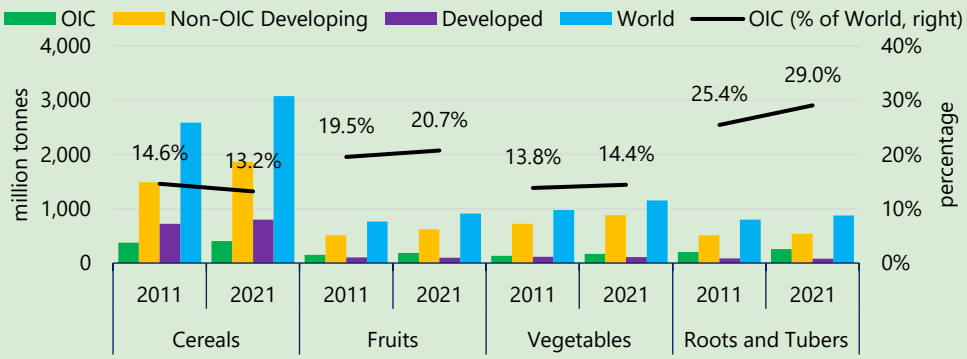
At the individual country level, 27 of the 44 OIC member countries with available data reported a positive a compound annual growth rate in per capita agricultural production during the 2011-2021 period. Among these member countries, Guyana

(14.3%), Senegal (10.1%), Oman (7.0%), Tajikistan (4.3%), Côte d'Ivoire (3.4%), Qatar (2.7%), Azerbaijan (2.5%), Saudi Arabia (2.5%) and Brunei Darussalam (2.5%) recorded the highest compound annual growth rate of more than 2%. On the other hand, 17 OIC countries experienced negative compound annual growth rate of per capita agricultural production, among them Maldives, Gambia, Iraq, Jordan, and Kuwait all with at least negative two compound annual growth rate of per capita agricultural production (**FIGURE 2.3, right**).

Overall, the poor performance of many OIC countries in the agricultural sector indicates that they still have insufficient food production capacity to meet the growing domestic demand. This situation makes many OIC countries heavily reliant on food imports, which can be costly and have negative consequences on their economies. Therefore, continued efforts individual OIC countries and efforts of the Islamic Organization for Food Security (IOFS) such as Afghanistan Food Security Program and Africa Food Security Initiative to improve agricultural production in OIC countries are crucial to enhance food security, reduce poverty, and promote economic growth.

2.2. Production of Major Crops

FIGURE 2.4 Production of Primary Crop Groups by Region, 2011 vs 2021



Source: SESRIC Staff calculations based on FAOSTAT Online Database.

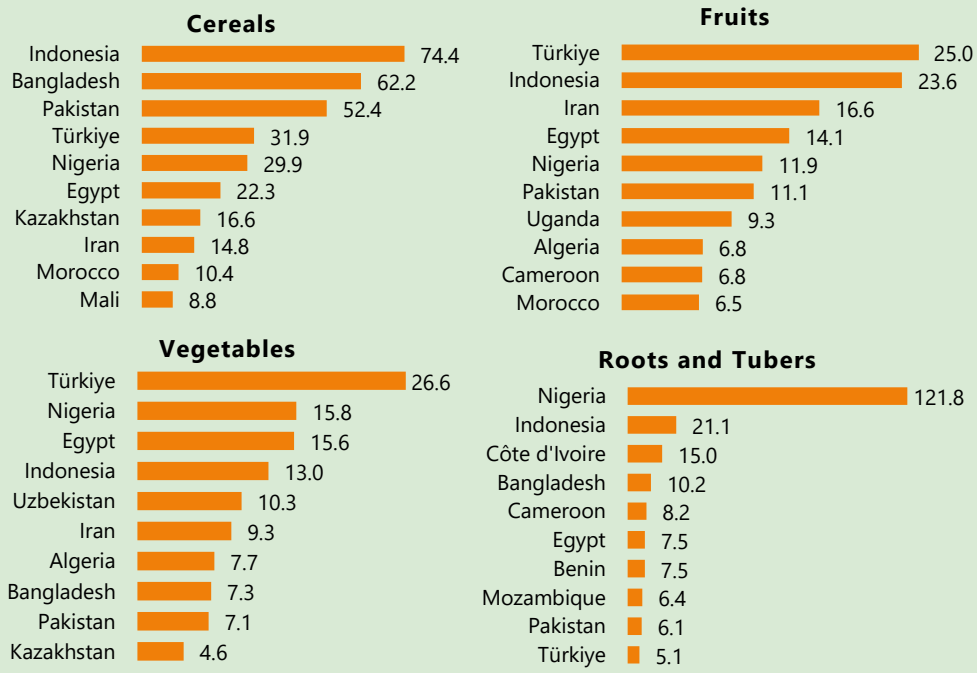
Primary crops can be grouped into cereals, fruits, vegetables, and roots and tubers. Over the past decade, the global production of these groups has increased. Cereals and roots and tubers were the largest group of crops produced in the OIC countries in 2021. Both account for 39.9% and 25.1% respectively of the total production of the four primary crops in the OIC countries. In this period, OIC countries contributed 405.2 million tonnes to the world's cereal production, representing a 13.2% share, which

slightly decreased from 14.6% in 2011. On the other hand, production of roots and tubers in the OIC was 254.2 million tonnes or 29.0% of the global production of roots and tubers (**FIGURE 2.4**).

Although fruits and vegetables only accounted for about 35% of the total production of primary crops in the OIC countries, their production has significantly increased between 2011 and 2021 by 26.7% and 25.4% respectively reaching 188.6 million tonnes and 166.4 million tonnes in 2021. Both accounted for approximately 20.7% and 14.4% the global production of fruits and Vegetables (**FIGURE 2.4**).

Overall, the OIC countries group, non-OIC developing countries, and developed countries showed considerable increase in the production of these primary crops. According to FAO (2022), such worldwide increase in the production of these primary crops is attributed to a number of factors namely; adoption of better farming practices, increased use of irrigation, pesticides, fertilizers, and expansion of the cultivated area, as well as the use of high-yield crops.

FIGURE 2.5 Top 10 Producers of Primary Crop Groups (million tonnes), 2021



Source: SESRIC Staff calculations based on FAOSTAT Online Database.

FIGURE 2.6 Production of Major Crop Commodities (million tonnes), 2021

Source: SESRIC Staff calculations based on FAOSTAT Online Database, * Sugar includes Sugar crops, Sugar cane and Sugar beet, Maize* (corn and green corn).

It is also noticeable that in 2021, production of the primary crops is concentrated in 17 OIC countries as shown in **FIGURE 2.5**. In production of roots and tubers, the top 10 producing countries accounted for 82.2% of the total roots and tubers produced

in the OIC countries in 2021. In a similar manner, only 10 OIC countries accounted for 79.9% of the total production cereals in the OIC. Regarding vegetables and fruits, the top 10 producing countries accounted for 70.5% and 69.9% respectively of the total production in 2021. This indicates a concentration of agricultural production within a few number of countries, with the majority of OIC member countries producing relatively small amounts of these key agricultural products.

FIGURE 2.6 shows the production data for major crop commodities in OIC member countries, along with their corresponding shares in the global average in the last decade. The OIC countries have exhibited the highest shares globally in the total production of dates (97%), oil palm fruit (87.8%), cocoa beans (64.3%), cassava (36.7%), and millet (34.9%) as compared to other primary crops such as barley, dry beans, coffee, maize, oats, rice, sorghum, soya beans, sugar, tea, wheat in 2021.

BOX A Dates Production in OIC Countries

Among the various fruit crops grown worldwide, dates stand out as the sole fruit crop in which OIC countries have a significant advantage in production compared to any other region globally. Dates have been cultivated for thousands of years, with evidence of their cultivation dating back to 7000 BC in the Middle East.

In the Holy Quran, many fruits and fruit-bearing plants have been mentioned, however, The word "date" under the Quranic names of Nakhl and Nakhil has been mentioned more than 20 times. For example, in Surah Al-Nahl Ayat 11 (16:11 Quran), Allah Says: "With it He produces for you corn, olives, date palms, grapes, and every kind of fruit: Verily in this is a Sign for those who give thought". The Quran also narrates the incidence when Holy Maryam was provided with fresh ripe dates when she was feeling pain during childbirth "Do not grieve! Your Lord has placed a small stream at your feet. Shake the trunk of the palm towards you and fresh, ripe dates will drop down onto you. Eat and drink and delight your eyes..." (Surah Maryam: 23-26).

In many ways, dates are important source foreign exchange and are considered ideal food due to their wide range of essential nutrients and potential health benefits. This is why dates hold special significance during the Holy Month of Ramadan, as many Muslims predominantly consume them during the Iftar.

According to the FAO database, the leading date-producing countries in the OIC and globally are: Egypt produced 1.7 million tonnes, representing approximately 18% of global date production; Saudi Arabia produced 1.6 million tonnes, accounting for about 16% of global date production. Iran produced 1.3 million tonnes, while Algeria produced 1.2 million tonnes, corresponding to 14% and 12% shares in global date production, respectively.

Furthermore, out of the 40 date-producing countries listed in the FAO database, 29 are OIC countries, and 17 of these countries are among the top 20 global date producers in 2021. The OIC countries and their respective global rankings include: Egypt (1), Saudi Arabia (2), Iran (3), Algeria (4), Iraq (5), Pakistan (6), Sudan (7), Oman (8), United Arab Emirates (9), Tunisia (10), Libya (11), Morocco (13), Kuwait (14), Turkey (15), Yemen (16), Qatar (19), and Jordan (20).

Source: FAO (2023), Ismail (2020), and Farooqi (2015).

TABLE 2.1 OIC Countries among Top 20 Global Producers of Major Crop Commodities, 2021

Commodity	Country (World Rank)
Barley	Türkiye (9), Iran (13), Morocco (14), Kazakhstan (16)
Cassava	Nigeria (1), Indonesia (6), Côte d'Ivoire (10), Mozambique (14), Cameroon (15), Benin (17), Sierra Leone (20)
Cocoa Beans	Côte d'Ivoire (1), Indonesia (3), Cameroon (6), Nigeria (7), Uganda (12), Guinea (17), Sierra Leone (20)
Coffee	Indonesia (3), Uganda (7), Côte d'Ivoire (14)
Dates	Egypt (1), Saudi Arabia (2), Iran (3), Algeria (4), Iraq (5), Pakistan (6), Sudan (7), Oman (8), United Arab Emirates (9), Tunisia (10), Libya (11), Morocco (13), Kuwait (14), Türkiye (15), Yemen (16), Qatar (19), Jordan (20)
Dry Beans	Uganda (8), Mozambique (14), Cameroon (16), Türkiye (19), Pakistan (20)
Maize	Indonesia (8), Nigeria (14), Pakistan (16), Egypt (18)
Millet	Niger (3), Nigeria (4), Sudan (5), Mali (6), Senegal (7), Burkina Faso (9), Chad (10), Pakistan (16), Guinea (18), Uzbekistan (20)
Oats	Türkiye (19)
Palm Oil	Indonesia (1), Malaysia (2), Nigeria (4), Cameroon (9), Côte d'Ivoire (12), Guinea (18)
Rice	Bangladesh (3), Indonesia (4), Pakistan (9), Nigeria (14), Egypt (18)
Sorghum	Nigeria (2), Sudan (6), Burkina Faso (11), Mali (13), Cameroon (14), Niger (15), Chad (17), Egypt (18)
Soybeans	Nigeria (13), Indonesia (19), Benin (20)
Sugar cane	Pakistan (4), Indonesia (10), Egypt (14), Türkiye (18)
Tea	Türkiye (4), Indonesia (7), Bangladesh (8), Uganda (10), Iran (17)
Wheat	Pakistan (8), Türkiye (11), Kazakhstan (15), Iran (17), Egypt (18)

Source: SESRIC staff analysis based on data from the FAOSTAT Online Database.

In light of the changes over the past 10 years, production of palm oil fruit, soya beans, coffee, maize, dates, sugar, cassava, tea, cocoa beans, millet, dry beans, rice, and sorghum . Noticeable of these countries are, the volumes of palm oil production, which increased by 51% from 242 tonnes in 2011 to 365.7 tonnes in 2021, and soya beans by 41% increase from 1.9 tonnes in 2011 to 2.7 tonnes in 2021. Whereas maize and coffee increased by 40% from 62.3 tonnes in 2011 to 86.9 tonnes in 2021 and 1 tonne in 2011 to 1.4 tonnes in 2021 respectively. Similarly, dates production also increased by 33% from 7 tonnes in 2011 to 9.4 tonnes in 2021.

At the individual country level, 35 countries are ranked among the top 20 global producers of major agricultural products. These products range from cereals like wheat, barley, rice, and maize, to commodities found in tropical and temperate regions such as palm oil, cocoa, coffee, and sugar (**TABLE 2.1**). However, many of

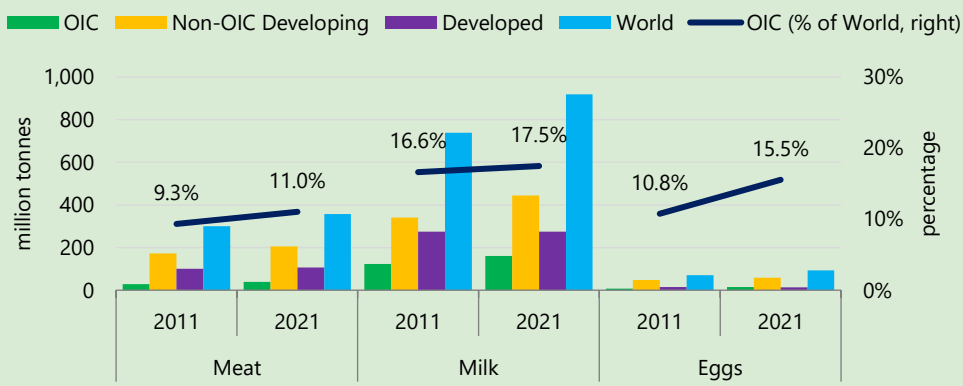
these countries face additional risks and challenges due to price fluctuations in the international commodity markets, especially those countries whose exports are heavily focused on a few agricultural commodities. Another challenge they face is the competitiveness of their commodities in international trade markets, as they often export these primary commodities with little or no added value, mainly due to inadequate processing facilities.

2.3. Livestock and Fisheries

Livestock

Rapid growth and technological innovation have led to profound structural changes in the livestock sector, including a move from smallholder mixed farms to large-scale specialized industrial production systems; a shift in demand and supply to the developing countries; and an increasing emphasis on global sourcing and marketing. These changes have implications for the ability of the livestock sector to expand production sustainably in ways that promote food security, poverty reduction and public health.

FIGURE 2.7 Production of Livestock Products, 2011 vs 2021



Source: SESRIC Staff calculations based on FAOSTAT Online Database.

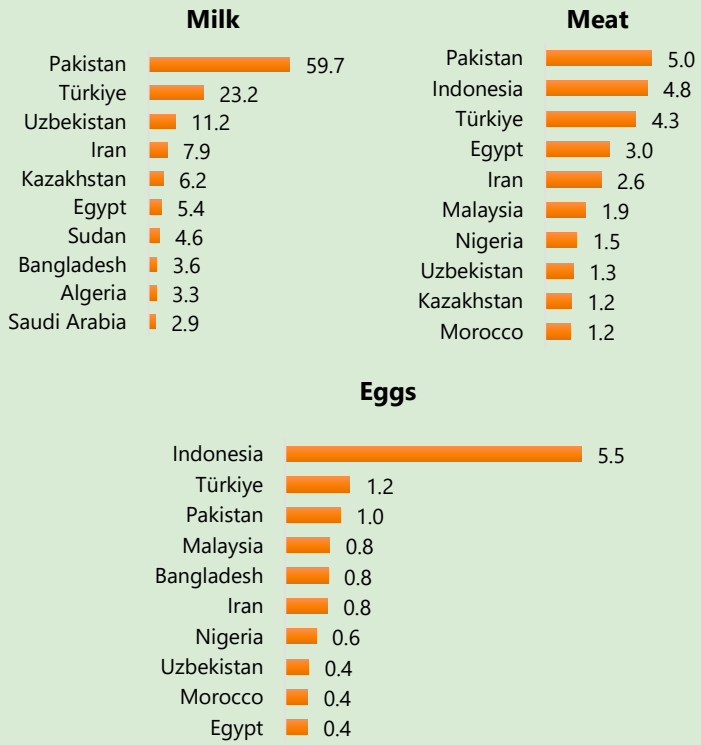
As such, between 2011 and 2021, there was a considerable increase in the production of major livestock products namely, meat, milk, and eggs by OIC countries. The production of meat rose by 40.5%, from 28.1 million tonnes to 39.4 million tonnes. Similarly, milk production increased by 30.8%, from 122.7 million tonnes to 160.5 million tonnes, while egg production witnessed the significant and the highest growth

among these products as its production almost doubled between the years from 7.6 million tonnes to 14.4 million tonnes.

Collectively, the share of OIC countries group in the global livestock production also improved. In 2021, these countries accounted for 11% of the total worldwide meat production, 17.5% of global milk production and 15.5% of the total eggs produced globally (**FIGURE 2.7**).

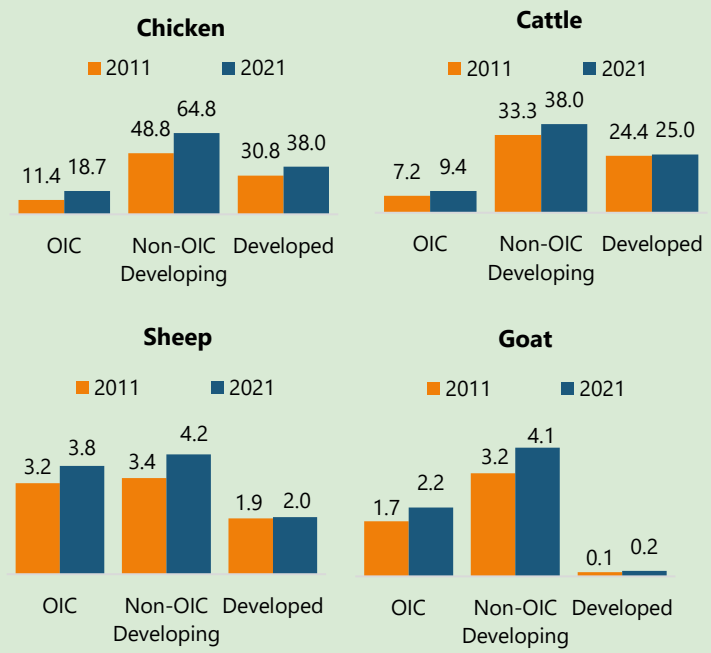
Similar to the production of the primary crops, the production of the three major livestock products resonate around only 14 OIC countries namely; Algeria, Bangladesh, Egypt, Indonesia, Iran, Kazakhstan, Malaysia, Morocco, Nigeria, Pakistan, Saudi Arabia, Sudan, Türkiye, and Uzbekistan. The top 10 producers of meat, milk, and eggs respectively accounted for 67.9%, 79.8%, and 83.5% of the total OIC countries group production in 2021 (**FIGURE 2.8**).

FIGURE 2.8 Major Producers of Livestock Products (million tonnes), 2021



Source: SESRIC staff analysis based on data from the FAOSTAT Online Database.

FIGURE 2.9 Production of Meat (million tonnes), 2011 vs 2021



Source: SESRIC Staff calculations based on FAOSTAT Online Database.

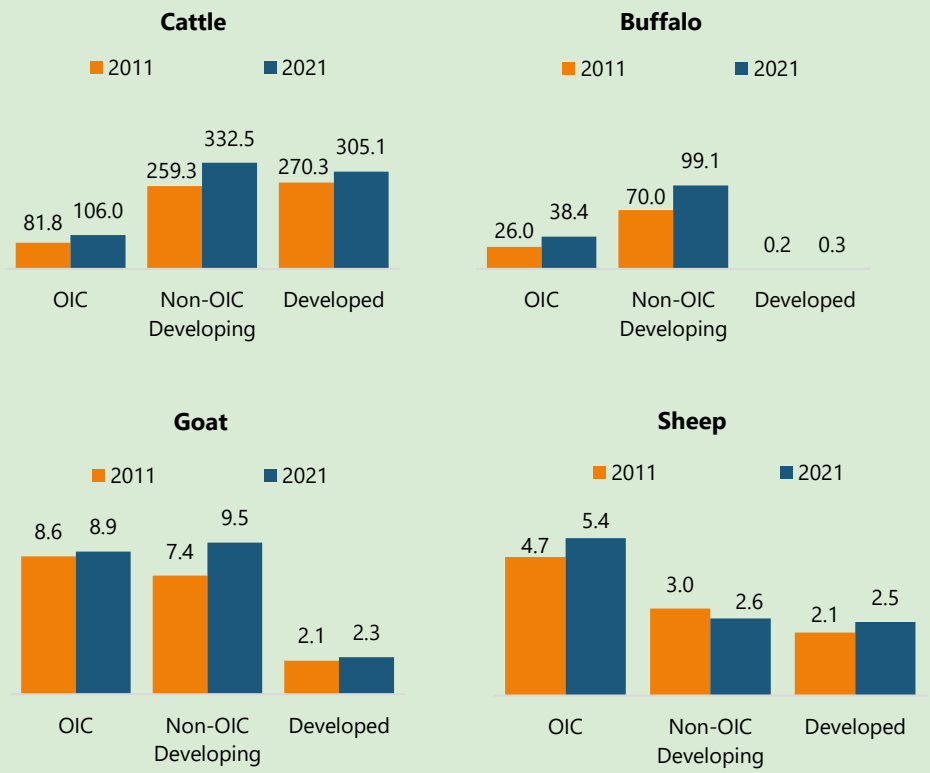
In OIC countries, the production of meat from chicken, cattle, sheep, and goats plays a significant role in the global meat supply. The nutritional components such as high-quality proteins, essential fatty acids, and a variety of vitamins got from meat contributes greatly to improved nutrition and better overall health among the population. The nutritional benefits of meat from these animals has led to an increased demand for their products over the years. For example, the production of chicken meat has seen a notable rise, increasing from 11.4 million tonnes in 2011 to 18.7 million tonnes in 2021. Similarly, the production of beef or cattle meat has increased from 7.2 million tonnes to 9.4 million tonnes during the same period. The production of sheep meat has also experienced growth, rising from 3.2 million tonnes to 3.8 million tonnes, while the production of goat meat increased from 1.7 million tonnes to 2.2 million tonnes. **FIGURE 2.9** shows that the demand for meat from these animals has prompted an upward trajectory in their production goats in OIC countries, non-OIC developing countries and developed countries between 2011 and 2021.

Milk production is another important component of livestock production, which is almost entirely derived from animals such as cattle, buffaloes, goats, sheep and camels. Production of milk from these animals varies significantly among regions and countries due to the factors such as feeds, water, climate, market demand, dietary traditions and the socio-economic characteristics of individual household.

Of the four major animal types (cattle, buffaloes, goats and sheep) used for milk production, only cattle are kept in a wide range of environments, as such their contribution to milk production is greater as compared to the other dairy animals. In 202 1, cattle produced 743.7 million tonnes, which accounted for about 81% of the world milk production, followed by buffaloes with 15%.

In OIC countries group, milk production from cattle buffaloes, goats, and sheep have steadily grown between 2011 and 2021. Milk production from cattle increased from 81.8 million tonnes to 106 million tonnes, from buffaloes it increased from 26.0 million tonnes to 38.4 million tonnes, from goats it increased from 8.6 million tonnes to 8.9 million tonnes, and from sheep milk production increased from 4.7 million tonnes to 5.4 million tonnes between 2011 and 2021 (**FIGURE 2.10**).

FIGURE 2.10 Production of Milk (million tonnes), 2011 vs 2021



Source: SESRIC Staff calculations based on FAOSTAT Online Database.

However, according to FAO (n.d) the increasing share in global dairy production of most developing countries including the OIC countries in the recent years is due to an increase in numbers of producing animals rather than a rise in productivity per

head. FAO emphasised that, in many of these developing countries, the ability to produce dairy is limited due to various factors such as inadequate feed quality, prevalent diseases, restricted availability of markets and essential services like healthcare, credit, and training, as well as the low genetic potential of dairy animals for milk production.

In 2021, at least 31 OIC countries appeared among the top 20 global producers of livestock products such as meat of (chickens, cattle, goats, sheep, camels, and buffaloes), raw milk of (cattle, sheep, goats, camel, and buffalo), eggs, and natural honey. Furthermore, at least 10 OIC countries appeared among the top 20 global producers of meat and milk of goat, sheep, and camels, with Indonesia, Iran, Pakistan, and Türkiye being some of the notable OIC countries in the list (**TABLE 2.2**).

TABLE 2.2 OIC Countries among Top 20 Global Producers of Livestock Products, 2021

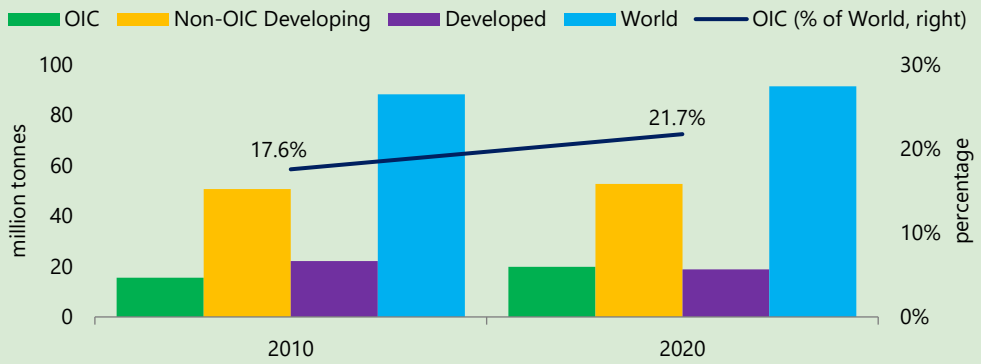
Commodity	Country (World Rank)
Meat of Chickens	Indonesia (5), Türkiye (10), Egypt (11), Iran (13), Pakistan (16), Malaysia (20)
Meat of Cattle	Türkiye (9), Pakistan (12), Uzbekistan (15)
Meat of Goat	Pakistan (3), Nigeria (4), Bangladesh (5), Chad (7), Sudan (8), Türkiye (10), Yemen (12), United Arab Emirates (17), Indonesia (18), Saudi Arabia (19), Burkina Faso (20)
Meat of Sheep	Türkiye (4), Algeria (5), Sudan (7), Pakistan (9), Iran (10), Chad (11), Morocco (13), Uzbekistan (14), Syria (15), Kazakhstan (16), Nigeria (17)
Meat of Camels	Sudan (1), Saudi Arabia (2), Somalia (3), United Arab Emirates (4), Mauritania (8), Oman (9), Niger (10), Turkmenistan (12), Egypt (13), Chad (14), Kazakhstan (15), Algeria (16), Pakistan (17), Libya (18), Iran (19), Afghanistan (20)
Meat of Buffalo	Pakistan (2), Turkmenistan (5), Egypt (6), Indonesia (11), Türkiye (14), Bangladesh (18), Iran (19), Iraq (20)
Eggs	Indonesia (4), Türkiye (9), Pakistan (11), Malaysia (15), Bangladesh (18), Iran (19)
Raw Milk of Cattle	Pakistan (8), Türkiye (10), Uzbekistan (17)
Raw Milk of Sheep	Türkiye (2), Syria (4), Algeria (6), Sudan (9), Somalia (10), Iran (11), Afghanistan (14), Mali (15), Indonesia (16), Niger (17), Jordan (19), Saudi Arabia (20)
Raw Milk of Goats	Bangladesh (2), Sudan (3), Pakistan (4), Türkiye (6), Somalia (10), Indonesia (11), Niger (13), Algeria (14), Iran (15), Mali (17)
Raw Milk of Camel	Somalia (2), Mali (3), Saudi Arabia (5), Niger (6), United Arab Emirates (7), Sudan (8), Chad (9), Mauritania (10), Qatar (11), Algeria (13), Morocco (16), Afghanistan (17), Djibouti (19), Libya (20)
Raw Milk of Buffalo	Pakistan (2), Egypt (4), Iran (8), Indonesia (9), Türkiye (12), Iraq (13), Bangladesh (14), Syria (18), Malaysia (19)
Natural Honey	Türkiye (2), Iran (3)

Source: SESRIC staff analysis based on data from the FAOSTAT Online Database.

Fisheries

Fisheries and aquaculture continue to make crucial contributions to the world's wellbeing and prosperity. They make up an important source of nutritious foods and animal protein for much of the world's population. Data from Fisheries and Aquaculture Department of the FAO reveals that capture fisheries and aquaculture rose by 3.6% to 91.4 million tonnes in 2020, down from 88.3 in 2010. With such a sustained growth in fish production and improved distribution channels, OIC fisheries production has grown significantly during the last decade from 15.5 million tonnes in 2010 to 19.9 million tonnes 2020, and accounting for 21.7% of the global capture fisheries production in 2020 (**FIGURE 2.11**).

FIGURE 2.11 Fisheries and Aquaculture Production (million tonnes), 2010 vs 2020

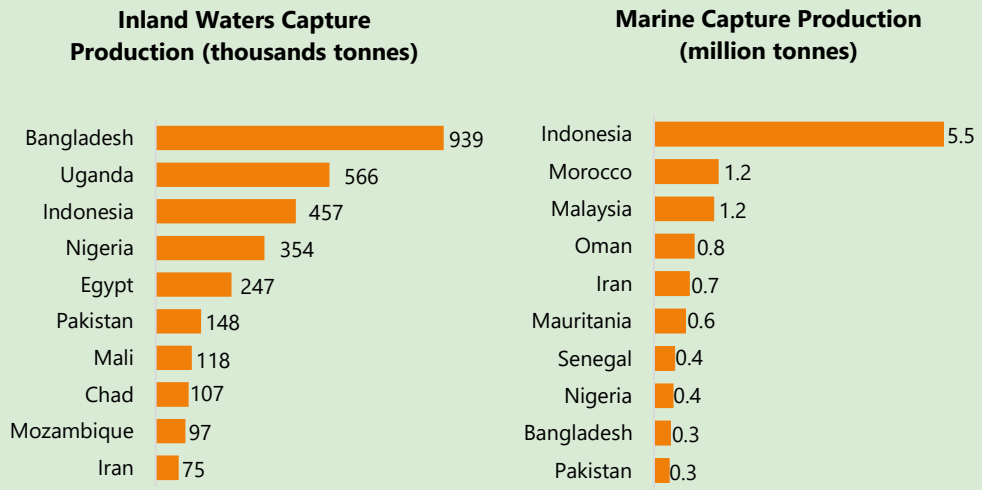


Source: SESRIC Staff calculations based on FAOSTAT Fisheries and Aquaculture Database. Data expressed in live weight equivalent.

As depicted in **FIGURE 2.12**, the highest volumes of aquatic species caught in OIC countries according to the fishing area (i.e., inland, or marine) concentrated in only 10 countries. Overall, in 2020, marine capture production in OIC countries group was 13.8 million tonnes as compared to 3.6 million tonnes catches in inland waters. At the individual OIC country level, Indonesia with 5.5 million tonnes reported the highest marine capture production among OIC countries. Followed by Morocco, Malaysia, Oman, Iran, Mauritania, Senegal, Nigeria, Bangladesh and Pakistan. The share of inland production also made a significant contribution in the total OIC countries group capture fisheries production. In this context, it is observed that the highest contributors of inland water catches among the OIC countries were Bangladesh, Uganda, Indonesia, Nigeria, Egypt, Pakistan, Mali, Chad, Mozambique, and Iran.

Albeit the volumes of marine and inland water catches remaining high in 2020, fishing operations among producing countries were severely affected by the COVID-19 pandemic FAO (2022a).

FIGURE 2.12 Marine and Inland Waters Capture Production, Top 10 OIC Countries, 2020



Source: SESRIC Staff calculations based on FAOSTAT Fisheries and Aquaculture Database. Data expressed in live weight equivalent.

3. Global and Regional Trade

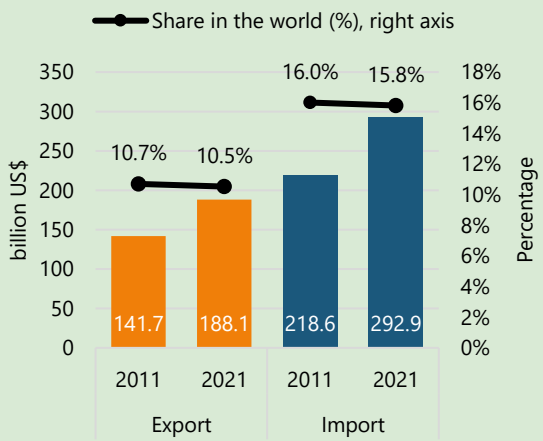
International trade serves as a catalyst for economic growth and development, creating mutual benefits for trading partners. The OIC consists of member countries spanning four continents, exhibiting varying levels of agricultural development among them. While some OIC countries excel as net exporters of diverse products, others find themselves among the net importers. In this context, the formulation of effective agricultural trade policies assumes paramount importance in ensuring food security and the sustainable supply of essential commodities. However, a few OIC countries face significant challenges that hinder their ability to fully capitalize on the advantages of international trade.

The aim of this section is to identify common trends based on recent statistics and comprehend the major challenges encountered in food and agricultural trade. It is important to note that, unless otherwise specified, the term "Food and Agricultural products" in this chapter refers to the collective category encompassing items classified under FAO's "Crops and Livestock Products."

3.1. Export and Import Trends

The food and agricultural exports and imports trends in OIC countries is presented in **FIGURE 3.1**. The data reveal that OIC countries, as a group, were able to expand their international trade capacities in food and agricultural products over time. The value of exports increased from US$ 141.7 billion in 2011 to US$ 188.1 billion in 2021. In the same period, the share of the OIC group in the world total food and agricultural export remain similar, changed from 10.7% to 10.5%. In a similar vein, the value of import in OIC countries climbed up from US$

FIGURE 3.1 Food and Agricultural Exports and Imports in OIC Countries, 2011 vs 2021

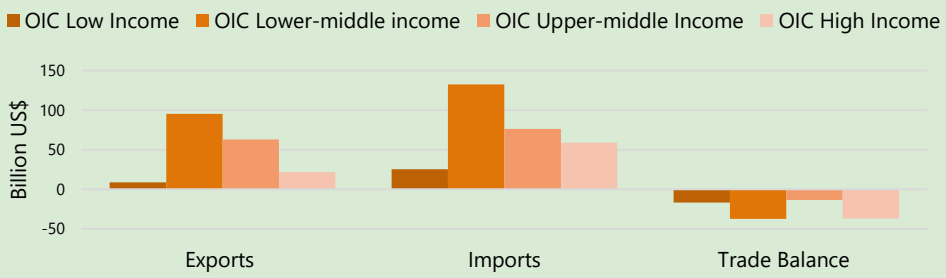


Source: SESRIC staff calculation based on data from FAOSTAT.

218.6 billion in 2011 to US$ 292.9 billion in 2021. Nevertheless, the share of the OIC group in the world total food and agricultural imports slightly declined from 16.0% to 15.8% in the same period. This trend in food and agricultural trade can be attributed to a surge in product diversification, reduced trade barriers, increased competition, and productivity gains (Jansen, 2013).

Nevertheless, OIC countries, as a group, continued to stay as a net importer in food and agricultural trade, as the value of import exceeded the value of export. The value of the OIC total food and agricultural trade deficit increased from US$ 76.9 billion in 2011 to US$ 104.8 billion in 2021. The performances of OIC countries based on income groups show variation (**FIGURE 3.2**). In 2021, both low income and upper-middle income groups recorded relatively less deficit, having registered net trade deficits of US$ 16.9 billion and US$ 13.4 billion respectively. Meanwhile, lower-middle and high income groups generated food and agricultural trade deficits of US$ 37.5 billion and US$ 37.0 billion respectively. At the individual country level, 50 out of 57 member countries recorded deficit in food and agriculture trade. The remaining seven countries that recorded trade surpluses were Uganda, Guyana, Burkina Faso, Türkiye, Côte d'Ivoire, Malaysia, and Indonesia.

FIGURE 3.2 Food and Agricultural Trade Performance by Income Groups, 2021



Source: SESRIC staff calculation based on data from FAOSTAT.

The existing disparities across OIC countries in terms of international trade of food and agricultural products could be considered as a window of opportunity to enhance intra-OIC trade. Achieving complementarity between OIC countries and sub-regions with excess supply (i.e. net exporter) and those with excess demand (i.e. net importer) for various agricultural products would help to deepen intra-OIC cooperation and generate more resources for socio-economic development in OIC countries.

At both the regional and country levels, trade performances within the OIC exhibit significant variations, influenced by several factors. For instance, certain OIC countries have placed greater emphasis on regional trade integration and the elimination of barriers in agricultural trade. Additionally, a few countries have implemented product diversification strategies aimed at improving their agricultural trade volumes. However, as a collective group, OIC countries still have room for improvement to secure a larger share in the global trade of agricultural products, particularly in light of intensifying global competition (COMCEC, 2018; OECD, 2015).

OIC countries have demonstrated their wealth of expertise in developing and implementing effective national agricultural trade policies and programs. The COMCEC (2019) report provides a comprehensive analysis of successful practices implemented by countries such as Morocco, Turkey, Gambia, and Chad, offering valuable insights into a diverse range of policies that can be utilized by OIC countries to enhance international trade in agricultural products. In this regard, fostering intra-OIC cooperation becomes crucial as it facilitates mutual learning and the exchange of experiences among member nations, leading to collective progress in this significant area.

Economic Importance

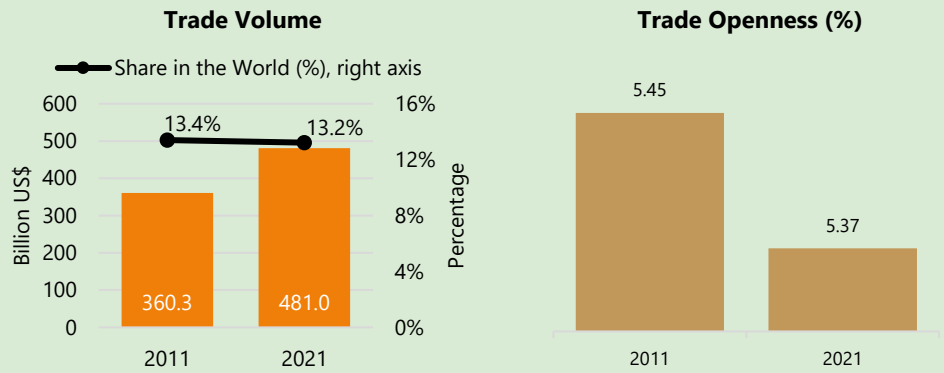
Understanding the real economic importance of a sector is critical to determine the right policies and identify priority areas. In many developing countries including several OIC countries, the economic importance of the agriculture sector is very high in terms of employment, contribution to GDP and international trade.

In terms of economic contribution to GDP, the agriculture sector has particular importance for many developing countries and OIC economies (see Chapter 2 for more details). The total trade volume of OIC countries in agriculture grew by 34% over the period 2011-2021 and reached US$ 481.0 billion in 2021. Nevertheless, the share of OIC group in the global food and agricultural trade market has relatively stagnated, reaching 13.2% in 2021. In the same vein, food and agricultural trade openness, which mirrors the relative share of the total food and agricultural trade in GDP decreased slightly from 5.45% in 2011 to 5.37% in 2021 reflecting a stagnated integration with the global agricultural trade markets (**FIGURE 3.3**).

At the individual country level, in 2021, food and agricultural trade openness was higher than 20% in six OIC countries namely Djibouti (68.2%), Yemen (59.0%), Somalia (41.4%), Afghanistan (24.5%), Guinea-Bissau (21.1%), and Sudan (20.4%). In 14 OIC countries, the agricultural trade openness stayed below the OIC average of 5.4%. This demonstrates that the relative importance of agricultural trade in the economies of

OIC countries varies substantially. This can be affected by factors like total population, geographical location, climatic zone, agricultural trade infrastructure, and availability of mineral resources for exports (e.g. gas, oil).

FIGURE 3.3 Total Food and Agricultural Trade Volume (left) and Trade Openness (right) in OIC Countries, 2011 vs 2021

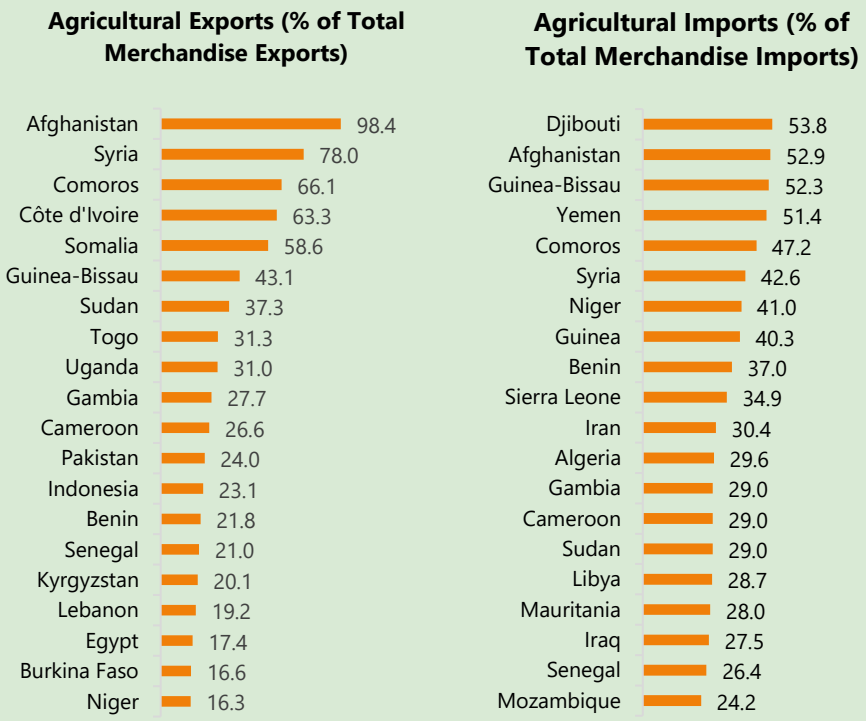


Source: SESRIC staff calculations based on data from FAOSTAT.

In a good number of OIC countries international trade of food and agricultural products play a key role in their economies in terms of both export and import. In this respect, **FIGURE 3.4** displays the role of agricultural trade in OIC economies by looking at the relative shares of food and agricultural export and import in total merchandise trade in 2021. The share of agricultural exports in total merchandise export exceeded the 50% threshold in Somalia (59%), Côte d'Ivoire (63%), Comoros (66%), Syria (78%), and Afghanistan (98%). In 20 OIC countries, food and agricultural export contributed less than 5% to the total merchandise export. In a similar vein, the performance of OIC countries in food and agricultural import is diverse when measured as a share of total merchandise import. On the one hand, in eleven OIC countries (Iran, Sierra Leone, Benin, Guinea, Niger, Syria, Comoros, Yemen, Guinea-Bissau, Afghanistan, and Djibouti) the share of agricultural imports in total merchandise imports was found to be higher than 30%. On the other hand, in 16 OIC countries this share stayed below the average of the OIC group (14%).

Overall, OIC countries, as a group, moved towards improving their international trade capacities in the agriculture sector in recent years. In terms of economic contribution, the sector is an important source for job creation and added-value generation in many OIC countries (COMCEC, 2018). In this context, effective and sound policies towards further eliminating existing trade barriers and improving regional integration in agriculture would help OIC countries to get a higher share in the global trade market of agricultural products.

FIGURE 3.4 Food and Agricultural Trade Relative to Total Merchandise Trade, Top 20 OIC Countries, 2021



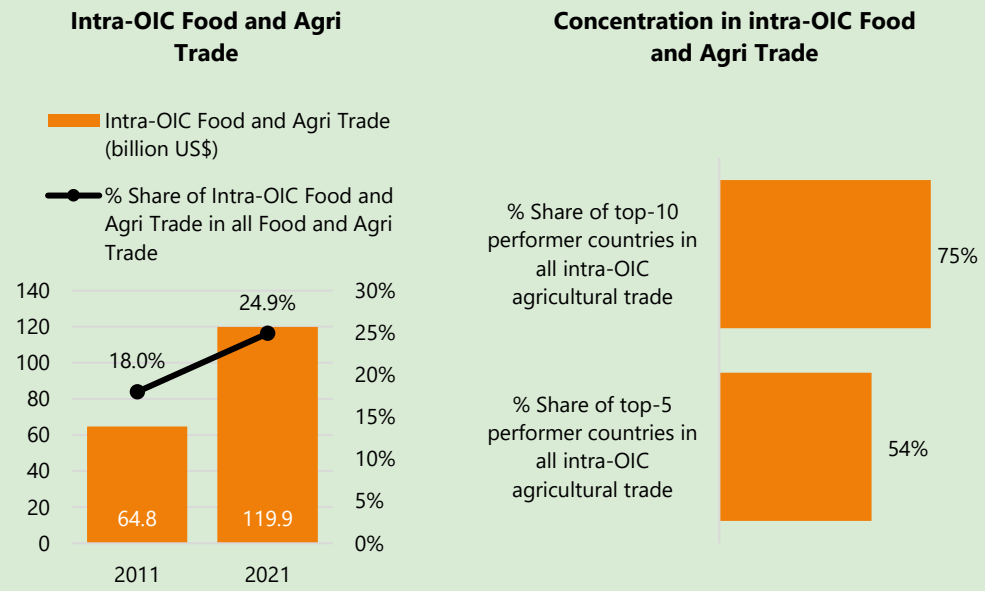
Source: Own calculation based on data from FAOSTAT.

The analysis further reveals that in some OIC countries, particularly located in Africa and Asia, agricultural exports and imports play a vital role in their international trade relations and economies as an engine of growth and a source of foreign exchange earnings. Nevertheless, a very high dependency on agricultural exports and imports make countries less resilient to external shocks. For instance, a shock in the world trade, such like the one experienced due to the COVID-19 pandemic can lead to significant losses in foreign exchange earnings. In a similar vein, a high reliance on imports of agricultural products may increase the risk of food insecurity in case of a shock or crisis in the global economy. In this respect, those OIC countries with high dependency on agricultural exports and imports need to exert more efforts to diversify their export products as well as invest in local production of food and agricultural products by using new techniques (e.g. irrigation, mechanization) particularly to increase their resilience.

3.2. Status of Intra-OIC Trade

No country can produce all types of agricultural products to meet the national aggregate demand. It is also almost impossible for any country to consume all domestically produced food and agricultural products. Consequently, countries trade their food and agricultural products internationally. The diversity of OIC countries in terms of production of climate, geography and major agricultural commodities presents a great window of opportunity for enhancing intra-OIC trade (SESRIC, 2021a). In fact, the positive trend seen in the value of intra-OIC food and agricultural trade supports this argument. Intra-OIC agricultural trade grew by about 85% over the period 2011-2021 and exceeded US$ 119.1 billion in 2021 (**FIGURE 3.5, left**). This has made the share of intra-OIC food and agricultural trade in all food and agricultural trade witnessed an increase from 18.0% in 2011 to 24.9% in 2021. In other words, about a quarter of the food and agricultural trade of OIC countries took place among the member countries, while remaining three quarters was realized with the rest of the world.

FIGURE 3.5 Intra-OIC Food and Agricultural Trade (left), 2011 vs 2021 and Concentration in Intra-OIC Food and Agricultural Trade (right), 2021



Source: Own calculation based on data from FAOSTAT.

Not all OIC countries extensively benefit from intra-OIC agricultural trade that such trade activities are heavily concentrated in a few OIC countries (**FIGURE 3.5, right**). The total value of intra-OIC agricultural trade registered by top-five OIC performer countries (United Arab Emirates, Indonesia, Türkiye, Malaysia, and Saudi Arabia represented a share of 54% in all intra-OIC food and agricultural trade in 2021. When this list is expanded to include Pakistan, Oman, Egypt, Iran, and Bangladesh, those top-10 performer OIC countries obtained a share of 75% in all intra-OIC food and agricultural trade. In other words, the remaining 47 member countries could only get a share of 25% in all intra-OIC food and agricultural trade in 2021.

Above-mentioned figures highlight the existence of untapped potential in terms of intra-OIC agricultural trade in many ways. Although there is a positive trend in terms of the value of intra-OIC agricultural trade, the prevalence of concentration of these activities in only a few OIC countries limits the expected extensive benefits from intra-OIC trade.

Commodity Composition

Looking at the commodity composition in agricultural trade in OIC countries could provide additional insights. In this context, **TABLE 3.1** presents detailed trade information on selected seven commodity groups in food and agricultural trade in 2021. In five out of seven major commodity groups, the value of import exceeded the value of export, thus implies a trade deficit. The highest deficit among the seven major commodity groups was observed in the group of "Cereals and Preparations", valued at US$ 59.8 billion. In the commodity groups of "Fruits and Vegetables" and "Fats and Oils (excluding Butter)", the value of export were recorded higher than the value of import, which reflects the trade surplus in OIC countries. In these commodity groups, OIC countries, as a group, offered internationally competitive prices that enabled them to extensively export to the rest of the world. The value of trade surpluses in these two commodity groups were US$ 0.2 billion and US$ 27.5 billion, for "Fruits and Vegetables" and "Fats and Oils (excluding Butter)" respectively.

In four commodity groups namely "Cereals and Preparations", "Other food (incl. Coffee, tea, cocoa, spices, etc.)", "Fruits and Vegetables", and "Fats and Oils (excluding Butter)", OIC countries, as a group, were able to generate export revenue totalling US$ 134.9 billion in 2021, equivalent to 72% of total OIC food and agricultural export. The lowest value of export (US$ 2.8 billion) was recorded in the group of "Meat and Meat Preparations" among the seven commodity groups.

The total value of import for major seven commodity groups exceeded US$ 232.7 billion. Among all commodity groups, the lowest import value was recorded in the

group of "Meat and Meat Preparations". OIC countries imported a significant amount of "Cereals and Preparations", which was valued at US$ 74.3 billion that made it the number one major commodity group in terms value of import.

TABLE 3.1 Agricultural Trade in Selected Major Commodities in OIC Countries, 2021

Commodity Groups	Export		Import		Trade Balance (billion US$)
	Value (billion US$)	% of OIC Total Food and Agricultural Export	Value (billion US$)	% of OIC Total Food and Agricultural Import	
Cereals and Preparations	14.6	8%	74.3	25%	-59.8
Other food (incl. Coffee, tea, cocoa, spices, etc.)	28.3	15%	46.7	16%	-18.5
Fruits and Vegetables	34.4	18%	34.2	12%	0.2
Fats and Oils (excluding Butter)	57.6	31%	30.1	10%	27.5
Dairy Products and Eggs	4.6	2%	16.7	6%	-12.1
Sugar and Honey	4.9	3%	16.2	6%	-11.3
Meat and Meat Preparations	2.8	1%	14.4	5%	-11.6

Source: Own calculation based on data from FAOSTAT.

The relative shares of major agricultural commodity groups could provide additional insights about their relative importance. In this context, the commodity group of "Fats and Oils (excluding Butter)" represented the highest share (31%) in the total value of the OIC food and agricultural export, followed by the group of "Fruits and Vegetables" with a share of 18%. In terms of import, "Cereals and Preparations" obtained the highest share of 25% in the total value of the OIC food and agricultural import. It was followed by the commodity group of "Other food (incl. Coffee, tea, cocoa, spices, etc.)" (16%).

Overall, OIC countries are diverse in terms of climate, geography and production of agricultural commodities. As a result, many of them export and import food and agricultural products to and from the world until they reach an equilibrium in terms of aggregate demand and supply. The ongoing changes in the global trade patterns on agricultural commodities constitute a window of opportunity for many developing countries including several OIC countries that would allow them to be part of global value chains (OECD, 2015).

Nevertheless, the prevailing trade policy measures namely tariffs, non-tariff measures and trade agreements could distort the optimum equilibrium level in terms of agricultural trade (COMCEC, 2019). It is also important to highlight that the agricultural trade performance of the OIC countries is also affected by global prices

of agricultural products. Many OIC countries have limited influence on the global price level of agricultural products such as due to limited production capacities, disorganized markets, lack of organized exchange commodity platforms, connectivity problems, and imperfect competition. In this context, OIC countries need to work on increasing their competitiveness through investing in production techniques such as investing in the use of fertilizers and agricultural mechanization. At the same time, they need to remove restrictions and barriers that distort agricultural trade such as high-tariff rates and complex and time-consuming customs procedures. In this way, OIC countries could be able to reach their full potentials in the production and trade of major agricultural commodities and get an increasing share in the world.

TABLE 3.2 Intra-OIC Trade Potentials in Major Commodities, 2021

Commodity Groups	Trade Status of OIC Group	Number of Countries with Trade Deficit	Number of Countries with Trade Surplus
Cereals and Preparations	Deficit	54	3
Other food (incl. Coffee, tea, cocoa, spices, etc.)	Deficit	46	11
Fruits and Vegetables	Surplus	36	21
Fats and Oils (excluding Butter)	Surplus	48	9
Dairy Products and Eggs	Deficit	54	3
Sugar and Honey	Deficit	53	4
Meat and Meat Preparations	Deficit	53	4

Source: SESRIC Staff Analysis based on the UNCTADSTAT Online Database

Looking at the numbers at the individual country level even makes it clearer that many OIC countries have trade deficits and surpluses in a number of major commodity groups. For instance, in "Cereals and Preparations" and "Dairy Products and Eggs", three OIC countries had a net trade surplus where 54 of them reported net trade deficits in this commodity group (**TABLE 3.2**). From an intra-OIC cooperation perspective, those three OIC countries could export more towards 54 OIC countries by using the cooperation platform of OIC. In a similar vein, 36 OIC countries had trade deficits in the group of "Fruits and Vegetables", whereas 21 of them generated a trade surplus in the same group. Again, a good match between those two groups of countries could take intra-OIC trade to greater heights.

2 TRENDS AND PATTERNS OF FOOD SECURITY

4. State of Food Security

Food security is defined by FAO as every individual having access to sufficient and nutritious food that meets his or her dietary needs for an active and healthy lifestyle. Today, countries around the world are recovering from the pandemic, however, patterns of food insecurity remain a challenge posing serious socio-economic difficulties. The eradication of hunger has taken a central stage in international strategic documents such as the Sustainable Development Goals and the OIC-2025 Programme of Action.

In many low and middle-income economies, hunger and undernourishment – two key indicators of severe food insecurity – are on the rise. Whereas, in developed economies, such as those in Europe, the prevalence of obesity in adults and overweight children is growing. All of this is a direct result of food insecurity resulting from a combination of factors including, but not limited to, difficult economic conditions, weak commodity prices, lack of adequate infrastructure, poverty, conflicts, and adverse climatic conditions, that either prolong or worsen chronic and transitory food insecurity around the world. In light of these challenges, the OIC 2025 Programme of Action puts forward that "without enough and adequate food, it is not possible for OIC member countries to climb the ladder of development" (OIC 2025 Programme of Action Document, Pillar 8, p. 10).

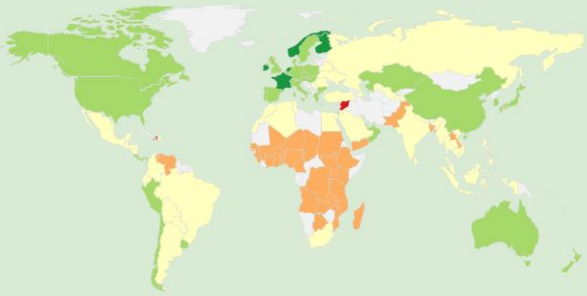
4.1. Overview of Food Security Trends

The Global Food Security Index (GFSI) (EIU, 2022) evaluates the food security of 113 countries, including; 37 OIC member states across four key pillars: affordability, availability, quality and safety, and sustainability and adaptation using a set of 68 indicators. Overall GFSI score ranges from zero to 100, where 100 = best food security. Based on the score countries are categorized into five groups reflecting food security conditions. Scores ranging from zero to 39.9 refers to "very weak" food security, scores from 40 to 54.9 refers to "weak" food security, scores from 55 to 69.9 refers to "moderate" food security, scores from 70 to 79.9 refers to "good" food security, and finally countries scored from 80 to 100 indicates "very good" food security condition in these countries.

The performance of countries varies depending on their geographical location, income status, and current political climate. Globally, only five developed countries;

Finland, Ireland, Norway, France and Netherlands respectively, were categorized as having "very good" food security conditions with overall GFSI scores above 80, in 2022.

FIGURE 4.1 Global Food Security Index (GFSI) Scores, 2022



VERY GOOD SCORE 80+		Δ
GOOD SCORE 70-79.9		**Δ**
UAE	75.2	3.6
Qatar	72.4	-0.6
Kazakhstan	72.1	3.9
Oman	71.2	-2.1
Bahrain	70.3	0.8
MODERATE SCORE 55-69.9		**Δ**
Malaysia	69.9	2.7
Saudi Arabia	69.9	2.6
Jordan	66.2	0.9
Turkey	65.3	0.1
Kuwait	65.2	-2.8
Morocco	63	-0.5
Tunisia	60.3	1.2
Indonesia	60.2	-3.4
Azerbaijan	59.8	1.6
Algeria	58.9	0.4
Uzbekistan	57.5	5.4
Tajikistan	56.7	4.4
Egypt	56	5.1

WEAK SCORE 40-54.9		Δ
Bangladesh	54	-2.5
Pakistan	52.2	-1.2
Mali	51.9	2.2
Senegal	51.2	1.2
Burkina Faso	49.6	-1
Benin	48.1	1.7
Uganda	47.7	3
Mozambique	47.3	3
Cote d'Ivoire	46.5	-4.3
Cameroon	46.4	-1.7
Niger	46.3	-4.5
Togo	46.2	-1.6
Guinea	45.1	1
Chad	43.2	0.9
Sudan	42.8	2.7
Nigeria	42	-2.7
Sierra Leone	40.5	0.4
Yemen	40.1	1.2
VERY WEAK SCORE 0-39.9		**Δ**
Syria*	36.3	-3.6

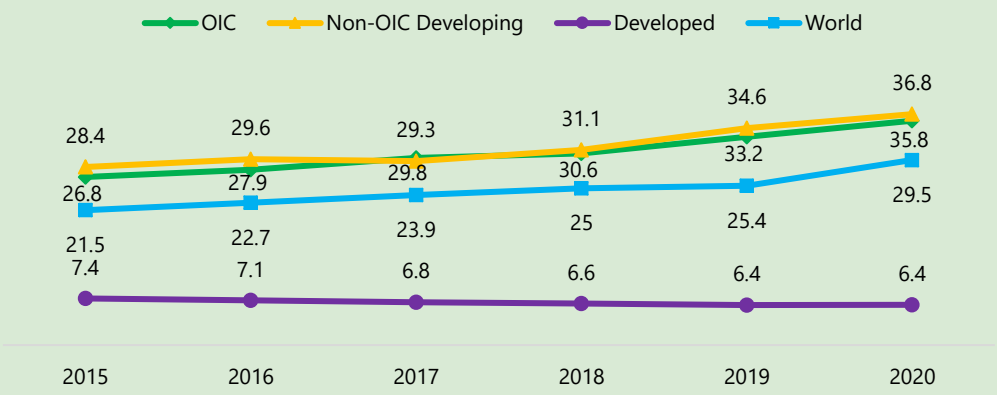
Source: Global Food Security Index by The Economist's Intelligence Unit, 2022. Table shows 2022 scores and change in scores since 2018. Scores are normalized 0-100, where 100=best conditions. Δ = change in score since 2018. Map shows 2022 country classification by score. *OIC membership suspended.

United Arab Emirates was the highest-scored OIC country with 75.2 in 2022 and ranked 23rd globally. Together with the United Arab Emirates also four more OIC countries, namely; Qatar, Kazakhstan, Oman, and Bahrain with scores above 70 were categorized as having "good" food security. 13 OIC countries had "moderate" food security, 18 OIC countries were categorized with "weak" food security, and one country (Syria) with very weak food security conditions as of 2022.

With regard to the progress between 2018 and 2022, as a comparison of current food security conditions with that prior to the pandemic, 23 OIC countries achieved some progress. Particularly, the 10 OIC countries with the most remarkable progress over the period considered were Uzbekistan, Egypt, Tajikistan, Kazakhstan, United Arab Emirates, Uganda, Mozambique, Malaysia, Sudan and Saudi Arabia. Upgrading critical food-related infrastructure has been key in making some of these member countries more food secure. On the other hand, 14 OIC countries revealed negative developments in their food security conditions or GFSI scores (**FIGURE 4.1**).

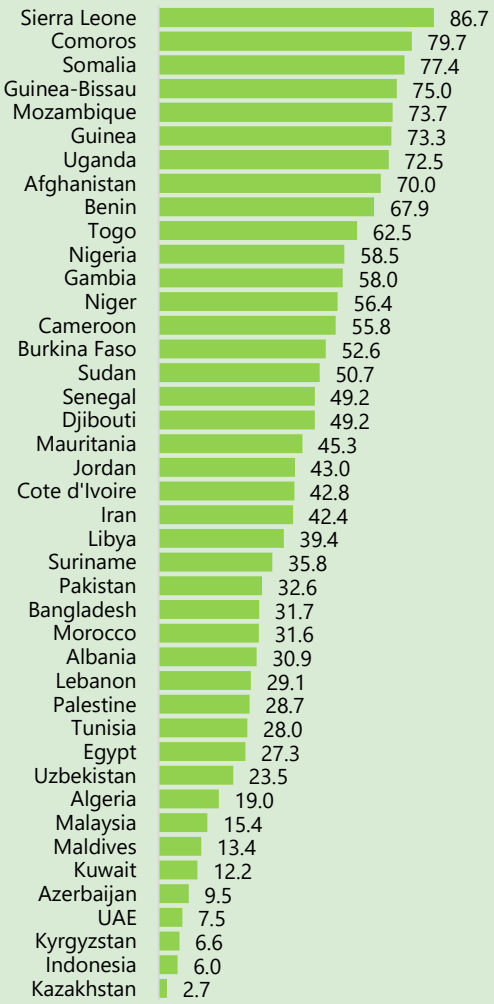
Moderate food insecurity is associated with the inability to regularly eat healthy, nutritious diets. Severe food insecurity refers to an insufficient quantity of food intake (calories) and is thus strongly related to undernourishment or hunger. Globally, an estimated 2.3 billion people were moderately or severely food insecure in 2020. Whilst the greatest numbers are seen in Sub-Saharan Africa and South Asia regions, moderate food insecurity is an issue even in developed countries.

FIGURE 4.2 Prevalence of Moderate or Severe Food Insecurity (%), 2015-2020



Source: SESRIC staff calculation based on the United Nations Statistics Division (UNSD), Global SDG Indicators Database. Note: (OIC: N = 42; Non-OIC Developing: N = 74; Developed: N = 33; World: FAO Estimates).

FIGURE 4.3 Prevalence of Moderate or Severe Food Insecurity (%) in OIC Countries, 2020



Source: United Nations Statistics Division (UNSD), Global SDG Indicators Database.

Proportions of people moderately or severely food insecure have been on the rise both in OIC and non-OIC developing countries and globally. Particularly since 2019, the outbreak of COVID-19 had a visible negative impact on food security. The prevalence of moderate or severe food insecurity has risen by 9 percentage points, from 26.8% to 35.8% of the total population, in OIC countries as a group, from 2015 to 2020. Similarly, non-OIC developing countries' average also increased from 28.4% to 36.8%, over the same period (**FIGURE 4.2**). Whereas, developed countries as a group have achieved to decrease the prevalence of moderate and severe food insecurity from 7.4% to 6.4% since 2015. Furthermore, the pandemic had relatively less impact on developed countries compared to developing ones.

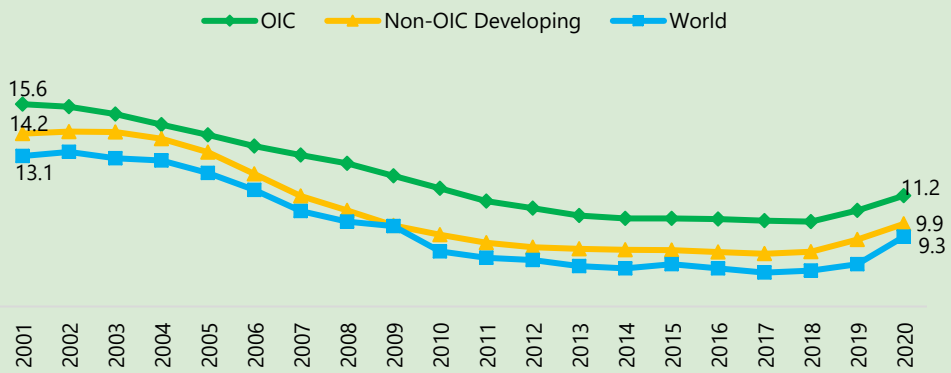
Concerning the individual country-level data, five OIC countries; Kazakhstan, Indonesia, Kyrgyzstan, UAE and Azerbaijan had relatively low levels of moderate or severe food insecurity - below 10% of the total population. However, the situation with food security is alarming across Sub-Saharan Africa and South Asian OIC countries. Half of the total population experienced moderate or severe food insecurity in 16 OIC countries. Among them, in 8 countries; Sierra Leone, Comoros, Somalia, Guinea-Bissau, Mozambique, Guinea, Uganda, and Afghanistan, over 70% of the total population suffered from severe or moderate food insecurity in 2020 (**FIGURE 4.3**). Political instability, combined with conflicts, famine, and economic

recession has resulted in a decrease in food security in these countries leading to shortages in food supply and production. Similarly, in several member countries food production has been volatile in recent years mainly due to unpredictable shocks resulting from climate change such as floods, droughts and crop diseases (WFP and FAO, 2023).

4.2. Progress towards Global Food Security Targets

The prevalence of undernourishment reflects the outcome of the nutritional status in a country, region or other geographic group. It reflects the insufficiency of access to the amount of food to provide the energy and nutrition required to conduct a healthy and active life. Prevalence of undernourishment refers to the proportion of the total population that are underfed and whose typical food intake is not enough to provide the nutritional energy levels that are required to maintain a normally active and healthy life. The statistically meaningful and quantifiable target is to reduce the prevalence of undernourishment to under 2.5% of the population.

FIGURE 4.4 Prevalence of Undernourishment (% of Total Population), 2001-2020

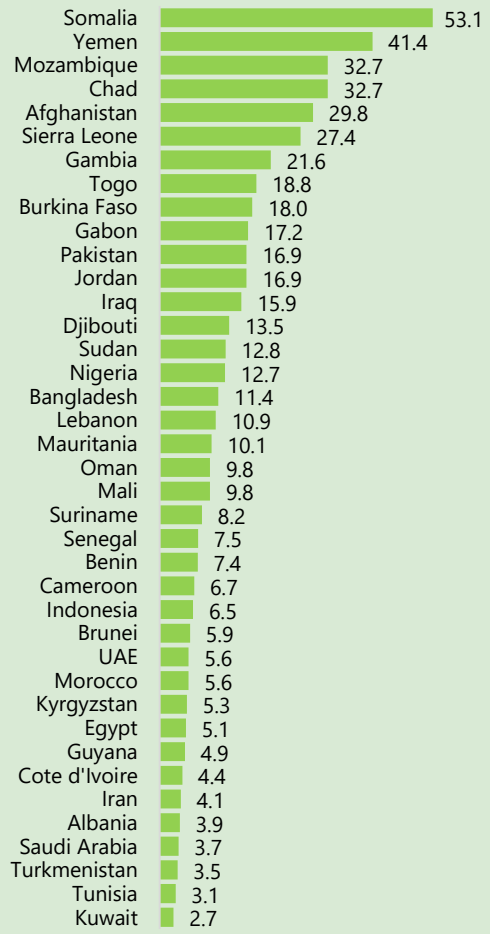


Source: SESRIC staff calculation based on the United Nations Statistics Division (UNSD), Global SDG Indicators Database. Note: (OIC: N = 45; Non-OIC Developing: N = 82; World: FAO Estimates).

FIGURE 4.4 shows that the prevalence of undernourishment has been on a decline over the last two decades, however, it has increased since 2019 due to the negative impact of the COVID-19 pandemic on food security.

As of 2020, there were approximately 203 million undernourished people in OIC countries, corresponding to 28% of the world's total undernourished people and 11.2% of the total population of the OIC countries. The majority of the

FIGURE 4.5 Prevalence of Undernourishment (%) in OIC Countries, 2020



Source: United Nations Statistics Division (UNSD), Global SDG Indicators Database.

undernourished people in the OIC countries are living in South Asia and Sub-Saharan Africa regions. Prevalence of undernourishment in the OIC countries as a group has been above the non-OIC developing countries (9.9% in 2020) and the world averages (9.3% in 2020), over the whole period in focus (**FIGURE 4.4**). Overall, similar downward trends in the prevalence of undernourishment can be seen at individual country levels between 2001 and 2020.

As of 2020, the highest number of undernourished people in OIC member countries was recorded in Pakistan (37.2 million), Nigeria (26.2 million), Bangladesh (18.8 million), Indonesia (17.7 million), and Yemen (12.3 million). Together, these five member countries are home to 112.2 million out of the total 203 million undernourished people in the OIC countries as a group.

In terms of the prevalence of undernourishment, as shown in **FIGURE 4.5**, the highest instances were observed in Somalia (53.1%), Yemen (41.4%), Chad (32.7%), Mozambique (32.7%), and Afghanistan (29.8%). On the other hand, six OIC countries, namely; Algeria, Azerbaijan, Kazakhstan, Malaysia, Türkiye, and Uzbekistan achieved to bring prevalence of undernourishment to below 2.5%, as of 2020 (countries that achieved the target are not included in **FIGURE 4.5**). In addition to these countries, the prevalence of undernourishment also remained below 5% in Kuwait, Tunisia, Turkmenistan, Saudi Arabia, Albania, Iran, Cote d'Ivoire, and Guyana.

4.3. Food Crisis Hotspots

The lack of sufficient economic growth and income is not the only factor that can result in the prevalence of undernourishment. Instead, unpreventable factors such as conflicts that create refugees and internally displaced persons, political instability, and centralization/decentralization of food policy and programs are also of vital importance in bettering or worsening undernourishment. According to the FAO classification updated as of June 2021, 47 countries globally of which 26 OIC member countries were identified as 'low-income food-deficit countries (LIFDCs)'. Low-income food-deficit countries are those that are 'poor' (their net income per person falls below the level used by World Bank to determine eligibility for International Development Assistance). These countries are also 'net importers of food' i.e. they cannot produce enough food to meet their needs and lack foreign exchange to fill the gap by purchasing food on the international market – thus outweighing their exports over imports.

TABLE 4.1 Low-Income Food Deficit Countries (LIFDCs) and Countries Needing External Assistance for Food among the OIC Members, 2023

Low-Income Food-Deficit Countries (LIFDCs) and Countries Needing External Assistance for Food (17)			
Afghanistan	Guinea	Niger	Sudan
Bangladesh	Mali	Senegal	Syria
Burkina Faso	Mauritania	Sierra Leone	Uganda
Cameroon	Mozambique	Somalia	Yemen
Chad			
Low-Income Food-Deficit Countries (LIFDCs) (9)			
Benin	Gambia	Kyrgyzstan	Togo
Comoros	Guinea-Bissau	Tajikistan	Uzbekistan
Cote d'Ivoire			
Countries Needing External Assistance for Food (5)			
Djibouti	Libya	Pakistan	
Iraq	Nigeria		

Source: SESRIC staff compilation based on Food and Agriculture Organization of the United Nations (FAO) List of Low-Income Food-Deficit Countries (LIFDCs) – updated in June 2021 and FAO's list of countries needing external assistance for food.

Countries in crisis requiring external assistance are those that lack resources to manage and respond to problems resulting in, and arising from, food insecurity. FAO identified 41 countries that require external food assistance globally of which 22 are OIC member countries. Conflicts in various OIC member countries result in their performing disproportionately in some critical food security-related areas as opposed to others. A shortfall in cereal production and reduced availability of pastures can be

a result of a lack of rain or other climate and environment-related causes triggering food crises in many OIC member countries. Overall, 17 OIC member countries are classified as both, low-income food-deficit countries and countries in crisis requiring external assistance for food – facing a situation of double gravity when it comes to food security (**TABLE 4.1**). Overall, according to World Food Programme (WFP) and FAO analysis covering the period from June to November 2023 acute food insecurity is likely to deteriorate in 18 hunger hotspots – comprising a total of 22 countries globally.

According to the Integrated Food Security Phase Classification (IPC) (Global Network Against Food Crises & FSIN, 2022) there are five phases of acute food insecurity; IPC Phase 1 (Minimal/None), IPC Phase 2 (Stressed), IPC Phase 3 (Crisis), IPC Phase 4 (Emergency), and IPC Phase 5 (Catastrophe/Famine). Eight countries globally of which six are OIC countries experienced at least 1 million additional people in IPC Phase 3 or above (people in crisis or worse), between 2021 and 2022: Nigeria (+6.5 million), Pakistan (+3.9 million), Somalia (+2.1 million), Kenya (+2 million), Sudan (+1.9 million), the Niger (+1.8 million), Yemen (+1.2 million) and Malawi (+1.2 million). Conflicts, economic shocks and weather extremes are the main drivers of food insecurity. Particularly, conflicts continued to be a major driver for around 117 million people facing high levels of acute food insecurity in 19 countries or territories globally. It is 22 million fewer people than the 2021 estimates - 139 million people across 24 countries or territories. The reason is economic shocks became more prominent driver of food insecurity in Afghanistan, South Sudan and Syria (Global Report on Food Crises 2023).

Requires significant social support to be delivered for people to recover from these shocks. The high levels of acute food insecurity already faced by the more than 59.1 million people in Crisis (IPC Phase 3) in the OIC countries, 16.7 million people in Emergency (IPC Phase 4), and approximately estimated 36 thousand people in a catastrophe like situations (IPC Phase 5) in 2022 (or early 2023) that's coupled by the already high burden of acute malnutrition in most of the OIC countries in food-crisis, that has led to deaths and serious health emergencies. OIC numbers are based on 10 OIC countries with acute food insecurity above IPC Phase 3 with available data. Among the OIC countries, the highest number of people in acute food insecurity, IPC Phase 3 and above were recorded in Yemen and Afghanistan 17.4 million and 17.2 million people, comprising 55% and 40% of their total population, respectively. Pakistan, Sudan and Bangladesh come next, in terms of the number of people in acute food insecurity IPC Phase 3 and above, 10.5 million, 9.6 million and 8.9 million people,

respectively. Besides, there are more than 90.1 million people in IPC Phase 2 and 94.6 million people in IPC/ Phase 1 in the OIC countries (**TABLE 4.2**).

TABLE 4.2 OIC Countries with the Highest Numbers of People by IPC Phases, 2022

Country	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase P3+	Phase P3+
	%	%	%	%	%	%	#
Afghanistan	24%	36%	32%	8%	0%	40%	17,213,584
Bangladesh	41%	35%	21%	3%	0%	24%	8,906,604
Djibouti	41%	38%	14%	7%	0%	21%	249,949
Lebanon	18%	45%	31%	6%	0%	37%	1,984,000
Mozambique	50%	40%	9%	1%	0%	10%	3,146,423
Pakistan	33%	38%	23%	6%	0%	29%	10,521,252
Somalia	52%	19%	22%	8%	0.03%	30%	5,027,420
Sudan	45%	35%	15%	5%	0%	20%	9,648,034
Uganda	45%	31%	21%	3%	0%	24%	1,796,780
Yemen	18%	27%	37%	18%	0.10%	55%	17,365,500
Total # Acute Food Insecurity	94,670,446	90,194,033	59,118,776	16,704,799	35,970	75,859,546	75,859,546

Source: SESRIC staff compilation based on the Integrated Food Security Phase Classification (IPC) Population Tracking Tool.

5. Nutrition Trends

In recent years, there has been a remarkable surge in the recognition and understanding of the vital role nutrition plays in our overall well-being. As more research emerges, the importance of adopting a balanced and nutritious diet has become increasingly apparent. Nutrition, as the cornerstone of our health, encompasses not only the provision of essential nutrients but also the impact of food choices on our physical and mental well-being. In this chapter, the changing landscape and latest trends of nutrition in OIC countries is explored with latest available statistics.

5.1. Availability and Affordability of Healthy Diets

Average Dietary Energy Supply Adequacy

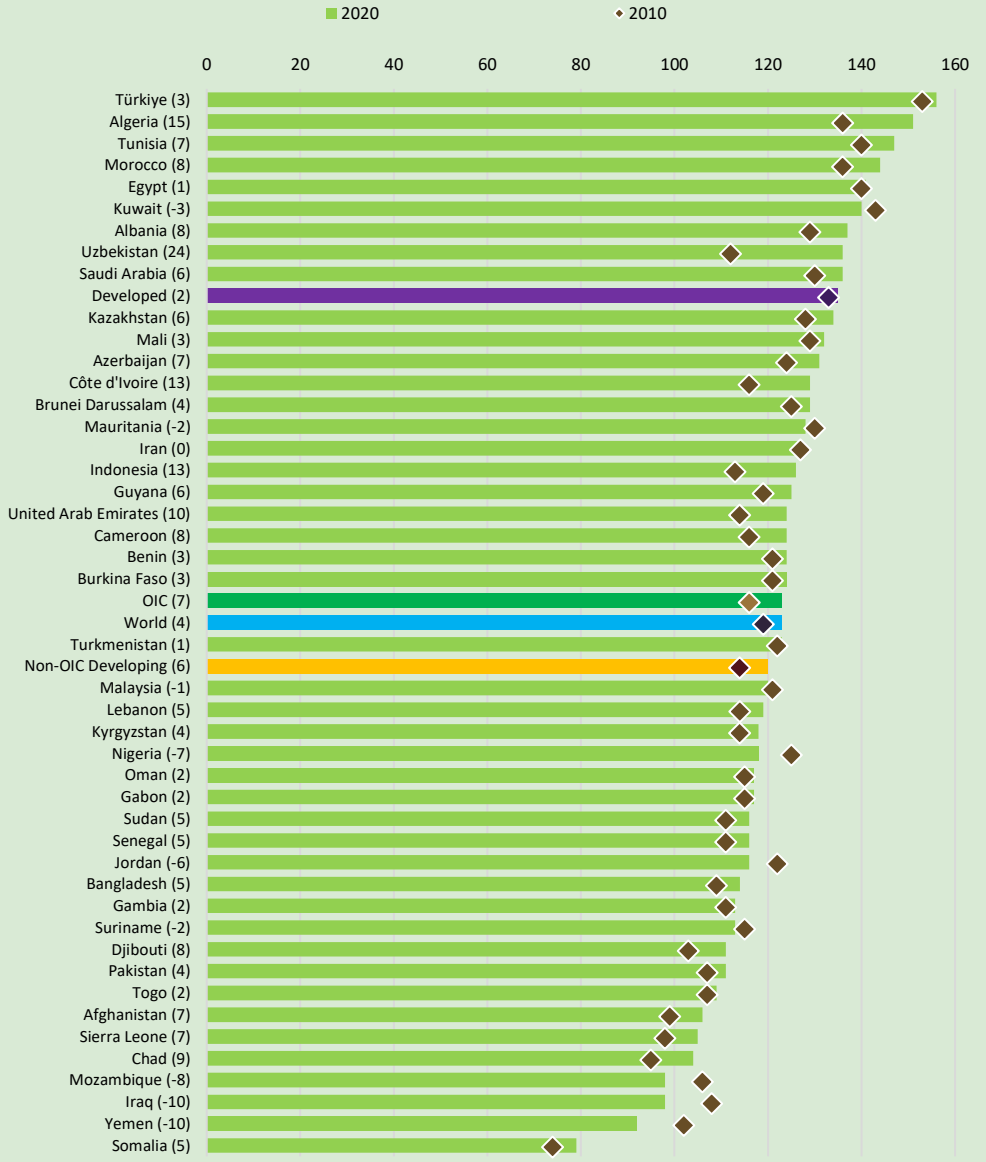
Dietary energy supply adequacy is a crucial measure that assesses the calorie content of available food for human consumption. This metric serves as a valuable tool in evaluating whether a particular region's food supply adequately meets the collective energy requirements of its population. It can be useful for identifying areas where interventions are needed to enhance the availability of dietary energy and ensure the nutritional needs of the population are met effectively.

In the past decade, there has been a global increase in the food available for human consumption, as evidenced by the rise in the average dietary energy supply adequacy worldwide. Between 2010 and 2020, the average dietary energy supply adequacy increased from 119% to 123%. The most noticeable increase was observed in the OIC countries group, where it rose from 116% to 123% during the same period, followed by the non-OIC developing countries, with an increase from 114% to 120%. Despite these positive trends, it is important to note that developed countries maintained the highest average dietary energy supply adequacy in 2020, although their increase was relatively slight, from 133% to 135%. This indicates that developed countries generally have a more abundant supply of dietary energy compared to other regions.

At the individual OIC countries level, the averages dietary energy supply adequacy in 22 OIC countries were above the OIC countries group and world averages in 2020. Among them nine countries, namely Türkiye, Algeria, Tunisia, Morocco, Egypt, Kuwait, Albania, Uzbekistan, and Saudi Arabia had averages above that of developed

countries. In contrast, the averages were lowest in four OIC countries namely; Mozambique, Iraq, Yemen, and Somalia all had below 100% in 2020 (**FIGURE 5.1**).

FIGURE 5.1 Average Dietary Energy Supply Adequacy (%), 2010 vs 2020



Source: SESRIC staff calculation based on the FAO Suite of Food Security Indicators, June 2022 update. Note: The percentages depicted in this chart are median values. (OIC: N = 45; Non-OIC Developing: N = 98; Developed: N = 35; World: N = 169).

Additionally, the averages dietary energy supply adequacy has shown a decline in nine OIC countries, namely Malaysia, Suriname, Mauritania, Kuwait, Jordan, Nigeria, Mozambique, Yemen, and Iraq. This decline indicates a decrease in the availability of sufficient energy through food in these countries, hence raising the concerns about the well-being and nutritional status of their populations.

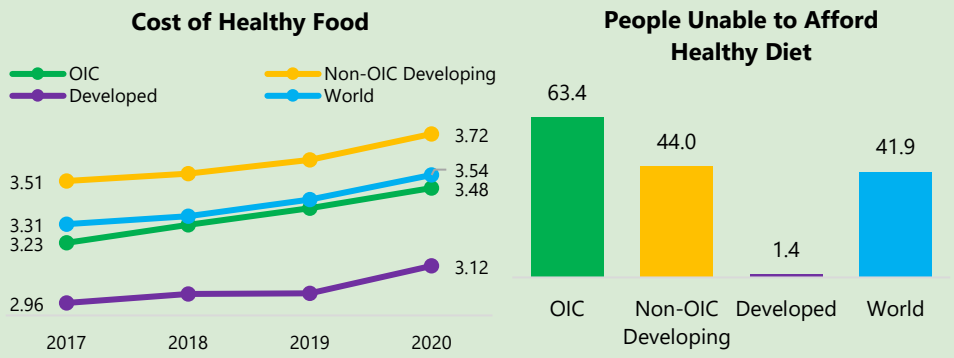
FAO (2017) reported that the reasons for such declines could vary from country to country and some of the factors could economic challenges, political instability and conflicts, natural disasters, and changes in agricultural production can contribute to a decrease in the dietary energy supply. The report mentioned that some of the specific regions experiencing a worsening food security situation include parts of sub-Saharan Africa, South-Eastern Asia, and Western Asia. Particularly concerning are situations where conflict is combined with droughts or floods, as these scenarios have shown significant deteriorations in food security in the recent years.

Cost and Affordability of a Healthy Diet

The link between food security and nutrition hinges on the quality of one's diet. When diet quality poor, this can result into various forms of malnutrition such as undernutrition and micronutrient deficiencies, as well as overweight and obesity. The cost and affordability of healthy diet indicators such as the cost of healthy diet (US$ /person/day) and percentage of people unable to afford a healthy diet provide vital information for stakeholders to help them enhance people’s economic access to a healthy diet and work towards fulfilling long-standing goals related to global food security and improved nutrition.

Against this backdrop, the averages cost of a healthy diet were higher in 2020 as compared to the averages of 2017. Between this period, there has been a sharp increase in global cost of a healthy diet. Between 2017 and 2020, the global average cost of a healthy diet increased by 6.7% from 3.31 US$/person/day to 3.54 US$/person/day. Whereas, in the OIC countries group it increased from 3.23 US$/person/day to 3.48 US$/person/day resulting to 7.7% increase, which indicates that OIC had the highest increase in the cost of a healthy diet as compared to world, non-OIC Developing countries, and developed countries. However, in 2020, the average cost of a healthy diet was highest in the non-OIC Developing countries group with 3.72 US$/person/day (**FIGURE 5.2**). Across the 47 OIC countries for which data was available, the average cost of a healthy diet increased during the period under consideration, with the exception of Algeria, Chad, Egypt and Uganda.

FIGURE 5.2 Cost of Healthy Diet (US$/person/day) (Left), 2017-2020 and Share of People Unable to Afford a Healthy Diet (%) (Right), 2020



Source: SESRIC staff calculation based on World Bank's Food Prices for Nutrition Database.

In 2020, a significant 41.9% of the global population could not afford a healthy diet. The situation was equally challenging in both OIC countries and non-OIC developing countries, with 63.4% and 44% of their respective total populations unable to afford a healthy diet in the same year. In contrast, the majority of people in developed countries were able to afford a healthy diet, with only 1.4% facing affordability challenges (FIGURE 5.2). In 2020, data from 21 of the 40 OIC countries with available data shows that more than 50% of the populations in these countries could not afford a healthy diet. Among these countries, the situation seem to be alarming in 12 countries, namely Nigeria, Sudan, Mozambique, Niger, Guinea, Guinea-Bissau, Pakistan, Benin, Uganda, Sierra Leone, Chad, and Burkina Faso where by more than 75% of their people could not afford a healthy diet.

The emergence of COVID-19 pandemic in 2020 exacerbated this situation. According to FAO (2022b), the economic impacts of the COVID-19 pandemic, along with the measures implemented to control it, have led to inflation in consumer food prices. This has resulted in higher costs and reduced affordability of a healthy diet globally. The report further mentioned that the expenses associated with maintaining a nutritious diet are expected to keep rising as the future trend in the affordability of a healthy diet in 2021 and beyond is uncertain due to variations in income growth.

5.2. Prevalence of Malnutrition and Undernutrition

The severity of food insecurity worsens malnutrition and has serious impacts on an individual's health and well-being. People who are food insecure may not suffer from

hunger, but they may lack access to nutritious and sufficient food, exposing them to malnutrition in the form of adult obesity, anaemia in adults, child stunting, wasting, over and underweight children – amongst a host of other diseases such as diabetes and cardio-vascular disorders (FAO, 2019). From a developmental perspective, malnutrition can have critical impacts on national economies stemming from economic costs resulting from a loss of human capital combined with the direct cost of healthcare. Food insecurity can also have detrimental impacts on households whose quantity and quality of nutrition intake is affected. For women, this can affect maternal nutrition, child growth, and an increased risk of diseases and anaemia (FAO, 2019). Malnutrition leads to anaemia among women of reproductive age around the world. It has also proven to be one of the more obstinate nutritional challenges, with the prevalence of anaemia not having changed since 2012. Iron deficiency is the most common cause of anaemia in women and children. It is also one of the more common nutritional disorders prevalent around the world. The consequences of anaemia and iron deficiency is can result in birth complications, increased risk of maternal mortality and impaired physical and mental development of a child (SESRIC, 2019).

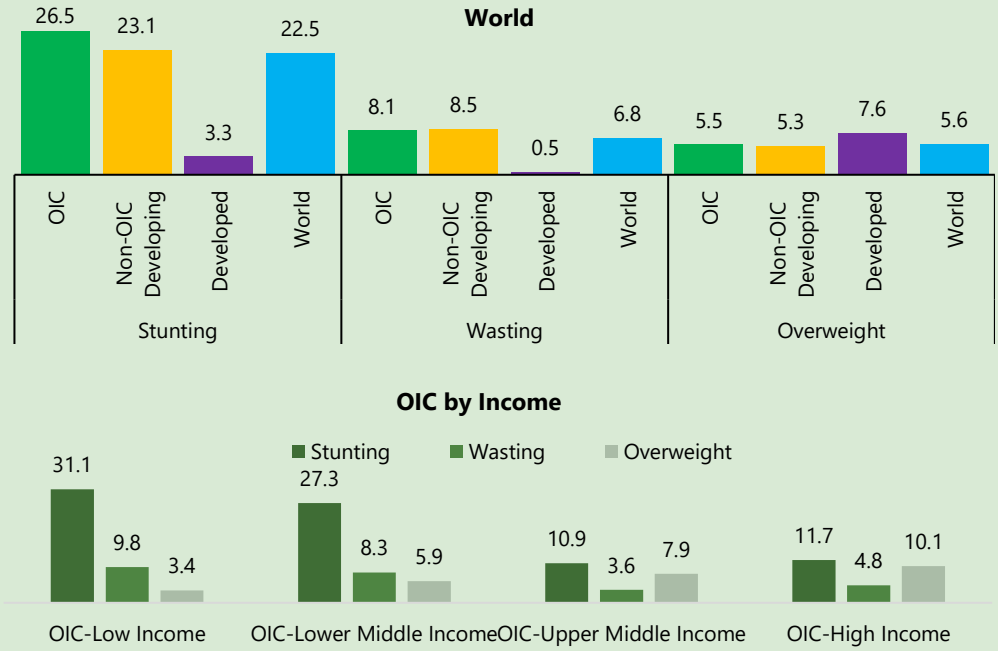
Stunting, wasting and overweight[3] still affect the lives of far too many children under 5 years and in 2022, among the children under-5 years of age, there are approximately 148.1 million stunted, 45 million wasted, and 37 million overweighed in the world (UNICEF, 2023). On the other hand, the prevalence of stunting, wasting, and overweight in children under-5 due to malnutrition continues to be a persisting issue for OIC countries even as the global prevalence of malnutrition related issues in children have improved in the past few years. Proper child nutrition helps not only in improving children's chances of survival during the early years of life but also contributes towards their physical and cognitive development. Without adequate food security, proper child nutrition is under jeopardy.

In 2021, stunting affected an estimated 22.5% children under 5 years globally and the prevalence of stunting was higher in the OIC countries group with a rate of 26.5%, followed by non-OIC developing countries at 23.1% and developed countries with 3.3% had the least rate of stunting children aged under 5 years (**FIGURE 5.3, top**). Breaking down the data by income levels within OIC countries, stunting rates were found to be highest in low-income OIC countries at 31.1%, followed by lower middle-income OIC countries at 27.3%. Upper middle-income OIC countries and high-income

[3] Stunting is a form of undernutrition where children are too short for their age. Wasting refers to an extreme form of undernutrition where a child is too thin for his/her height. An overweight child is too heavy for his/her height.

OIC countries reported stunting rates of 10.9% and 11.7%, respectively in 2021 (**FIGURE 5.3, bottom**). The estimated prevalence rates of stunting children under 5 years of age in 11 OIC countries (Libya, Niger, Mozambique, Sudan, Yemen, Pakistan, Nigeria, Afghanistan, Chad, Indonesia, and Benin) mostly those in low-income group were more than 30%.

FIGURE 5.3 Nutritional Status of Under 5 Children in World Region (top) and in OIC Countries by Income Groups (bottom) (% of total children under-5), 2021



Source: SESRIC staff calculation based on UNICEF/WHO/World Bank Joint Child Malnutrition Estimates. Note: Data is from latest year available. (OIC: N=55; Non-OIC Developing: N=89; Developed: N=16 ; World: N=160).

Globally, an estimated 6.8% of children under 5 years of age were affected by wasting 2021. As shown in **FIGURE 5.3, top**, wasting prevalence in OIC member countries was relatively lower at 8.1% as compared to 8.5% in non-OIC developing countries. Within the OIC countries, the burden of wasting varied across its income group levels as well. Low-income OIC countries had a wasting rate of 9.8%, lower middle-income OIC countries reported 8.3%, while upper middle-income OIC countries and high-income OIC countries had wasting rates of 3.6% and 4.8%, respectively (**FIGURE 5.3, bottom**). Notable of the OIC countries with the highest prevalence of wasting were Burkina Faso (20.3%), Bangladesh (19.3%), Yemen (16.4%), Sudan (16.3%), and Senegal (16.2%).

The estimates demonstrate that OIC countries as a group, along with non-OIC developing countries and the world as a whole are still significantly distant from achieving one of the commitments established for the Global Nutrition Targets 2025, which is to reduce and maintain childhood wasting to less than 5% by 2025. The Sustainable Development Goals (SDGs) also incorporated this target aims to decrease the proportion of children affected by wasting to less than 3% by 2030 (WHO, 2020). In a nutshell, the current progress falls short of these targets, indicating the need for intensified efforts and strategies to address the persistent issue of malnutrition in the OIC countries and globally.

Overweight can cause serious health consequences throughout an individual's life cycle. Currently, there are approximately 37 million overweight children under-5 in the world. The prevalence of overweight among children under-5 were slightly lower in OIC countries (5.5%) and non-OIC developing countries (5.3%) than the global average for overweight children which was 5.6% in 2021. Of all the groups, developed countries had the highest overweight rate of 7.6% regarding the children under-5 years of age. This pattern continues in OIC countries as low-income OIC countries had the lowest rate at 3.4%, while lower middle-income OIC countries had a rate of 5.9%. The rates were highest in in upper middle-income OIC countries at 7.9% and high-income OIC countries at 10.1% (**FIGURE 5.3, bottom**).

Studies have shown that there is a correlation between obesity among and certain demographic factors such as residence in urban areas and belonging to wealthier households as stunting and wasting are more prevalent among children in rural areas and from economically disadvantaged households (FAO, 2022b).

6. Drivers of Food Security Trends

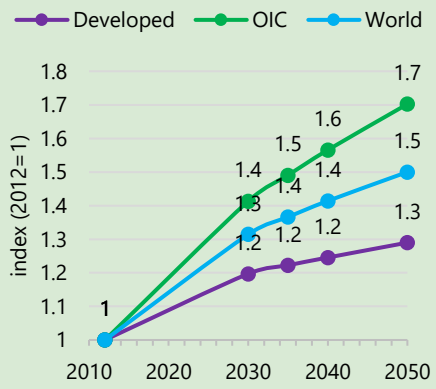
Despite significant advancements in food production and distribution, millions of people around the world continue to suffer from hunger and malnutrition. The drivers of food security are complex and multifaceted, encompassing a range of factors that impact food availability, access, utilization, and stability. With the world population projected to reach 10 billion by 2050, ensuring food security for all is becoming increasingly challenging. In addition, changes in food prices, largely driven by shifts in demand and supply, have significant implications for food security. Climate change, with its unpredictable and extreme weather patterns, can also exacerbating food insecurity. Understanding these drivers and their complex interplay is crucial for developing effective strategies to address food insecurity and ensure a sustainable food future. This chapter explores these drivers of food security and their interplay, highlighting the need for a holistic and integrated approach to addressing the issue of food security.

6.1. Population Growth

There is a high risk of insufficient food and agricultural products output due to an increase in demand for food that cannot be satisfied by an adequate supply. This could be a result of the rapidly expanding population.

It is estimated that the world population to exceed 8.5 billion by 2030 and to continuously increase –though at a significantly reduced rate– to reach 10 billion in the second half of the 2050s (SESRIC, 2021b). The population of developed countries, growing at a rate already as low as 0.26% in the last 5-year period of 2015-2020 is expected to enter a declining trend after the mid-2030s. Thus, almost all of the

FIGURE 6.1 Gross Agricultural Production Projection to 2050 (index 2012=1)



Source: Own calculations based on "Business as Usual" scenario in FAO (2018).

population growth until the mid-2030s and all further growth is expected to occur in the developing world.

In the OIC countries, the population has doubled in 33 years and exceeded 1.9 billion in 2020, accounting for 24.5% of the global population. Although the population growth rate is declining in the OIC as well, these ratios are estimated to rise by 26.3% by 2030 and to increase even further in the following years (SESRIC, 2021b). With these in mind, statistics show that developing countries and OIC countries in particular have been growing at much faster rates than developed countries in the last two decades, and this trend is expected to continue in the decades to come.

Consequently, this high-growth performance requires more attention to be paid to its food security reflections in the coming years, with the aim of providing sufficient and healthy food for the population while at the same time minimising the negative impacts on human health and on the environment.

Future agricultural supply will respond to demand from the growing population, increasing per capita income, and changing consumer preference (FAO, 2018). It is estimated that 50% more agricultural production (in terms of value) relative to 2012 will be needed by 2050 to meet the food requirements of a growing global population. While agricultural production is projected to grow less in developed countries, in the OIC, it is expected that faster population growth will require higher growth in agriculture production. To meet future food demand, at least 70% more agriculture production will be needed in OIC by 2050 (**FIGURE 6.1**).

In the years to come, it will be necessary for the farmers in the OIC to produce an extra quantity of food. This will be challenging as the OIC continues to be a net importer and more than half of its population still cannot afford a healthy diet. Climate change could also make it more difficult to find natural resources, particularly in areas where there is insufficient land or water for agricultural and food production to be viable. Meeting these challenges would require dramatic changes must be made to food production and consumption while keeping the agriculture sector productive and sustainable.

6.2. Changes in Food Prices and Availability

The lingering effects of the COVID-19 pandemic continue to exert inflationary pressure on foods and are contributing to a mixed picture of economic recovery among countries. At the same time, geopolitical instability, conflicts, and insecurities

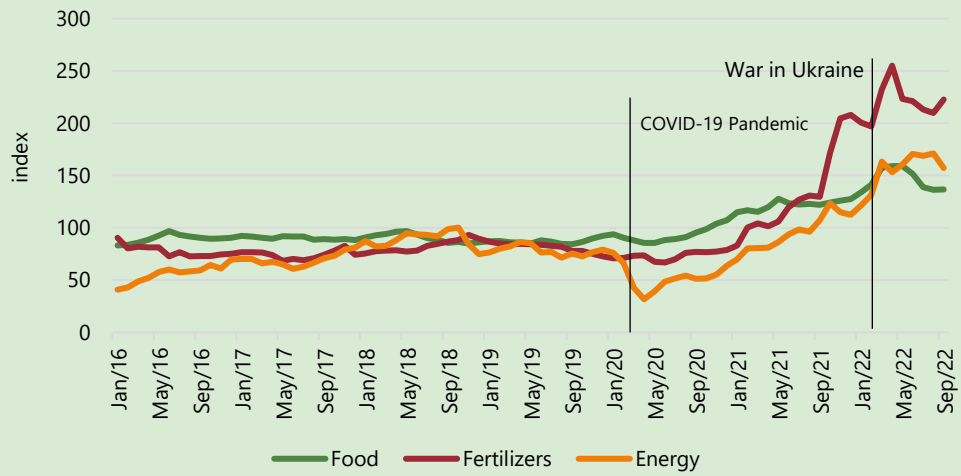
play a significant role in inciting an economic downturn. This, in turn, may have negative repercussions on food security.

The conflict in Ukraine is currently aggravating the situation by interrupting supply chains and influencing global food markets. First, the price of staple commodities such as wheat and cereals rose significantly. Russia and Ukraine are both substantial exporters of wheat. When export routes are restricted, food supplies become limited and prices go up. The war has also disturbed supplies of fertiliser from Russia, which was the biggest exporter in the world. This is made worse by the rising price of gas, which is needed to make fertiliser.

Second, Western countries adopted severe sanctions against Russia, which impeded free trade and led to the return of protectionism. In addition, disruptions in the oil supply shook global markets, resulting in an increase in oil prices, which was followed by a quick rise in food costs. Thirdly, these supply-side variables invariably result in demand-side repercussions; as food costs rise, it becomes more difficult for individuals to afford agricultural items. Demand inevitably declined. Obviously, poorer regions are more severely affected than wealthy countries.

Consequently, the prices of foods, fertilisers, and energy have been on an upward trend since early 2021 and continue to rise amid the war in Ukraine (**FIGURE 6.2**). Levels that have not been seen in decades.

FIGURE 6.2 Global Food, Fertilizers, and Energy Price Indices, 2016-2022

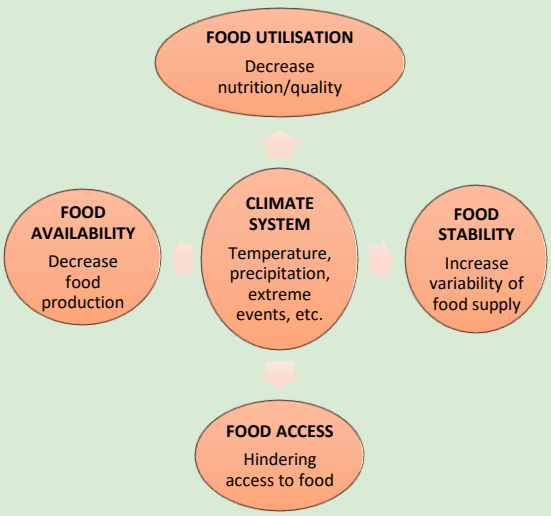


Source: Based on World Bank Commodity Price Index.

Conflict-induced economic downturns are projected to have the greatest detrimental effect on food security in OIC countries. During the ongoing crisis, many people lost their jobs or had their incomes drastically reduced, which will push some households into poverty and threaten overall food security. The population that suffers a loss of income is at risk of not being able to afford their daily food needs. This situation is exacerbated by the increased cost of food as a result of a supply disruption. Member countries that rely substantially on food imports may be at a higher risk. Shock to international trade and currency exchange fluctuation could hamper the food stock, rising local prices, and threatening food security even more. In Sudan for instance, amid the fight to control the COVID-19 outbreak, the prices of various staple foods have increased to record highs in March following a further devaluation of the country's currency (FAO, 2020b).

It is projected that the trend of economic decline would persist through 2022 and beyond. Global growth is anticipated to fall from 6.0% in 2021 to 3.2% in 2022 and then to 2.7% in 2023, while global inflation is projected to increase from 4.7% in 2021 to 8.8% in 2022 before declining to 6.5% in 2023 (IMF, 2022). However, due to their distinct production and trade structures, as well as the varying rates of economic recovery, consumer food price increases are anticipated to vary significantly between regions. The current situation demonstrates how crucial it is for nations to create self-sufficient and sustainable agricultural systems. To achieve this, OIC countries, notably the least developed ones, must reform their agricultural systems.

FIGURE 6.3 Climate Change and Food Security



6.3. Climate Change and Environmental Factors

The present vulnerabilities of food insecurity and malnutrition due to the crisis are further pressured through the compound impacts of climate change on the agrifood systems. In fact, climate change is already contributing to reduced food

security and nutrition and will continue to do so through its direct and indirect impacts on all four dimensions of food security: agricultural production (availability), access to food (sufficient income), utilization (nutrition, quality), and stability (**FIGURE 6.3**).

Food Availability and Access

Impacts of the climate change on food availability relates to the supply side of food, from the farmers level all the way to food processing, supply and distribution of foods. Agriculture, as the primary sector of food production, is highly vulnerable to the adverse impacts of global climate change since higher temperatures, lower precipitation levels, CO2 concentration, and extreme climatic events (such as drought or floods), can lead to reduced crop yields or even crop failures.

Climate change has been observed to have impacts on food availability in OIC countries. In Pakistan, climate warming is seen to be the reason for the change in crop growing patterns. During 1980-2014, the spring maize growing season moved forward by an average of 4.6 days per decade, while the sowing of autumn maize has been pushed back by an average of 3.0 days per decade (Abbas et al., 2017). There is growing evidence that climate change is reducing crop yields in Africa, including for staple foods like maize, wheat, sorghum, and fruit crops like mangoes, which is contributing to already severe food insecurity throughout the continent (Ketiem et al., 2017). There is an intensifying problem with malnutrition in the Sahel region, which, in part is due to the impacts of climate change, as harsh climatic conditions that result in extreme drought have a negative effect on agriculture (Chabejong, 2016).

Climate change may also have negative impacts on access to food. Access to food relates to income and the ability of individuals to acquire sufficient food and nutrition. During the COVID-19 crisis, access to food is the main source of food insecurity in many OIC countries, notably due to the loss of jobs and income in the midst of the COVID-19 pandemic. In the case of climate change, people working in the agriculture sector, as well as the most vulnerable part of society, is highly at risk of not being able to access sufficient food.

Desert locust swarms infested Eastern Africa at the end of 2019 and caused extensive damage to crops and pastures, endangering food security and livelihoods. According to the FAO, over 200,000 hectares of cropland and pastureland were destroyed, making it extremely difficult for 2 million people in the region to obtain food.

Although desert locusts have existed in this region for centuries, this recent outbreak can be attributed to a unique characteristic of the positive Indian Ocean Dipole event (IOD), which was partially caused by long-term sea surface temperature trends. The western Indian Ocean's warming has increased the frequency and intensity of severe weather, including tropical cyclones. Extreme positive IODs are anticipated to occur twice as frequently under a 1.5 °C warmer climate, which could also increase the frequency of pest outbreaks.

Climate change increases the need for robust adaptation measures, such as transnational early warning systems, biological control mechanisms, crop diversification, and additional technological advancements in the fields of sound and light stimulants, remote sensing, and modelling for tracking and predicting movement.

Furthermore, increased extreme events may disrupt agricultural trade and transportation infrastructure. Climate change has caused increasingly unprecedented extreme weather conditions and natural hazards during the past decades. According to the latest data from the Centre for Research on the Epidemiology of Disasters (CRED), the number of natural disasters globally increased from 3,374 in 1992–2001 to 3,802 in 2012–2021, with a peak of 4,300 in 2002–2011. A similar trend is happening in OIC countries. The number of natural disasters has increased from 820 in 1992–2001 (24% of the global total) to 911 in 2012–2021 (26% of the world total), peaking at 1,114 occurrences of disasters in 2002–2011 (24% of the world total). The rising number of natural disasters in OIC countries was driven by climate-related disasters such as floods, earthquakes, storms, wet mass earth movements, and droughts, suggesting a clear link to climate change. These disasters have caused major economic and human losses. Between 1992 and 2021, around 600 million people in OIC countries were impacted, with more than half a million mortalities and over $200 billion in economic damage.

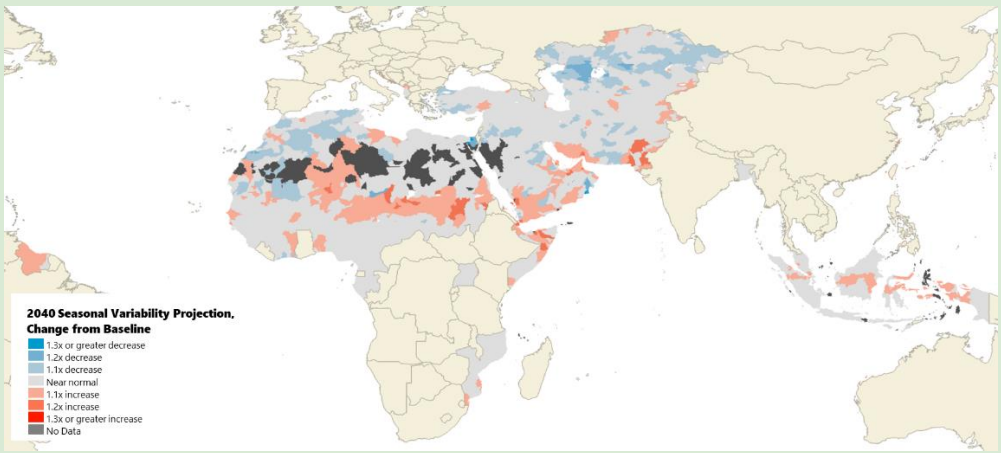
Food Stability and Utilization

A core element of food security – 'food stability' – is directly related to shock factors that can affect both, national and household, food security. Food stability is ensured when "a population, household or individual have access to adequate food at all times, i.e. they should not risk losing access to food as a consequence of sudden shocks (e.g. an economic or climatic crisis) or cyclical events (e.g. seasonal food insecurity)" (FAO, 2008). Events affecting food stability also have an impact on both the availability and access to food, which makes them particularly important for policy makers.

Increased frequency and severity of extreme events (e.g., droughts and heatwaves) lead to greater instability of supply through production losses and disruption to food transport. Furthermore, water, as one of the primary inputs in food production is at risk of increasing its variability. The variability makes water availability less predictable, thereby constraining the effectiveness of water planning and management.

Variability of water supply in some areas in OIC is already high and the future supply of water is predicted to be more erratic and uncertain due to increasing water supply variability. **FIGURE 6.4** shows that some member countries in Sub-Saharan Africa (SSA), Middle East and North Africa (MENA), and Asia are expected to have an increase in seasonal variability of at least 1.1 times relative to the baseline level. The areas that have high supply variability coincide with the ones that already have high water stress, implying that climate change will put more stress on these areas. Climate-related disturbance in water systems is already being felt in various OIC regions. For instance, the degradation of quality and quantity of water resources is recorded in OIC countries in North Africa (Hamed et al., 2018), while an important

FIGURE 6.4 Projected Change in Seasonal Water Supply Variability by 2040



Source: Adopted from SESRIC (2021b)

basin in SSA such as Lake Chad is already experiencing a significant decrease in its surface area (Mahmood et al., 2019). A further change in climate, as a result, will potentially deteriorate the water resources in OIC even further, which will potentially result in a disturbance in the steady supply of food in the region.

The food utilization indices, the fourth core factor contributing to food security, determine the quality of food being consumed and its impact on individuals'

nutritional status. In theory, 'food utilization' looks at how adequate access to water, sanitation, healthcare, feeding practices, food preparation, diet diversity, and household distribution of food is optimally utilized to generate energy and nutrients required by individuals to lead a healthy life (FAO, 2008). For instance, a lack of purchasing power leads households to change their eating habits, resorting to cheaper, unhealthier foods. When combined with the quality and distribution of food supply, this can have impacts on meeting the average dietary energy supply of populations.

To some extent, climate change will have an impact on food utilisation through changes in food safety and quality. A change in temperature, increase in the intensity of extreme events, and other climate-related disturbances may influence food safety by changing the population dynamics of contaminating organisms (IPCC, 2021). For instance, the prevalence of pathogens (such as mycotoxins), the occurrence of harmful algal blooms, and the bioaccumulation of contaminants will all increase as temperatures and CO2 levels rise, posing a threat to human health through pollutant contamination of food (IPCC, 2019). Increased CO2 concentrations in the atmosphere would also diminish the nutritional value of grains, some fruits, and vegetables. Moreover, the rising frequency and severity of extreme events drive up the price of healthy produce compared to alternatives that are lower in nutrients.

3 IMPROVING RESILIENCE OF AGRICULTURAL AND FOOD SYSTEMS

7. Enabling Environment for Agricultural Development

Many agriculture-based developing countries possess a natural comparative advantage in the global market for agricultural and food products; however, they have not been able to capitalise on these advantages to foster competitive agriculture, the food industry, and economic development. The rise of global markets based on competitive advantage has led policymakers to focus on assessing the "enabling environment" for improving the resilience of agricultural and food systems. This requires the development of a robust supply chain, which involves the establishment of a supportive policy framework that fosters productivity (FAO, 2013). The policy framework should foster innovation and technological development and allow farmers and producers to gain access to finance. This will help raise their competency in utilising modern and socially appropriate technologies so that they can maintain and improve their comparative advantage.

7.1. Governance

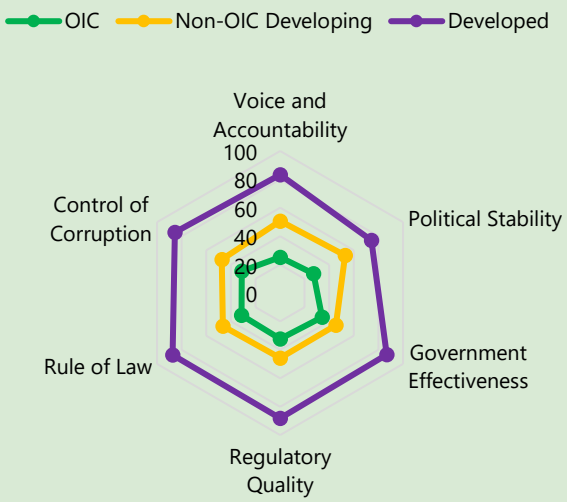
One of the factors influencing the resilience in agriculture sector is a good governance. This is because good governance can help to enhance the efficiency, productivity, and sustainability of the agriculture sector. This can lead to improved livelihoods for farmers, enhanced food security, and more sustainable use of natural resources. According to (Lio & Liu, 2008), countries with better governance can achieve higher agricultural output even when they have similar agricultural capital stock and land resources. This suggests that governance plays a crucial role in driving agricultural productivity by facilitating agricultural capital accumulation.

The significance of governance becomes evident as it is identified as a fundamental factor contributing to the economic underperformance of many developing countries. Therefore, in order to enhance agricultural performance in these countries, it is crucial to prioritize not only physical and educational investments but also improvements in the governance infrastructure.

Following Kaufmann et al., (2005), Governance refers to the traditions and institutions that exercise authority in a country, which can be divided into three aspects: respect for the institutional framework, quality of government action, and selection of the

authority. The first aspect, respect for the institutional framework, comprises two dimensions: "the rule of law" and "control of corruption". The second aspect, quality of government action, has two dimensions: "government effectiveness" and "regulatory quality". The third aspect, selection of the authority, consists of two dimensions: "voice and accountability" and "political stability". Each six dimensions are crucial to agricultural development, as it can help provide public goods and services that contribute to agricultural productivity.

FIGURE 7.1 Governence Indicators by Region (100=best), 2021



Source: SESRIC staff calculations based on World Bank's Worldwide Governance Indicators (WGI) dataset.
Note: Values shown are simple averages of percentile rank among each country group. Percentile rank indicates rank of country among all countries in the world ranging from 0 (lowest) to 100 (highest) rank.

The current state of six dimensions of governance in OIC countries and other world regions is presented in **FIGURE 7.1**. The governance in OIC countries, as a group, is still fall short other regions under consideration. The percentile rank of all six dimensions of governance in OIC countries are between 25 and 34, well below non-OIC developing countries (between 45-53) and developed countries (between 74-88). For OIC countries, "government effectiveness" (34) was the dimension with highest rank, while "voice and accountability" (25) was the lowest.

To enhance governance, consideration must be given to all six dimensions: rule of law, corruption control, government effectiveness, regulatory quality, voice and accountability, and political stability. This includes strengthening legal frameworks, promoting fairness and equality, implementing anti-corruption measures, improving public administration efficiency, ensuring transparent and fair regulations, encouraging citizen participation and access to information, and promoting peaceful political processes. Implementing effective governance systems is crucial for driving

positive reforms in agriculture, which in turn can have a significant impact on food security and poverty reduction.

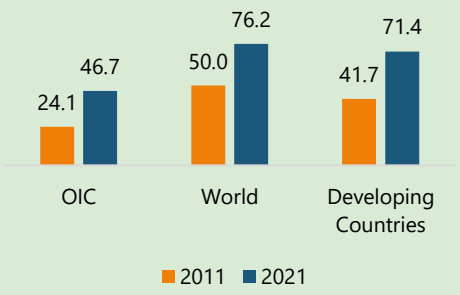
In this regard, to enhance the resilience of agriculture and food systems in OIC countries, it is essential to prioritize the strengthening of institutional capacity and the implementation of supportive policies. This includes measures such as improving land tenure and property rights frameworks, developing effective price policies and trade regulations, and ensuring access to markets for farmers and producers.

7.2. Access to Finance

Access to finance plays a vital role in facilitating and bolstering agricultural production. However, providing rural finance faces inherent complexities due to the seasonal nature of agriculture, unpredictable weather patterns, price-related risks, and the widespread dispersion of farming activities. In numerous low-income and middle-income countries, the limited availability of financial resources poses a significant constraint on the adoption of high-value farm inputs (Sinha et al., 2013).

Improving access to finance can be particularly a challenging task, especially for small farmers and SMEs in the agrifood industry. Constrains regarding access to financing again bring to the fore the issue of land tenure since as previous studies indicate in places where land tenure is weak and property rights are insecure, farmers may not have incentives to invest in beneficial technologies that would improve their agriculture productivity (Jack, 2011). As a result, the lack of modern use of agriculture inputs in OIC countries not only reduces agricultural productivity but also prevents long-term agricultural development.

FIGURE 7.2 Account Ownership (% of population), 2011 vs 2021



Source: SESRIC staff calculations based on World Bank's Global Findex database.

Account ownership is a fundamental indicator of financial inclusion, serving as the key to unlock people access to and utilization of financial services (World bank, 2022). Through the possession of accounts, whether with banks or regulated institutions such as credit unions, microfinance institutions, or mobile money service providers, individuals acquire the

power to securely store, transfer, and receive funds. This newfound financial capability empowers account holders to make crucial investments in various sectors, including agriculture.

Significant progress has been made in global account ownership over the past decade. From 2011 to 2021, the percentage of adults with account ownership worldwide increased from 51% to an impressive 76%. Within this timeframe, account ownership in OIC countries also saw a substantial rise, rising from 24% to 47% of adults. Developing countries experienced a notable surge as well, with account ownership escalating from 42% to 71% (**FIGURE 7.2**).

However, despite these advancements, a significant disparity remains between OIC countries and other regions. Many farmers in OIC countries still lack access to financial services. This hinders the ability of farmers to improve productivity since farmers often cite a lack of capital as the main reason for not modernize their farming Many farmers in OIC countries still lack access to credit, particularly in rural areas. Constrains regarding access to financing again bring to the fore the issue of land tenure since, in places where land tenure is weak and property rights are insecure, farmers may not have incentives to invest in beneficial technologies that would improve their agriculture productivity (Mohammed et al., 2020).

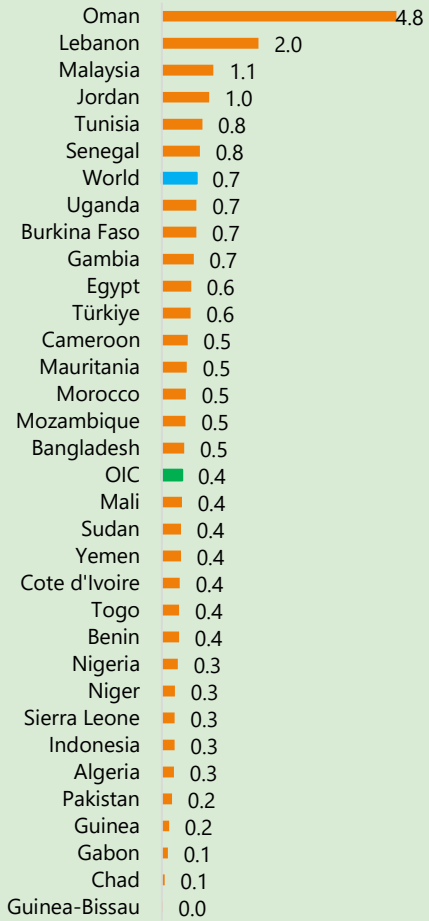
The situation is particularly challenging in many low-income countries, where a combination of agricultural risks, limited borrower information, complex legal procedures, and high transaction costs create reluctance among financial service providers to cater to impoverished farmers (Sinha et al., 2013). In such circumstances, support for financial services can encompass a range of measures, including capacity building through technical assistance and training. Additionally, it is crucial to provide financial backing to revolving funds and offer guarantees to banks or lending institutions, mitigating the risks associated with lending to small farmers who have limited collateral.

7.3. Research and Data

As new technologies and farming practices emerge, it is essential for farmers to stay informed and up-to-date in order to maximize their agricultural productivity and efficiency, while contributing to sustainable agriculture and food security. Various stakeholders, including governments, private industries, and international organizations, are increasingly investing in research and development (R&D) to

develop new technologies and innovations that can contribute to increased agricultural productivity.

FIGURE 7.3 Agricultural R&D Intensity Ratio (%), 2016



Source: SESRIC staff calculations based on ASTI database

The agricultural R&D intensity ratio (IR) is a useful indicator to compare the level of agriculture R&D spending between countries and regions. It measures agricultural research spending as a percentage of agricultural gross domestic product (GDP). The United Nations and African Union recommend that agricultural research spending should be at least 1% of agricultural GDP. However, globally, agricultural research spending falls short of this threshold, with a global IR level of 0.7%. For comparison, high income countries had average IR levels of 2.8%, while China, Brazil, and India had IR levels of around 0.6%, 1.8%, and 0.3% respectively (Beintema et al., 2020).

In 2016, OIC countries had an average intensity ratio of 0.4%, far below the recommended target and the global average level. However, there has been an improvement in OIC's average IR over the past decade, increasing from 0.3% in 2007. **FIGURE 7.3** shows the IR of OIC countries in 2016, with only seven member countries recorded IR higher than the world average level. Three OIC countries surpassed the 1% recommended threshold level, namely Oman (4.8%), Lebanon (2.0%), and Malaysia (1.1%). Lebanon and Oman also significantly increased their IR, with an increase of 4.7 and 1.3 times compared to their IR levels in 2007, respectively.

Despite the high importance of the agricultural sector in the economy, developing countries, in particular, lack investment in agricultural R&D (Beintema et al., 2020). Agricultural research capacity depends on various factors such as the size of the

economy, the importance of the agriculture sector in the overall economic system, and the level of development of the country. Underinvestment is relatively larger among countries with small- and medium-sized research systems (i.e. IR less than 0.3%), which usually have limited potential to improve their research capacity in the short term. Therefore, cooperation between countries with similar characteristics of the agricultural system can be beneficial and foster the development of the agricultural research system of the country.

Several OIC countries have taken notable initiatives to strengthen their agriculture R&D capacity, primarily through their dedicated agriculture research institutions. These institutions play a crucial role in driving innovation and advancements in the agricultural sector. Here are some examples:

- In Malaysia, the Malaysian Agricultural Research and Development Institute (MARDI) plays a pivotal role in enhancing agriculture R&D. MARDI conducts extensive research on various aspects of agriculture, including crop improvement, sustainable farming practices, and agro-biotechnology. The institute actively collaborates with farmers and local communities to ensure the practical applicability and effectiveness of their research findings.
- Egypt's Agricultural Research Center (ARC) is another prominent institution that contributes significantly to agricultural development. ARC conducts research across multiple agricultural sectors, encompassing crop improvement, water management, and animal production. The center maintains continuous collaborations with international partners to foster knowledge exchange and enhance research capabilities.
- Saudi Arabia has demonstrated its commitment to agricultural research and development through the support provided by the King Abdulaziz City for Science and Technology (KACST). KACST actively funds and collaborates on various initiatives focused on crop improvement, water management, and sustainable agriculture practices. The partnership between KACST and research institutions helps drive innovation and development in the sector.
- In Indonesia, the Indonesian Agency for Agricultural Research and Development (IAARD) takes the lead in agricultural research efforts. IAARD conducts research covering a wide range of agricultural aspects, including crop improvement, sustainable farming systems, and post-harvest technologies. The agency places great emphasis on collaborating with farmers and local communities to ensure the practical implementation and effectiveness of their research outcomes.

Research institutions has to work with extension services to develop new technologies that can improve the efficiency and productivity of the agriculture and food

production. Research institutions provide evidence-based research that can be used to inform policy development in the agrifood industry. Examples of such measures include the introduction of more water-efficient crop varieties, better methods for managing soil, and more efficient irrigation systems. Extension services, on the other hand, are responsible for disseminating the technologies to farmers and other stakeholders across agriculture and food systems. In order to ensure that new technologies are adopted and used properly, training and providing support are also critical elements.

Accurate and up-to-date data play a pivotal role in facilitating research and development. Investing in comprehensive data collection is essential to empower farmers and policymakers with valuable insights. Access to reliable data such as information on crop yields, weather patterns, market trends, and land usage enables governments and agricultural organizations to design targeted interventions and support systems that cater to the specific needs of farmers. Moreover, data-driven approaches help in optimizing resource allocation, minimizing waste, and enhancing overall agricultural productivity. Emphasizing data as a fundamental pillar of agriculture development ensures a more sustainable, efficient, and resilient food production system that can address the ever-evolving challenges of a rapidly changing world.

In this regard, the Statistical, Economic, and Social Research and Training Centre for Islamic Countries (SESRIC) has been at the forefront of efforts to strengthen statistical systems in the domain of agriculture and food security at the national, OIC and international levels. Through its flagship data dissemination platform, the OIC Statistics Database (OICStat) (https://www.sesric.org/oicstat.php), SESRIC has been actively promoting the accurate and reliable data on and for the OIC countries to enable evidence-based policy decisions in agriculture development and food security. The OICStat is periodically maintained to ensure the dissemination of the most up-to-date data through the inclusion of new socio-economic indicators on the OIC Member Countries. It is made available online in three official languages of the OIC (Arabic, English, and French).

The OICStat is equipped with "user-friendly" features and currently hosts 1847 indicators under 27 categories with data dating back to 1970. Currently, 118 indicators are disseminated under the agriculture category. These indicators encompass vital aspects such as agricultural production, land use, irrigation, livestock, fisheries, and agricultural trade.

For the construction of sound and feasible development plans and policies, timely and reliable agricultural statistics play an important role in enhancing the production and distribution of food and agricultural products in OIC countries by strengthening the resilience and standards of their communities and ensuring the food security. It is especially required for forecasting as well as an immediate reaction during socio-economic crises such as the recent COVID-19 pandemic as well as the Ukraine-Russia conflict.

To promote reliable and up-to-date data collection in order to ensure sound analysis of food security situation in OIC countries before and amidst such crises, SESRIC explores potential collaboration with all relevant regional and international stakeholders. In this context, SESRIC has conducted an important project on "Enhancing Food Security through National Food Balance Sheets" in collaboration with the Standing Committee for Economic and Commercial Cooperation of the Organisation of Islamic Cooperation (COMCEC) and Food and Agriculture Organization of the United Nations (FAO) in 2021. The project included a training workshop with an aim to equip the official statisticians and agricultural experts of the OIC countries for developing and preparing the annual food balance sheets of their respective countries. The national food balance sheets provide comprehensive information on patterns, levels and trends of national diets, and play an essential role for the analysis of the food and nutrition situation and for policymaking to address it.

Furthermore, since 2020, SESRIC has been hosting and managing the "OIC Portal on Water Resources" (which can be accessed at https://oicwater.sesric.org/) with a view to providing a platform for OIC member countries to share their water-related information, success stories, initiatives, innovative techniques and new mechanisms on water-related issues. The portal seeks to enhance cooperation and collaboration among member countries in addressing water challenges, including water scarcity, pollution, and climate change. In addition, the portal serves as an information and knowledge hub for the OIC member countries in the domain of water.

Efforts in building the capacities of national statistical systems as well as collating and disseminating such data not only empower policymakers but also aid farmers in making informed decisions about crop choices, resource allocation, and risk management. Furthermore, collaboration between countries can help to share knowledge, best practices, and technologies that can help to improve the efficiency, productivity, and sustainability of agriculture. This can be achieved through partnerships between agricultural research institutions, international organizations, and governments, leading to greater investment in research and development.

7.4. Capacity Development

Developing the capacity of individuals, organizations, and institutions involved in agriculture plays a vital role in creating an environment that fosters agricultural development. This process involves enhancing skills, knowledge, and capabilities through training and education. By investing in capacity development, various stakeholders, including governments, non-governmental organizations, and others, can empower farmers, researchers, extension workers, policymakers, and communities. The ultimate goal is to promote sustainable agricultural practices and boost overall productivity and development in the sector.

Several ways capacity development contributes to creating an enabling environment for agriculture include:

- **Enhanced Technical Skills**: Farmers and agricultural practitioners benefit from capacity development programs by receiving training in the latest and most effective agricultural techniques and technologies. As a result, they can improve farming practices, increase crop yields, and manage resources more efficiently.
- **Institutional Strengthening**: Agricultural institutions involved in policymaking, research, extension services, and market facilitation also benefit from capacity development efforts. By enhancing their capabilities, these institutions can better support farmers, tackle challenges, and implement effective agricultural policies and programs.
- **Knowledge Sharing and Networking**: Capacity development initiatives encourage knowledge sharing and networking among stakeholders in the agricultural sector. This allows for the exchange of best practices, innovative ideas, and lessons learned, leading to more informed decision-making and improved agricultural practices.
- **Promotion of Research and Innovation**: Capacity development fosters investment in research and innovation within the agricultural sector. Farmers and researchers are empowered to explore and adopt new technologies, crop varieties, and sustainable agricultural practices.
- **Policy and Regulatory Improvements**: Capacity development for policymakers and agricultural regulators leads to a better understanding of the sector's challenges and opportunities. This knowledge enables the formulation of appropriate policies, regulations, and incentives that support the growth and development of agriculture.

In this regard, SESRIC has been actively involved in enhancing the capabilities of government institutions, extension services, and local authorities in OIC member

countries. SESRIC's efforts in capacity building are exemplified through the establishment of various Capacity Building Programmes (CaBs), such as the

Agriculture and Food Security Capacity Building Programme (Agri-CaB), Cotton Capacity Building Programme (Cotton-CaB), Water Resources Management Capacity Building Programme (Water-CaB), and Statistical Capacity Building (StatCaB) Programme.

BOX B Reverse Linkage Project for Bangladesh: Cotton Varieties Development

Over the past 10 years, SESRIC has actively engaged in several Reverse Linkage projects with the Islamic Development Bank Group (IsDB). SESRIC has played a pivotal role in successfully implementing various phases of these projects, with a particular focus on capacity-building activities.

One standout initiative worth highlighting is the Reverse Linkage Project for Bangladesh on "Cotton Varieties Development". In this project, SESRIC collaborated with IsDB and other stakeholders, including the Nazilli Cotton Research Institute (CRI) of Türkiye (under the Ministry of Agriculture and Forestry of the Republic of Türkiye) and the Turkish Cooperation and Coordination Agency (TIKA).

The primary objective of the "Cotton Varieties Development" project is to enhance local cotton production in Bangladesh, especially in less productive agricultural lands. The beneficiary institution is the Cotton Development Board (CDB), operating under the Ministry of Agriculture of Bangladesh, while the provider institution is Türkiye's Nazilli Cotton Research Institute (CRI).

The project focuses on facilitating knowledge and experience exchange between experts at the Nazilli Cotton Research Institute and their counterparts at the Cotton Development Board (CDB) of Bangladesh. This knowledge transfer aims at enhancing the research capacity of CDB's staff by providing theoretical and hands-on training in cotton breeding and advanced production practices.

The project kick-started with a start-up meeting at the Nazilli Cotton Research Institute in Aydın, Türkiye, in November 2019. This was followed by a Study Visit on "Enhancing Capacity in Cotton Varieties Development". The visit aimed at familiarizing Bangladeshi participants with the work, strategies, methodologies, and techniques employed by various organizations, institutions, and private companies involved in cotton research and development in Türkiye. Subsequently, the project continued with five other training courses held in Dhaka, Bangladesh, spanning between 2020-2023. The trainings provided participants with practical insights and skills in cotton agronomy, enabling them to implement sowing experiments effectively.

SESRIC's engagement in this Reverse Linkage project has been instrumental in bolstering cotton varieties development efforts in Bangladesh. The project has laid the groundwork for the country's sustainable cotton production and agricultural development. Moving forward, SESRIC remains committed to promoting similar initiatives in the domain of agriculture that contribute to the growth and prosperity of the OIC member countries.

- **Agri-CaB** focuses on improving the technical capacities of Member Countries to develop and implement policies that support sustainable agriculture and food security. This includes capacity-building activities in crop production, livestock management, agricultural marketing, etc.
- **Cotton-Cab** aims to improve the competitiveness of cotton production in OIC Member Countries. This includes capacity-building activities in cotton cultivation, harvesting, processing, etc.
- **Water-Cab** focuses on improving water resource management in the member countries by providing capacity-building activities on water conservation, irrigation, water quality management, etc.
- **StatCab** aims at matching statistical needs and capacities of the National Statistical Offices (NSOs) of OIC member countries in order to close the statistical capacity gaps and thus contributing to the improvement of National Statistical Systems (NSSs) of the member countries.

SESRIC also organized several activities as part of the "Reverse Linkage Project" (See **BOX B**).

All of the initiatives aim to equip policymakers, agricultural experts, researchers, and extension workers with the necessary knowledge, skills, and tools to enhance their capacities in different aspects of agriculture and food security. The initiatives cover a wide range of topics, including modern agricultural techniques, water management, climate-resilient farming practices, post-harvest handling, value chain development, and market access. SESRIC organizes workshops, training courses, seminars, and study visits to promote peer-to-peer learning and facilitate the exchange of knowledge and good practices among OIC member countries.

To ensure the quality of its capacity-building programmes, SESRIC collaborates with national, international and regional organizations as well as universities, and research institutions. By promoting knowledge transfer and technology adoption, these initiatives aim to improve agricultural productivity, increase farmers' income opportunities, and bolster food security in the OIC member countries.

8. Sustainable Rural Development

Agriculture, food security, and rural development are deeply interconnected, with each influencing the well-being of communities in significant ways. At the core of this relationship is agriculture, which serves as the primary source of food production. Rural areas play a crucial role in food production, contributing substantially to the supply of food and agricultural products.

The efficiency and productivity of agriculture directly impact food security. Embracing sustainable practices, modern techniques, and improved infrastructure leads to increased crop yields and enhanced food production. However, many rural communities in OIC countries continue to face challenges such as poverty, limited access to resources, lack of infrastructure, and environmental degradation.

The interdependence between agriculture, food security, and rural development underscores the need for a comprehensive and holistic approach to sustainable development. Recognizing and harnessing these interconnections are vital for formulating effective policies and initiatives that promote economic growth, reduce poverty, ensure food security, and enhance the overall well-being of communities.

Some of the ways to address these challenges is to focus on improving physical and human development in rural areas and improve the quality of resources available. In this chapter, the sub-topics of physical and human development and natural resources quality improvement within the context of agriculture and food security is explored, examining the key challenges and opportunities in this area and exploring strategies to increase productivity and improve resilience of agri food systems in OIC member countries.

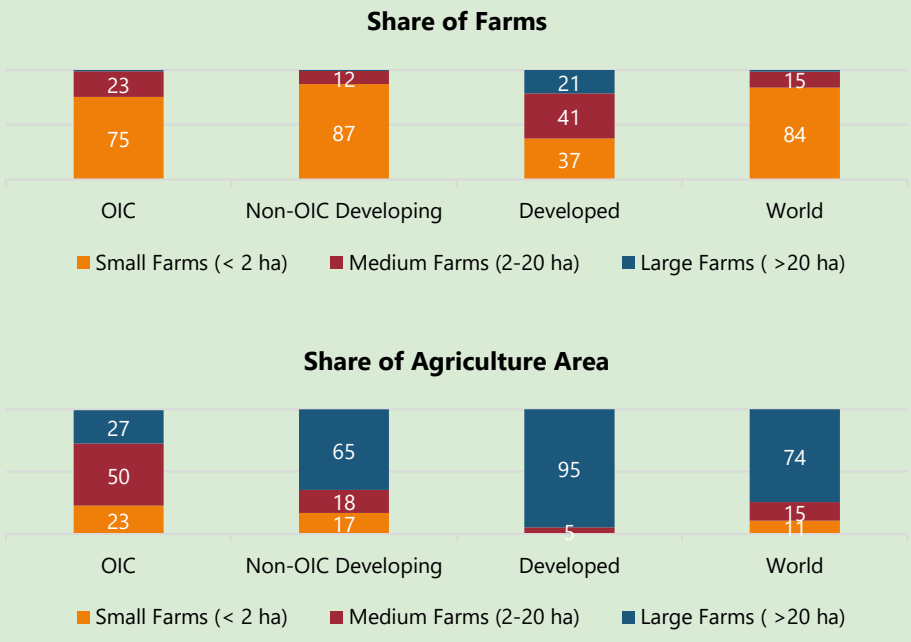
8.1. Physical and Human Development

Addressing challenges in rural areas plays a crucial role in tackling poverty and ensuring food security, especially in regions with a significant number of vulnerable farmers, such as small-scale farmers. While small farms have the potential to yield favourable harvests, they heavily rely on manual labour and resources, resulting in low productivity levels. Consequently, countries strive to transition their workforce away from agriculture, as younger individuals pursue education, migrate to urban centers, and seek higher-paying jobs that offer enhanced productivity levels and

income. A nation cannot overcome deep poverty if a majority of its population remains engaged in smallholder farming.

It is disheartening and paradoxical that many smallholder farmers, who are among the world's poorest individuals, often experience hunger themselves. Globally, there exist over 608 million farms, with approximately 84% of them classified as small farms (covering less than two hectares). However, despite their significant number, these small farms only operate on approximately 12% of the world's agricultural land. Similarly, in OIC countries, around 75% of farms are categorized as small farms, yet they account for merely 23% of the total agricultural land within the OIC region (**FIGURE 8.1**).

FIGURE 8.1 Distribution of Farms Relative to Total Number of Farms (% of total farms) (Top) and Agriculture Area (% of total agriculture area) (Bottom) by Region, 2021



Source: SESRIC staff calculations based on dataset in Lowder et al. (2021)
Note: The dataset consist of 127 world countries including 28 OIC countries.

As described by Jansen (2013), small farms predominantly belong to the category of subsistence agriculture, where traditional production techniques heavily rely on the intensive use of human and animal labour, with minimum utilization of other inputs.

BOX C Rural Development Initiative: the Case of Nigeria's FADAMA Projects

The FADAMA Project Series in Nigeria was an agricultural initiative focused on rural development, particularly in irrigable lowland areas along the country's major river systems. It comprised three phases: FADAMA I, FADAMA II, and FADAMA III. FADAMA I (1992) was a pilot project offering basic irrigation and support to farmers in selected states. FADAMA II (2003) introduced a Community-Driven Development model, promoting local stakeholder engagement in decision-making. FADAMA III expanded geographically, becoming a well-known national brand for local agricultural development.

The project series prioritized building strong farmers' institutions. FADAMA User Groups (FUGs) were established, representing various users like crop farmers, pastoralists, and fishermen. Quotas were introduced to include women and youth in decision-making. These FUGs formed broader FADAMA Community Associations (FCAs) to coordinate activities and collective bargaining. Professional facilitators, financial, and technical advisors supported the groups, and participatory planning was emphasized. The project aimed to foster mutual respect among resource user groups for sustainability.

The impact of FADAMA included increased agricultural yields and incomes. FADAMA I saw financial returns of 65% per hectare for vegetables and nearly 500% for rice paddies. FADAMA II led to a 63% rise in beneficiary incomes, and FADAMA III resulted in significant increases in real incomes and crop yields. Furthermore, the FADAMA Users Equity Fund (FUEF), a revolving fund, helped improve farmers' access to credit from local banks.

The project's group approach promoted collaboration, inclusiveness, and accountability, strengthening social capital and avoiding conflicts. Farmers' buy-in was evident through their substantial contributions to local financing costs. As of December 2021, the FADAMA project established two microfinance banks and helped set up a special community radio station for farmers.

Source: Adapted from Jenane & Oredipe (2022)

These farming practices are commonly adopted by impoverished farmers who cultivate small plots, often in communal settings. Consequently, the productivity of such farms is typically low.

Nevertheless, there exists significant potential for small farms to function as efficient producers capable of generating surplus that can positively impact the broader economy. Therefore, enhancing the productivity of these small-scale farmers becomes a crucial focal point. Alongside improvements in agricultural productivity, the development of a thriving rural nonfarm sector and diversification towards higher-productivity crops are also integral components of achieving success (Rohne Till, 2022).

This reality puts a high importance on rural development especially targeting smallholder farmers. One of the area that can be improved is through education. Education for rural population can greatly improve the agricultural labour efficiency. Therefore, programs to provide workers with the skills and training needed to operate and maintain new technologies should be supported. This can include training on

modern agricultural technologies, sustainable land management practices, and financial management (for example see **BOX C**). Infrastructure development is essential for improving the efficiency and productivity of the agrifood industry. Governments can invest in infrastructure development, including roads, electricity, and communication networks, to improve the access of farmers and agrifood industry enterprises to markets, information, and other resources. Targeted programmes for smallholder farms evidently increased households' farm productivity and income from agricultural sales, leading to the observed higher dietary diversity and food security in beneficiary households (Sibhatu et al., 2022).

An effective approach to enhance agricultural development is by investing in rural infrastructure, particularly rural roads. Improving rural road networks will lead to reducing transport costs, strengthening marketing infrastructure, and value chains, therefore significant benefits can be achieved. For example, empirical evidence suggested that, in Indonesia improved road quality increased labour wages and decrease working time for agricultural workers (Yamauchi, 2016). These improvements can particularly benefit smallholders and enhance the production and marketing of specific cash crops. The resulting increase in income for smallholders can lead to reduced poverty levels, while the improved infrastructure can facilitate increased exports, contributing to economic growth and development.

8.2. Natural Resources Quality

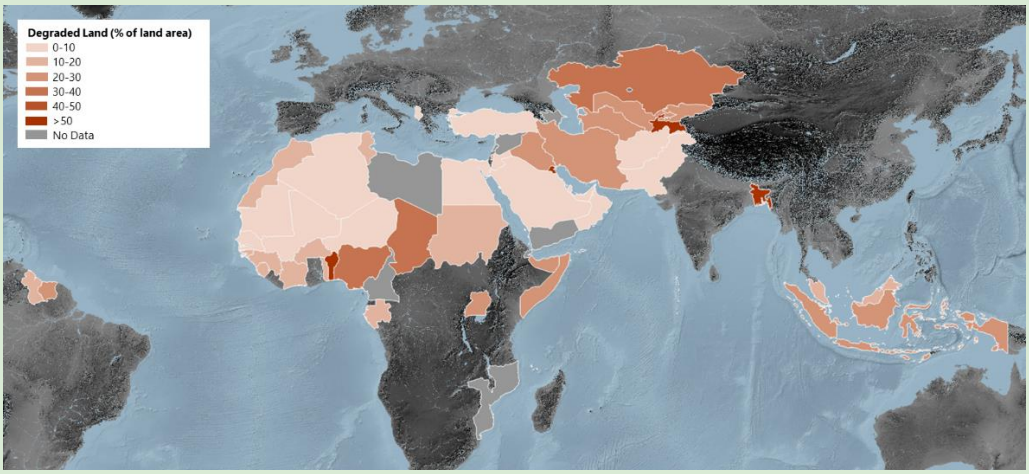
Agricultural production and productivity depends heavily on natural resource endowments, particularly water, land, and soil quality. The availability and quality of these resources are crucial determinants of the potential for agricultural production and the sustainability of agricultural systems over time.

In terms of land availability, the amount of land for cultivation can limit the potential for crop production. In regions with limited land resources, enhancing agricultural productivity often requires using land more efficiently through techniques like crop rotation, intercropping, and precision agriculture (Abegunde et al., 2019). Additionally, preserving land through conservation practices, like reducing deforestation and preventing soil erosion, can help maintain the productivity of agricultural systems over time.

Water is another critical resource for agriculture, as crops require water for growth and survival. Adequate water availability is essential for plant growth, photosynthesis, and the formation of seeds and fruits. Variations in water availability can significantly influence crop yields and the stability of agricultural systems. For instance, water

scarcity can result in drought conditions, causing crop failure and reduced yields. On the other hand, excess water can lead to waterlogging and soil salinization, both of which can negatively affect crop growth and yields. Therefore, an optimal balance of water resources is essential to ensure optimal agricultural productivity.

FIGURE 8.2 Degraded Land by Country (% of total land area), 2000-2015



Source: SESRIC staff generated map, based on UNSTAT SDG Indicators.

Soil quality is also crucial for agriculture, as it provides essential nutrients and physical support to crops. Soil characteristics such as texture, structure, organic matter content, and nutrient availability all contribute to determining the productivity of agricultural systems. Soil degradation due to erosion, overuse, or poor management can reduce soil fertility and lower agricultural productivity. Additionally, soil degradation can reduce the ability of soil to retain water, leading to waterlogging, soil salinization, and decreased crop growth (Jie et al., 2002).

Land degradation is a major threat to biodiversity and agricultural productivity in OIC countries and elsewhere. From 2000 to 2015, approximately one-fifth of the Earth's vegetated land surface experienced persistent and declining trends in productivity, primarily due to poor land and water management (UN, 2020), equivalent to around 2,600 million ha of degraded land. In contrast, the OIC Environment Report (SESRIC, 2021b) highlights that 16% of the land area in the OIC is degraded, equivalent to around 500 million ha of degraded land. At the country level, four countries have alarming levels of land degradation (land degradation of over 50%), namely Tajikistan (97%), Bangladesh (65%), Kuwait (64%), and Benin (53%). Except for Bangladesh, these

are countries with the majority of dry land. Further land degradation would result in desertification (**FIGURE 8.2**).

Land degradation is not solely caused by nature but also by human activity. Unsustainable agricultural practices, rapid urbanization, weak land governance, and expansion of agricultural areas have led to uncontrolled land-use change, contributing to land degradation. In Tajikistan, for instance, severe land degradation occurred due to inappropriate land management practices, poor irrigation, overgrazing, and deforestation. These factors combined have resulted in land abandonment and loss of productivity, intensifying rural poverty in the country (UNDP-UNEP, 2012). To ensure optimal agricultural productivity, soil resources must be managed sustainably through practices like conservation tillage, cover cropping, and the use of organic matter inputs.

BOX D Various Examples of Sustainable Agriculture Practices in OIC Countries

Several OIC member countries have implemented commendable practices in various aspects of sustainable agriculture. For instance, Conservation Agriculture has been successfully adopted in Azerbaijan, Kazakhstan, and Uzbekistan, promoting soil conservation and enhancing agricultural productivity (FAO, 2016). Agroforestry practices have found success in Indonesia and Malaysia, combining tree cultivation with agricultural activities to promote biodiversity and ecosystem resilience (FAO, 2021). Climate-resilient crop varieties are being developed and utilized in various member countries, particularly in Sub-Saharan Africa, aiding in adaptation to changing climate conditions (Acevedo et al., 2020). Furthermore, notable specific initiatives such as the "Green Morocco Plan" in Morocco and the "System of Rice Intensification" (SRI) in Indonesia have displayed innovative approaches towards sustainable agricultural development. In Bangladesh the innovative "Floating Gardens" initiative is implemented, aiming to enhance agricultural resilience in the face of climate change. These examples highlight the commitment and progress made by various OIC member countries in implementing sustainable agriculture practices while at the same time addressing environmental challenges.

In term of natural resources quality improvements, management of soil fertility and water are very important to ensure land productivity. Policies and programs that promote sustainable soil and water management practices, such as integrated soil fertility management, conservation agriculture, drip irrigation, and rainwater harvesting, should be pursued. Some of the practices is illustrated in **BOX D**.

Furthermore, countries can collaborate to address common challenges related to disasters, such as floods, droughts, and pest outbreaks. Cooperation can lead to the development of risk reduction and management strategies that can help to mitigate the impact of disasters on agriculture and ensure the continued productivity of the sector.

CONCLUSIONS AND RECOMMENDATIONS

The agriculture sector holds crucial importance for many OIC member countries as it serves as a primary driver of economic development and livelihood for a significant portion of the population. The OIC-2025 Programme of Action recognizes the pivotal role of agriculture in achieving food security, combating hunger, and promoting overall growth and prosperity across the Islamic world. However, the development of agriculture and the assurance of food security in OIC countries face multifaceted challenges, including issues of productivity, economic crises, and the impacts of climate change. In this era of increasing future uncertainty, it is imperative for member countries to intensify their efforts and collectively strengthen the resilience of the agricultural and food systems. This can be achieved through improving the enabling environment for sector's development and fostering sustainable rural development practices.

Concluding Remarks

While OIC member countries have made notable advancements in the agriculture sector and improved food security, progress has been uneven and slow, with disparities between and within countries. Low-income food-deficit countries and countries in crisis requiring external assistance for food face particular challenges, including limited agricultural capacity, inadequate infrastructure, inefficient resource utilization, and fragile peace and security situations.

Efficient management of agricultural resources and optimized utilization of inputs are essential for enhancing agricultural productivity in OIC countries. However, many OIC countries still face obstacles in optimizing their agricultural inputs, resulting in lower land and labour productivity compared to the global average. These challenges stem from various factors, including limited access to modern inputs, inefficiencies in the land market, and the absence of modern financial mechanisms. In addition, the rapid urbanization should be address in order to prevent declining productivity due to lack of labour. To address these issues, OIC countries need to focus on improving resource management, promoting the adoption of modern technologies, and establishing supportive financial systems that incentivize farmers to invest in productivity-enhancing measures.

The eradication of hunger and food insecurity remains a significant global challenge. The COVID-19 pandemic and factors like rising food prices associated with the Russia-Ukraine war have further exacerbated patterns of food insecurity, posing socio-economic difficulties worldwide. Despite these challenges, several OIC countries have shown progress in addressing food security. The United Arab Emirates, along with Qatar, Kazakhstan, Oman, and Bahrain, achieved "good" food security scores on the Global Food Security Index. However, disparities exist, with some OIC countries experiencing negative developments in food security conditions.

Undernourishment remains a concern in OIC countries, with approximately 203 million undernourished people, accounting for a significant portion of the global undernourished population. While the prevalence of undernourishment in OIC countries is higher than the global and non-OIC developing country averages, there has been a noticeable downward trend over the past decade. Factors contributing to undernourishment go beyond economic growth and income levels, encompassing conflicts, political instability, and centralization/decentralization of food policies. Moreover, a significant number of OIC member countries require external food assistance due to crisis situations, with conflicts and climate-related causes exacerbating food insecurity challenges.

Significant challenges and disparities exist in the availability and affordability of healthy diets, malnutrition rates, and access to clean water and sanitation services in both OIC countries and globally. While average dietary energy supply adequacy has increased overall, some OIC countries still struggle to provide sufficient energy and nutrition to their populations. Affordability of healthy diets remains a concern, hindering efforts to achieve food security, especially in OIC countries where a significant portion of the population cannot afford nutritious food. Food insecurity and high rates of malnutrition, including stunting, wasting, and overweight among children under five, pose significant health and economic challenges.

Policy Recommendations

Transforming the challenges of the agriculture sector in OIC countries into opportunities for improvement is vital for enhancing the resilience of agricultural and food systems. This requires establishing an enabling environment and prioritizing sustainable rural development. Below are several overarching recommendations to consider by member countries across various aspects:

1. **Focus on vulnerable and smallholder farmers.** The majority of farmers in OIC countries are smallholders, and addressing hunger, malnutrition, poverty, and improving livelihoods in these countries requires specific attention to small farms. Supporting vulnerable communities and smallholder farmers is essential for strengthening food security and increasing the resilience of the agriculture sector. Training and education programs can enhance agricultural labour efficiency by equipping smallholder farmers with the necessary skills and knowledge to adopt modern technologies, practice sustainable land management, and improve financial management.

   During times of crisis, timely and appropriate humanitarian aid is crucial, ensuring that it meets fundamental needs, causes no harm, is accessible to all, and builds capacity and resilience. Well-targeted social protection measures, such as expanding existing programs, can alleviate difficulties during crises. In the face of escalating food prices, ensuring that cash-based transfers retain their value to meet essential needs is vital.

   Additional measures to protect the most vulnerable include shock-responsive social protection schemes, distribution of food assistance and cash transfers, school feeding programs, combining cash transfers with technical assistance, labour market interventions such as public work schemes, insurance, microfinance, credit schemes, and improving access to liquidity and finance for vulnerable groups (FAO, 2020a). These measures collectively contribute to the overall welfare and resilience of smallholder farmers and vulnerable communities in OIC countries.
2. **Securing land tenure and property rights.** In many OIC countries, particularly the least developed ones, the absence of established land tenure security presents a significant challenge. This situation leads to inequalities in land ownership, limited access to land, and inefficiencies in land productivity. To foster agricultural growth, it is crucial to address this issue by ensuring land access and granting control over land to impoverished and marginalized rural households.

   The lack of asset ownership as collateral for bank loans further hampers farmers' ability to invest and modernize their farming practices. Additionally, the inadequate functioning of land markets due to insecure property rights, weak contract enforcement, and legal restrictions exacerbates these challenges, underscoring the need for land tenure security and reducing inequality in land ownership.

To promote agricultural growth in OIC countries, it is necessary to ensure land access and empower poor and marginalized rural households with control over land. This will incentivize rural households to invest in agriculture rather than seeking opportunities in urban areas. Integrated rural development projects should prioritize infrastructure development to efficiently utilize agricultural resources and enhance productivity.

It is therefore crucial to implement strong and comprehensive policies and regulations to effectively address land tenure issues. These policies should provide clarity, guidance, and stability to establish secure and transparent land ownership and rights. Streamlining land administration processes, enhancing property rights, and improving access to land for marginalized and impoverished rural households are key aspects that such policies should address. Furthermore, these policies should support sustainable land management practices, promote responsible land use, and protect agricultural land from encroachment and conversion to non-agricultural purposes.

3. **Development of new business model such as contract farming.** New business models have the potential to revolutionize the agriculture sector in OIC countries by promoting sustainable practices, creating new market opportunities for farmers, and improving access to finance and other resources.

   One example of such business model is contract farming. It is an effective business model that can greatly benefit countries by promoting agricultural productivity, enhancing market access, and reducing risks for both farmers and agribusinesses. In addition to contract farming, several other innovative models can contribute to the transformation of the agricultural landscape, such as farmer cooperatives, social enterprises, value-chain integration, and digital platforms.

   These business models not only create opportunities for farmers to increase their incomes and improve their livelihoods but may also contribute to the adoption of sustainable agricultural practices and the overall development of rural communities. It is important to note that, to fully realize their potential, it is crucial for governments, private sectors, and civil society organizations to collaborate and provide the necessary support, including policy frameworks, capacity-building programs, and investment incentives.

4. **Implementation of effective price policies (including trade).** Agricultural price policy refers to intentional actions taken by governments or authorities to influence or regulate the prices of agricultural products. These policies involve setting regulations and interventions to stabilize or control prices through measures like price supports, subsidies, taxes, and import/export regulations. The objectives of these policies aim to strike a balance between the interests of

farmers, consumers, and the overall economy. Effective agricultural price policies require considering market dynamics, supply and demand factors, international trade, and socio-economic goals.

Best practices for agricultural price policy include implementing market-based mechanisms to promote competition and efficiency, providing targeted support for small-scale farmers to mitigate price volatility, ensuring transparency through price information dissemination, utilizing risk management tools, promoting value chains and market linkages, engaging stakeholders in policy-making, and establishing robust monitoring and evaluation systems. These practices aim to balance market forces, support farmer livelihoods, and address specific challenges in the agricultural sector.

Furthermore, enhancing the competitiveness of agrifood products in the global market is essential. OIC countries often have comparative advantages in certain agricultural products, but high trade costs can hinder growth even with complementarities. To enhance agrifood trade, countries should increase market intelligence, reduce trade barriers, and improve customs formalities. These efforts contribute to expanding trade opportunities and capitalizing on the strengths of OIC countries in the agricultural sector.

5. **Improvement of market and finance access.** Governments can support the agriculture sector by improving access to markets through various measures. This includes the construction of physical infrastructure like roads and ports, as well as implementing policies and programs to lower trade barriers and increase trade financing. Strengthening institutions such as agricultural research and extension services, regulatory agencies, and market information systems is also important to enhance market access. Building the capacity of these institutions ensures that farmers and agrifood industry enterprises have the necessary knowledge, resources, and support to operate efficiently and sustainably.

   To improve access to finance in the agriculture sector, several financial instruments can be utilized and developed. These include microfinance, leasing, agricultural value chain financing, credit guarantees, revolving funds, and agricultural funds. A comprehensive approach is required to enhance access to finance. This involves creating an enabling regulatory environment by implementing sound financial sector policies and regulations that promote transparency, stability, and investor confidence. It also includes expanding the reach of formal financial institutions by encouraging branch networks in underserved areas and promoting innovative digital financial services to overcome geographical barriers.

Furthermore, financial literacy and capacity-building programs are essential to empower individuals and small businesses with the necessary knowledge and skills to access and effectively utilize financial services. Incentivizing the development of inclusive financial products tailored to the specific needs of underserved populations, such as microfinance and targeted lending programs, is crucial. Additionally, promoting public-private partnerships and collaboration among stakeholders helps mobilize resources, share risks, and foster innovation in financial inclusion initiatives.

6. **Support the adoption of modern technology and practices including digitization**. The adoption of modern technologies and practices in agriculture can address challenges like water scarcity, land degradation, and climate change, while increasing yields and crop quality. OIC countries should prioritize the modernization of agricultural inputs and practices to achieve these goals. This involves embracing modern agricultural inputs like high-quality seeds, mechanization, and fertilizers, as well as adopting advanced practices such as integrated pest management, conservation agriculture, micro-irrigation, and precision agriculture. Therefore, OIC countries can gradually transition away from the prevalent subsistence and smallholder farming systems to a more modern, resource efficient, and sustainable agriculture systems.

   Precision agriculture, for instance, exemplifies the use of digital technologies in the agricultural supply chain to enhance resilience and minimize disruptions (For example, see **BOX E**). This approach optimizes agricultural processes, reduces resource waste, and maximizes productivity while ensuring adaptability in the face of challenges. To accelerate the adoption of these technologies, governments can attach conditions to stimulus packages and implement targeted innovation policies. However, as job creation is often a primary objective of stimulus measures, the implications of new practices for the labour force need careful consideration and active labour market management.

7. **Increase capacity of farmers to implement climate-smart agriculture practices.** Climate change is a global issue that requires local actions, particularly in the agricultural sector of OIC countries. Strengthening agricultural capacities is crucial to mitigate and adapt to climate change, leading to environmental benefits, socio-economic advantages, and improved food security. Adopting "climate-smart" agricultural practices is key to achieving sustainable food production. These practices aim to increase productivity, reduce greenhouse gas emissions, and enhance resilience to climate shocks. Practical measures such as cropland management, grazing land management, and livestock management can be implemented.

BOX E Precision Agriculture Practices in Türkiye

Precision Agriculture (PA) technologies provide better management practices resulting in more precision in agricultural operations from tillage to harvesting to reduce inputs, increase profits, and protect environment. PA practices in Türkiye have gained significant momentum in recent years. Farmers in Türkiye have embraced advanced technologies and precision agriculture methods to optimize their crop production. Some of key PA practices implemented in Türkiye are as follows:

- **GPS and Remote Sensing**: Global Positioning System (GPS) technology is widely used in Türkiye for precise field mapping and crop monitoring. GPS-enabled equipment allows farmers to accurately mark field boundaries and track the location of farm machinery during operations. Remote sensing techniques, including satellite imagery and aerial drones, provide valuable data on crop health, yield potential, and stress detection.
- **Variable Rate Technology (VRT)**: VRT is extensively adopted in Türkiye to optimize the application of inputs such as fertilizers, pesticides, and irrigation water. By using soil sensors, GPS guidance, and software systems, farmers can precisely vary the application rates of inputs based on the specific needs of different areas within their fields. This approach ensures targeted and efficient use of resources while reducing costs and minimizing environmental impact.
- **Precision Planting**: Precision planting practices are employed to optimize seed placement and spacing, ensuring uniform crop emergence and improved plant health. Planting equipment equipped with GPS technology, tractor with automatic steering, and seed monitoring systems enable farmers to precisely place seeds at optimal depths and maintain consistent spacing between plants. This practice contributes to higher crop yields and better resource utilization.
- **Yield Monitoring and Mapping**: Yield monitoring systems are used to collect data on crop yields during harvesting. GPS-enabled equipment records and maps yield variations across fields, providing valuable insights into spatial yield variability. This data can be used for site-specific management decisions, such as adjusting input application rates and implementing corrective measures in low-yielding areas.
- **Data Management and Decision Support Systems**: Farmers in Türkiye utilize advanced software and data management systems to integrate and analyze various sources of information, including crop data, weather data, soil data, and yield maps. Decision support systems help farmers make informed decisions regarding input management, crop rotation, irrigation scheduling, and pest control strategies.

The adoption of PA practices in Türkiye is increasing and expected to contribute to increased productivity, improved resource efficiency, and enhanced sustainability in agriculture. PA leverages technology and data-driven approaches, where farmers are able to optimize their operations, minimize environmental impacts, and ensure more precise and targeted management of their crops.

Source: Say et al. (2018) and Republic of Türkiye Ministry of Agriculture and Forestry (2020)

In the agriculture sector, policy reshaping is essential to promote environmental sustainability, resilience, and innovation for improved productivity. It is important to invest in training and provide support to farmers to encourage the adoption of sustainable agricultural practices. Such measures would not only benefit the environment and climate but also enhance farmers' livelihoods.

8. **Enhance public-private partnership for rural infrastructure development.** Infrastructure development plays a crucial role in the growth, resilience, and rural development of the agricultural sector. However, some OIC countries still face

infrastructure gaps that hinder the development of a strong agricultural and food sector. To address this, three key agricultural infrastructure needs must be prioritized: rural roads and accessibility, water resource development (such as irrigation and dams), and electricity. Access to reliable infrastructure contribute to increased productivity, improved market access, reduces post-harvest losses, and facilitates the efficient movement of agricultural inputs and products.

Furthermore, significant investments are needed to improve water, sanitation, and hygiene (WASH) services, particularly in OIC countries with low access rates. Policies should focus on enhancing access to clean water, sanitation facilities, and promoting proper handwashing practices, with a particular emphasis on marginalized communities. Achieving sustainable improvements in WASH services requires community participation, gender equality, and cross-sectoral collaborations.

Collaboration between the public and private sectors is needed to meet these goals. Enhancing public-private partnerships for rural infrastructure development allows for the mobilization of private sector resources, expertise, and innovation, leading to more efficient project delivery, improved service quality, and sustainable development outcomes in rural areas.

Finally, there is also an urgent need to improve cooperation between OIC member countries to provide effective and efficient benefits to society. Cooperation is crucial for strengthening institutional capacity and knowledge sharing among OIC member countries to effectively address challenges in agriculture sector and food security. Investing in education and training programmes for government officials and professionals, along with regional and international cooperation, enables the exchange of best practises, technology transfer, and financial support for enhancing resilience of agricultural and food systems.

Furthermore, cooperation between countries can lead to the development of trade agreements that can help to facilitate trade in agricultural products and reduce trade barriers, leading to increased market access and higher prices for farmers. Harmonization of policies and regulations can also help to reduce trade barriers and make it easier for agrifood producers to access finance and other resources.

Member countries are invited to also actively engage in various environmental programmes organized by various OIC institutions such as SESRIC, the Islamic Development Bank (IsDB), Standing Committee for Economic and Commercial Cooperation (COMCEC), Standing Committee for Scientific and Technological Cooperation (COMSTECH), Islamic Educational, Scientific and Cultural Organization (ICESCO), and the Islamic Organisation for Food Security (IOFS).

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ANNEXES

Annex I: Country Classifications

OIC Member Countries (57):

AFG	Afghanistan	GAB	Gabon	MDV	Maldives	SDN	Sudan
ALB	Albania	GMB	Gambia	MLI	Mali	SUR	Suriname
DZA	Algeria	GIN	Guinea	MRT	Mauritania	SYR	Syria*
AZE	Azerbaijan	GNB	Guinea-Bissau	MAR	Morocco	TJK	Tajikistan
BHR	Bahrain	GUY	Guyana	MOZ	Mozambique	TGO	Togo
BGD	Bangladesh	IDN	Indonesia	NER	Niger	TUN	Tunisia
BEN	Benin	IRN	Iran	NGA	Nigeria	TUR	Türkiye
BRN	Brunei Darussalam	IRQ	Iraq	OMN	Oman	TKM	Turkmenistan
BFA	Burkina Faso	JOR	Jordan	PAK	Pakistan	UGA	Uganda
CMR	Cameroon	KAZ	Kazakhstan	PSE	Palestine	ARE	United Arab Emirates
TCD	Chad	KWT	Kuwait	QAT	Qatar	UZB	Uzbekistan
COM	Comoros	KGZ	Kyrgyzstan	SAU	Saudi Arabia	YEM	Yemen
CIV	Cote d'Ivoire	LBN	Lebanon	SEN	Senegal		
DJI	Djibouti	LBY	Libya	SLE	Sierra Leone		
EGY	Egypt	MYS	Malaysia	SOM	Somalia		

* Syria is currently suspended from OIC membership.

Note: Country codes are based on ISO 3166-1 alpha-3 codes.

Non-OIC Developing Countries (98):

Angola	Dominica	Madagascar	São Tomé and Príncipe
Antigua and Barbuda	Dominican Republic	Malawi	Serbia
Argentina	Ecuador	Marshall Islands	Seychelles
Armenia	El Salvador	Mauritius	Solomon Islands
The Bahamas	Equatorial Guinea	Mexico	South Africa
Barbados	Eritrea	Micronesia	South Sudan
Belarus	Ethiopia	Moldova	Sri Lanka
Belize	Fiji	Mongolia	St. Kitts and Nevis
Bhutan	Georgia	Montenegro	St. Lucia
Bolivia	Ghana	Myanmar	St. Vincent and the Grenadines
Bosnia and Herzegovina	Grenada	Namibia	Swaziland
Botswana	Guatemala	Nauru	Tanzania
Brazil	Haiti	Nepal	Thailand
Bulgaria	Honduras	Nicaragua	Timor-Leste
Burundi	Hungary	Palau	Tonga
Cabo Verde	India	Papua New Guinea	Trinidad and Tobago
Cambodia	Jamaica	Paraguay	Tuvalu
Central African Republic	Kenya	Peru	Ukraine
Chile	Kiribati	Philippines	Uruguay
China	Kosovo	Poland	Vanuatu
Colombia	Lao P.D.R.	Romania	Venezuela
Democratic Republic of the Congo	Lesotho	Russia	Vietnam

Republic of Congo	Liberia	Rwanda	Zambia
Costa Rica	North Macedonia	Samoa	Zimbabwe
Croatia	Panama		

Developed Countries (39):**

Australia	Germany	Lithuania	Singapore
Austria	Greece	Luxembourg	Slovak Republic
Belgium	Hong Kong	Macao SAR	Slovenia
Canada	Iceland	Malta	Spain
Cyprus	Ireland	Netherlands	Sweden
Czech Republic	Israel	New Zealand	Switzerland
Denmark	Italy	Norway	Taiwan
Estonia	Japan	Portugal	United Kingdom
Finland	Korea, Rep.	Puerto Rico	United States
France	Latvia	San Marino	

** Based on the list of advanced countries classified by the IMF.

Income Classification of OIC Member Countries

Low Income (16)

Afghanistan	Mozambique	Uganda
Burkina Faso	Niger	Yemen
Chad	Sierra Leone	
Gambia	Somalia	
Guinea	Sudan	
Guinea-Bissau	Syria *	
Mali	Togo	

*Syria is currently suspended from its OIC membership.

Lower-middle Income (20)

Algeria	Egypt	Pakistan
Bangladesh	Indonesia	Palestine
Benin	Iran	Senegal
Cameroon	Kyrgyzstan	Tajikistan
Comoros	Mauritania	Tunisia
Côte d'Ivoire	Morocco	Uzbekistan
Djibouti	Nigeria	

Upper-middle Income (14)

Albania	Jordan	Maldives
Azerbaijan	Kazakhstan	Suriname
Gabon	Lebanon	Türkiye
Guyana	Libya	Turkmenistan
Iraq	Malaysia	

High Income (7)

Bahrain	Oman	United Arab Emirates
Brunei Darussalam	Qatar	
Kuwait	Saudi Arabia	