Organisation of Islamic Cooperation

Statistical Economic and Social Research
and Training Centre for Islamic Countries

Agriculture and Food Security in OIC Member Countries

2016

AGRICULTURE AND FOOD SECURITY

IN OIC MEMBER COUNTRIES

2016

Contributing Institutions

Ministry of Food, Agriculture and Livestock of the Republic of Turkey

Massachusetts Institute of Technology (MIT) The Abdul Latif Jameel Poverty Action Lab (J-PAL)

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

Telephone : 0090–312–468 6172

Internet : www.sesric.org

E-mail : pubs@sesric.org

ISBN: 978-975-6427-44-6

Cover design by Savaş Pehlivan, Publication Department, SESRIC,

SESRIC hereby expresses its profound appreciation to the Department of Training, Broadcasting and Publications of the Ministry of Food, Agriculture and Livestock of the Republic of Turkey for providing printing facilities.

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

TABLE OF CONTENTS

ABBREVIATIONS AND ACRONYMS

CO_2	: Carbon dioxide
COMCEC	: OIC Standing Committee for Economic and Commercial Cooperation
CPI	: Consumer Price Index
EAP	: East Asia and Pacific
ECA	: Europe and Central Asia
FAO	: Food and Agriculture Organization of the United Nations
FPI	: Food Production Index
GHG	: Green House Gases
IDB	: Islamic Development Bank
IPCC	: Intergovernmental Panel on Climate Change
IPCC- UN	: Intergovernmental Panel on Climate Change
J-PAL	: The Abdul Latif Jameel Poverty Action Lab
LAC	: Latin America and Caribbean
LGB	: Larger grain borer
LIFDCs	: Low-Income Food-Deficit Countries
MDGs	: Millenium Development Goals
MENA	: Middle East and North Africa
OIC	: Organisation of Islamic Cooperation
SA	: South Asia
SDGs	: Sustainable Development Goals
SSA	: Sub-Saharan Africa
UNEP	: United Nations Environment Programme
UNIDO	: United Nations Industrial Development Organization
WORLDMUN	: World Model United Nations
WTO	: World Trade Organisation

Acknowledgements

This report was prepared by a research team at SESRIC led by Mazhar Hussain and consisting of Cem Tintin, Kenan Bagci, Nilufer Oba and Davron Ishnazarov. The work was conducted under the general supervision of Nabil Dabour, Assistant Director General of SESRIC and Acting Director of Research Department.

FOREWORD

Over the past decade, food security crises around the world have highlighted the importance of agricultural development and food security in all countries around the globe. In fact, while agriculture is widely known to be a primary economic activity and is assumed to play a major role in the economies of most developing countries, this feature does not stand firm in the case of many OIC countries as well as in the case of OIC countries as a group. Many OIC countries are still facing a number of serious constraints and challenges in these two critical areas. On average, the share of agriculture in total GDP of OIC countries amounted to only 10.4% in 2014, gradually declining from 12.0% in 2000 and 16.3% in 1990.

During this period, agricultural activity in many OIC countries has been steadily replaced by services and, to a lesser extent, by industry. This is due to a combination of policy, structural, climatic and geographical factors. These factors include economic transformation and structural diversification efforts in some countries, the increasing migration of agriculture labour force from rural to urban areas seeking higher wages in other sectors, mainly in the services sector, inadequate agricultural investment and infrastructure, low level of agricultural machinery and technology utilization, the fluctuations in world agricultural commodity prices and trade difficulties that many of these countries are still facing in the international commodity markets, and the scarcity of water resources in many OIC countries, which are located in arid and semi-arid sub-regions of West Asia and North-eastern Africa.

In most of the OIC countries, agriculture production and the supply of agricultural products, mainly food products, did not keep pace with the rapidly increasing demand for food due to the rapid increase in their populations, leading to a widening food gap to be filled by imports. This makes these countries, particularly the 28 OIC Low Income Food Deficit Countries (OIC-LIFDCs), vulnerable to any sharp rise in the international food prices in terms of increasing the food import bills and trade deficits, posing serious negative impacts on health and education, in particular for children, and consequently, worsening the already deteriorated state of food security through increasing the number of undernourished people.

Employing 37.7% of the total population of OIC countries in 2014, agriculture is still considered as an important economic activity with high potential to play a significant role in the economic development of many OIC countries. This is particularly true for the 36 agricultural-based OIC member countries, 19 of which are least-developed countries. These countries enjoy high potential in terms of at least one of the main three ingredients of the agriculture sector (i.e., arable land, agricultural labour force and water resources). Moreover, 25 OIC countries from different climatic regions rank among the top 20 producers of major agricultural commodities worldwide. These commodities vary from cereals such as wheat, rice and maize to tropical/temperate zone commodities such as cocoa, coffee, rubber and sugar. In this respect, the development of a modern agriculture sector in these countries would, therefore, help reduce poverty, secure food sufficiency, provide additional job opportunities for millions, and promote other sectors in the economy that are related to agricultural production.

Given this state of affairs, the *Agriculture and Food Security in OIC Member Countries 2016* highlights the recent state as well as the constraints and challenges of agricultural development and food security in OIC countries. It explores major issues such as agricultural production and productivity, trade in agriculture commodities, agricultural population and land use in agriculture, water resources and their use in agriculture, production and trade of food, food aid, prevalence of undernourishment, and impacts of food price volatility. The report also sheds light on the importance of promoting intra-OIC investment in the agriculture sector and includes a diverse set of policy recommendations and project proposals for enhancing OIC cooperation in this important area.

Amb. Musa Kulaklikaya
Director General
SESRIC

EXECUTIVE SUMMARY

Agriculture Sector: Resources and Potential

Agricultural activities play an important role in OIC economies in terms of employment, production, and therefore development. Recent statistics show that 238 million people (representing 14.1% of the total population) in OIC countries are economically active in the agriculture sector. In particular, in 16 OIC countries the share of the economically active agricultural population is more than 20% of the total population that testifies the importance of the agricultural activities. Overall, more than 51.4% of population in OIC countries lives in rural areas. The OIC countries occupy 25.9% of the world agricultural land area with permanent meadows and pastures take the lion share of the agricultural land in OIC countries.

All these figures imply that OIC countries are not only important players in the world in terms the agricultural population size but also in terms of the agricultural land size. This puts OIC members collectively to the world agricultural production network as a major player.

In terms of water resources and their use in agricultural activities, OIC countries collectively emerge as an important group of countries. The share of OIC countries in the world in terms of precipitation in depth is 22.6%. Among the OIC countries, Malaysia has the highest average precipitation in depth score whereas Egypt and Libya are ranked at the bottom. IRWR (internal renewable water resources) constitute almost 73% of total renewable water resources in OIC countries which implies that OIC countries, collectively, depend more on their internal renewable resources rather than external. Nevertheless, there are several OIC members that experience water scarcity at different degrees. For instance, Kuwait and UAE has the lowest levels of total renewable water resources per capita that put them into the absolute water scarcity category. Such OIC countries are severely in need of external water resources to satisfy the increasing demand for water, unless they find innovative ways to reach usable water from other resources such as purifying the sea water. Moreover, the sustainability of external water resources also has a particular importance for the member countries that have a higher water dependency ratio.

As a group, OIC countries withdraw 29% of the agricultural water in the world. Given the low precipitation in depth scores in countries like Egypt, the ratio of the irrigation area as a percentage of the agricultural area is very high and covers up to 92.8% of the total agricultural area. Concerning the irrigation techniques, the OIC countries mostly deploy the surface irrigation (82%), which is the least water-saving technique among irrigation techniques, whereas the localized irrigation technique, that is the most water-saving one, is practised on only 1.3 million hectares, corresponding to 1.7% of the total area equipped for irrigation in OIC countries.

The OIC countries have an insufficient fertilizer use ratio when compared to other developing countries. In 2013, the fertilizer use per hectare of arableland was calculated as 128 kilograms for the OIC countries. Other developing countries, on the other hand, were using 142 kilograms fertilizer per hectare of arable land. With increasing arable land tendency, agricultural mechanization needs of OIC countries have become more evident that can be seen in the declining number of tractors available per one-thousand hectare of arable land.

As a natural result of the scarcity of water resources, inefficient irrigation techniques, insufficient fertilizer use and low agricultural mechanization, the OIC countries face with low land and labour productivity levels in the agriculture sector. Both land and labour

productivity levels in OIC counties are below the average of the world as of 2013, even though the OIC countries collectively have experienced an increase in their productivity levels since the 2000s.

In research and development, OIC countries perform better than other developing countries in terms of the number of agricultural research staff numbers. Among the members, Morocco has the highest number of agricultural research staff (per 100,000 farmers) which is 747. In terms of the expenditure on agricultural research and development activities (per economically active person in agriculture), the OIC countries also outperform other developing countries with an average spending amount of US$ 172. Turkey spends the highest amount of money (US$ 537) on agricultural research (per economically active person in agriculture) among the OIC members.

Agricultural Production and Trade

While agriculture is widely known to be the primary economic activity and assumed to play a major role in the economies of developing countries, this feature does not stand firm in the case of OIC countries as a group. After a slight expansion in the post-crisis period, the average share of agriculture in the total GDP of OIC economies contracted to 10.2% in 2014.

Agricultural Production Index of the FAO shows that OIC countries, as a group, have registered a comparable performance in terms of increasing their agricultural output vis-à-vis other developing countries as well as the world during the period 2000-2013 and a much better one as compared to the developed countries. As far as the per capita agricultural production index is concerned, it is observed that, during the period under consideration, the average per capita agriculture production in OIC countries has experienced a relatively modest increase as compared to other developing countries as well as the world as a whole.

During 2000-2014, OIC countries have experienced an increase in their share in world production of cereals, fruits, vegetables and meat. In all cases but meat, however, OIC countries have seen a contraction in their shares in the developing countries production. OIC agricultural production concentrates in a few member countries as only ten countries accounted for the 80.7%, 76.2%, 75.7% and 69.0% of the total production of cereals, fruits, vegetables and meat in 2012, respectively.

OIC countries have exhibited their highest shares globally in the total production of palm oil (93%), cocoa (64%), cassava (40%), sorghum (24%), and millet (35%) – as compared to other major commodities based on 2013-2014 data. For the majority of commodities considered in this study, food and feed are apparently the primary methods of utilisation. On average, 97.7% of tea, 91.2% of coffee, 90.0% of sugar, 79.7% of rice, 73.5% of wheat, 75.2% of millet, 81.4% of cocoa, 67.8% of sorghum, and 45.8% of cassava supplies were domestically utilised as human food products in the member countries, whereas 74.9% of barley, 68.2% of oats, 45.2% of maize, and 29.4% of cassava supplies were utilised domestically for feeding to the livestock and poultry.

Notwithstanding the low level of development in the agriculture sector and the relatively low share of OIC countries in the global agricultural production, a significant majority of the member countries are among the top 20 producers of some major agricultural commodities worldwide. However, for many of these countries, particularly those in which the bulk of their exports concentrate on a few of such agricultural commodities, price fluctuations in the international commodity markets may pose additional risks and challenges.

Consumption of livestock products in developing countries, measured as per capita annual consumption in kilograms during, has increased significantly over the past decade. Yet, OIC countries continue to suffer from relatively low levels of consumption in major livestock

products, namely, meat, milk and eggs. One household in OIC countries consumed on average 123.5 kg of livestock products in 2013, as compared to the average 159.2 kg in other developing countries and 289.9 in developed countries. World average is 174.4 kg in 2013. On the production side, developing countries have apparently responded to growing demand for livestock products by rapidly increasing production – with the group of OIC countries being no exception. Between 2000 and 2013, OIC countries as a group have increased their meat, milk and eggs production by 63.5%, 58.3% and 63.7%, respectively. Supply-side factors, such as cheap inputs, technological change and scale efficiency gains in recent decades, seem to be the main drivers of this rapid production growth. Growth in livestock consumption, coupled by increasing economic liberalization, has led to significant growth in the trade of these products. Analysis in this report yields two main conclusions: first, OIC countries are over-dependent in imported livestock products, except for eggs, and, second, this dependency is growing rapidly. As of 2013, OIC countries accounted for 4.6% of world total livestock produce exports and 17.4% of total imports.

Capture fisheries and aquaculture supplied the world with about 191 million tonnes of fish in 2013. During 2004-2013, the average per capita consumption of fisheries products in OIC countries has increased from 13.8 to 16.0 kg – registering a 16.1% increase. This growth pace compares favourably to other developing countries where the average per capita consumption has increased from 15.6 to 16.5 during the same period (6.5%). Again, on the production side, OIC countries accounted for 17.3% of the total world fisheries production in 2013. Inland fisheries production has expanded rapidly over the last decade whereas marine production has remained relatively stable. OIC countries improved their share in world inland fisheries production from 14.5% in 2000 to 17.3% in 2013. Despite a slow growth at global scale, marine fisheries production in member countries have experienced a rapid expansion and increased its share in global marine production from 9.7% to 17.3% over the same period. In terms of production method, a similar argument holds true for global aquaculture fisheries production against capture as well, as the former has more than doubled from 41.7 million tonnes in 2000 to 97.2 in 2013.

In 2011, the total exports of fish, crustaceans and molluscs originating from OIC countries reached 2.7 million tonnes. On the contrary, OIC countries imported 4.2 million tonnes of these fish products in the same year – running a net trade deficit of 1.5 million tonnes.

As far as the aggregate agricultural trade figures are concerned, it has been observed that, as a group, OIC countries have increased their presence in the global trade of major agricultural products. However, with insufficient agricultural production capacity to meet the food demand of their rapidly growing populations, OIC countries, as a group, continued to rely heavily on agricultural imports, particularly of food products. This is clear, in particular, in the case of cereals where, with US$ 53.3 billion imports in 2013, OIC countries accounted for more than half (53.8%) of total cereals imports of developing countries in 2013, and more than one-third (36.5%) of the world total. As in the case of production, a significant portion of the total agricultural trade of OIC countries is concentrated in a few member countries. In monetary value terms, only the top five OIC exporters account for 84.9%, 67.2%, 64.1%, and 79.3% of total cereal, dairy product, fruit & vegetables, and meat exports of OIC countries, respectively, whereas, top 5 importers accounted for 43.9%, 45.7%, 42.8% and 56.4% of the import volume related to each of these major product groups. As a result of the relatively high dependence of many OIC countries on imports of agricultural products, the OIC countries as a group recorded significant trade deficits in most of these products – most notably in cereals with a US$ 46.4 billion, compared to US$ 11.6 billion in 2003. This indicates that the domestic production of agricultural products, mainly food, in most OIC

countries does not increase in equal pace with the increase in population and, hence, that in demand for these products.

Impacts of Climate Change on Agriculture

Climate change is one of the most crucial contemporary environmental challenges with serious negative socio-economic consequences. Undoubtedly, agriculture sector is extremely vulnerable to the climate change mainly due to its higher dependence on climate and weather conditions. Climate change can affect agriculture sector through various channels: temperature rise, variation in rainfall and precipitation distribution, extreme weather events like floods, drought and storms, carbon concentration, and intensification of pest growth. Impacts of climate change on agriculture sector are uneven at global level. In general, developing countries located mainly in arid, semi-arid and dry sub-humid regions are more vulnerable compared to the developed countries. Among the OIC countries, the most vulnerable are the low income and poor member countries located in Africa and Asia. Their higher vulnerability stems mainly from their geographic location, heavy reliance on agriculture, poor infrastructure and low financial capacity to adapt and mitigate the negative impacts of climate change.

Agriculture Development: Major Obstacles and Challenges

Agricultural development in many OIC countries does not receive due prominence from policy makers as agriculture development remains fallow with anemic per capita agricultural growth. In fact various structural, policy and climatic factors can be attributed to the persistent low agricultural productivity in the majority of OIC countries. It is observed that agriculture activities in many OIC countries have been replaced by industrial activities, which has led to underinvestment in public funding for developing more effective and efficient agriculture practices. Poor land productivity in many OIC countries can be attributed to the fact that farmers continue to use outdated farming methods that are waste of human and physical capital due to misuse and insufficient use of fertilizers and mechanization. Inherent problems with property rights and poor contract enforcement are additional factors that lead to inefficiencies in land productivity. Lack of credit particularly in rural areas limits the ability of farmers to expand and improve the productivity of their land, where the lack of a well-functioning and accessible financial market is the major challenge in new technology adoption. On the other hand, considering that access to water and existence of irrigation systems is a major determinant of land productivity, good management of scarce water resources constitutes the most formidable challenge to agriculture in the majority of OIC countries. Current overuse and degradation of water resources and growing consumption by the non-agriculture water consumers will surge the cost of water, and tighten its availability for agriculture even further. Throughout the OIC group, agriculture is particularly exposed to various climatic risks such as long periods of droughts and contamination of pests which is going to be even more acute due to climate change. Considering that 26 OIC countries are subject to water stress and/or scarcity and that more than 86.2% of water consumption in OIC countries goes to agriculture, lower levels of precipitation and increased water evaporation will severely hamper agricultural production. In this regard, lack of agriculture insurance is an additional threat for food security in many OIC countries. However, before consistently introducing agricultural inputs such as seeds and fertilizers to farmers, it is a challenge to introduce agriculture insurance. Another policy area that requires reconsideration in OIC countries is the current insufficient human capital and scientific expertise in agriculture R&D due to limited budgets allocated by national governments. It is also observed that a serious amount of crops do not reach to final consumers due to postharvest losses which needs to be addressed with proper grain storage facilities.

Development of Agro-Food Industries

Agro-industries carry significant importance for development due to several reasons. Most importantly, agro-industries generate strong backward and forward linkages, promoting demand for and adding value to primary agricultural production and creating employment and income along the processing-distribution chain. More specifically, agro-processing enterprises generate demand for agricultural raw materials; this in turn creates work opportunities at the farm level and contributes to increased demand for agricultural inputs such as fertilizers and feeds. Similarly, economic activity is generated in the downstream areas of logistics, distribution and service provision.

Agro-food industry is often the main industrial activity and a major contributor to production, export earnings and employment in many developing countries. However, the analysis on selected crops and livestock products shows that in some products OIC countries have the capacity to process what they already produce and to benefit from value addition during procession of agricultural products. On the other hand, in some others OIC countries lack the capacity to process the goods they produce and lose valuable earnings that could be gained from value added during processing of the goods.

The agro-food industries play a major role in employment creation and income generation. The OIC countries for which the data are available have on average higher shares in four indicators of agro-food industries compared to the averages of other developing countries, indicating higher importance of the sector for these economies. The highest discrepancy between OIC and non-OIC developing countries exists in the share of industry in total output, which is 15.9% in OIC countries and only 10.2% in other developing countries. Similarly, agro-food industries represent on average 16% of total employment in manufacturing industries in 34 OIC countries compared to only 11% in other developing countries. Wages in agro-food industries represent accordingly a higher share of total payments, 12.2% of wages paid in all manufacturing industries in OIC countries compared to 9.1% in other developing countries. Finally with respect to the relative importance of the industry in value-added, 11.9% of total value-added in manufacturing industries comes from agro-food industries in OIC countries, compared to 10.1% in other developing countries and 9.7% in developed countries. On the other hand, 16.9% of total enterprises are operating in agro industries in OIC countries compared to 24.7% in other developing countries.

State of Food Security

Global food production index (FPI) has increased by 25% in 2013 compared to the base year level of 100 in 2005. FPI of OIC countries, as a group, also indicated an upwards trend and remained above the world average. However, at the individual country level, the increase in FPI was lower than the world average in 25 OIC countries in 2013.

Food production per capita index of OIC countries exhibited an upward trend during 2000-2013. On average, in terms of per capita food production, OIC countries witnessed an increase of 10% remaining below the world average, which witnessed a 15% increase during the same period.

During the period 2000-2014, food trade indicated an upward trend, where global food exports increased from US$ 430 billion in 2000 to US$ 1483 billion in 2014. OIC countries also witnessed an increasing trend in their food exports during the same period by increasing their food exports from US$ 27 billion in 2000 to US$ 140 billion in 2014. However, at the individual country level, food exports are concentrated in a few OIC countries, where in 2014, only 10 countries, together, accounted for 84% of total food exports of OIC countries.

Total food imports of OIC countries increased from US$ 43 billion in 2000 to US$ 218 billion in 2014. As was the case with food exports, OIC food imports are also concentrated in a few member countries, where in 2014; the top 10 OIC food importing countries accounted for 68% of the total food imports of OIC countries.

During the period 2000-2014, the growth of food exports were outweighed by the growth of food imports in OIC countries. Food trade deficit of OIC countries has increased rapidly from US$ 16 billion in 2000 to US$ 79 billion in 2014.

According to recent FAO classifications, 28 OIC countries are found to be among the world 54 low-income food-deficit countries (LIFDCs); most of them are in Sub-Saharan Africa and the arid regions of West Asia and North-eastern Africa. Food shortages continued to affect a significant number of the 28 OIC-LIFDCs, where 17 of them have been classified by the FAO as "Countries in Crisis Requiring External Assistance."

The volume of cereal aid declined, over the past two decades, in absolute terms. Total cereal aid deliveries to OIC countries decelerated to 0.41 million metric tons in 2013-15, down from 5.5 million metric tons in 1990-92, corresponding to a decrease of 92.6%. Similarly, the total cereal aid shipments to the OIC-LIFDCs declined from 3.4 million metric tons in 1990-92 to 0.36 million metric tons in 2013-15, corresponding to a decrease of 89.4%.

Although the prevalence of under-nourishment (i.e. the share of undernourished people in the total population) in OIC Countries declined from 23.6% in 1990-92 to 14.8% in 2014-16 period, there were still 166 million undernourished people in OIC countries, corresponding to 20.8% of the world total undernourished people. At the individual country level, some OIC countries made impressive progress and the share of undernourished people in their total population declined significantly during the period between 1990-92 and 2014-16. However, prevalence of under-nourishment was still very high in many OIC countries, particularly in the OIC-LIFDCs in Sub-Saharan Africa and South Asia.

During the food crisis of 2006-08, prices of all major food commodities witnessed an exponential increase and reached to their historic peaks in 2008. After a slight decrease in 2009, prices of most of the major food commodities exhibited an upward trend again up to the end of 2012. Afterwards, prices started to decline and as of 2015 prices of maize, soybeans, rice, barley and wheat were significantly lower than their 2012 levels. Undoubtedly, food price hike and volatility witnessed during and after the food crisis of 2006-08 caused serious negative socio-economic impacts on the economies of many developing countries, including OIC members and, therefore, created further hardships for millions of people who were already suffering from the hunger and poverty in these countries. The OIC-LIFDCs were more exposed to these negative impacts than the others, where food price inflation worsened the already deteriorated food security situation in these countries, increased the food import bills and trade deficits, triggered the head line inflation and, thus, posed serious negative impacts on health and education of the poor people in these countries who spend the bulk of their income on food consumption.

OIC Cooperation in Agriculture and Food Security

The importance of agriculture sector in the economies of OIC countries, especially the importance of the issues related to food security, and, thus, the urgent need for growth and development in the agriculture sector had been recognised quite early. It was also realised that the food issue was closely linked with agricultural production, productivity, input use, infrastructure, agricultural policies, trade and related issues. Consequently, in the context of its rapidly expanding economic agenda, the OIC began to focus quite extensively on agriculture and food security, particularly during the 1980s.

Six ministerial conferences have been held between 1981 and 2015 to strengthen the cooperation and foster development in agriculture and food security in OIC countries. Additionally, the 1981 and 1994 OIC Plans of Action to Strengthen Economic Cooperation among Member Countries and the 2005 OIC Ten-Year Programme of Action to Meet the Challenges Facing the Muslim Ummah in the 21st Century have also paid significant attention to agricultural and rural development and food security.

Agriculture and food security has been identified as one of the six priority areas in the new COMCEC Strategy with the aim of increasing the productivity of agriculture sector and sustaining the food security in OIC countries. With this new strategy, COMCEC aims support the productivity of agriculture sector, improve the effectiveness of the regulatory and supportive role of the state in agriculture sector and food security, promote reliable and up-to-date data collection with a view to ensuring sound analysis of the sector and improve the market performance and access of the member countries.

Notwithstanding all these efforts, the OIC countries did not reach, over these long years, workable cooperation arrangements with concrete results in agricultural development and food security area to help the development efforts of the majority of the member countries. All the above-mentioned conferences and meetings have only brought out, although not yet realized, ideas to enhance cooperation among the OIC countries in food security and agriculture. Among others, these ideas include:

- Strengthening cooperation in the field of preparation and implementation of food security programs at regional and national levels and in rehabilitation and rebuilding of the agricultural sector in poor member countries,
- Financing food and agricultural projects at national and communal level,
- Solving the financial constraints on food production,
- Sharing agricultural technology among OIC countries.

In general, agricultural development and food security in a country can be improved by increasing agriculture output, particularly food products, through either increasing agricultural productivity or extension of the arable land area (i.e. bringing more land under cultivation). This, of course, necessitates the availability of appropriate investments in agriculture sector at the national level and/or in terms of foreign direct investments (FDI). However, while investment in agriculture is a well-established economic activity in the developed countries, it is still lagging behind in many developing countries, particularly in the least-developed and low-income agricultural-based countries.

During the recent years, two project proposals have gained support from the member states and moved towards materialization. These proposals were on the establishment of an Islamic Organisation for Food Security (IOFS) and OIC Agro-food Industrial Association. IOFS will be a specialized institution of OIC. Its aims are mainly to provide expertise and technical know-how to member states on the various aspects of sustainable agriculture, rural development, food security and biotechnology, including addressing the problems posed by desertification, deforestation, erosion and salinity as well as providing social safety nets; to assess and monitor the food security situation in member states in order to determine and make necessary emergency and humanitarian assistance, including the creation of food security reserves; to mobilize and manage financial and agricultural resources for developing agriculture and enhancing the food security in member states; and to coordinate, formulate and implement common agricultural policies, including the exchange and transfer of appropriate technology and public food management system.

On the other hand, OIC Agro-Industrial Association would serve as a platform for companies and individuals engaged in this industry to exchange ideas and experiences and develop a robust value-chain approach to agro-industrial development. Once established, the OIC Agro-Industrial Association will operate like its counterparts in other regions and is expected to provide a forum for all the public and private ventures working in the domain of agro-industrial development towards contributing to the growth of agro-food industries.

In addition to the ongoing cooperation activities, the report proposes three project proposals for cooperation among the OIC countries in the area of agriculture development and food security. These are establishment of OIC Seed and Crop Improvement Centre (OIC-SCIC), establishment of OIC Agricultural Investment Promotion Agency (OIC-AIPA) and establishment of OIC Agriculture Commodity Exchange Market (OIC-ACEM).

1.Agriculture Sector: Resources and Potential

Agricultural activities play an important role in OIC economies as in many other developing countries in terms of employment, production and therefore development. This chapter overviews some selected agricultural indicators such as the land use, irrigation techniques and agricultural productivity for the OIC countries in a comparative perspective. The analysis shows that compared with the situation in the 2000s, OIC countries, as a group, stand in a better position in terms agricultural production, productivity and mechanization in the 2010s. However, many OIC countries still lag behind the OIC averages, and therefore they are in need of agricultural reforms to improve their position in agricultural production and activities. On top of that for several OIC countries agriculture is a key sector that can help carrying them to higher standards of living. To this end, enhancing the utilization of the available agricultural resources and increasing the existing labour and land productivity levels in the agriculture sector would make an important contribution to the development process in OIC countries.

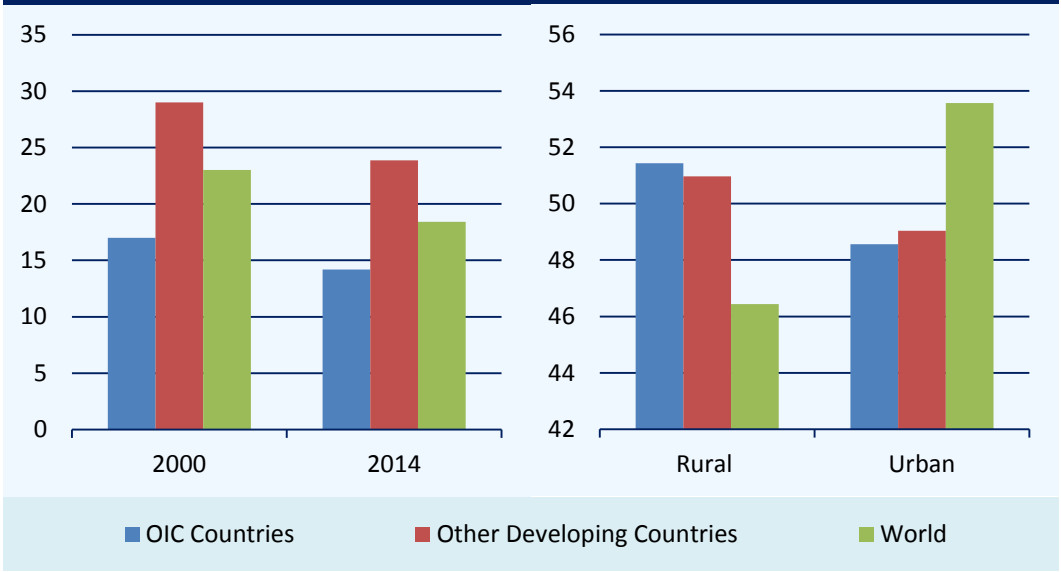
1.1. Agricultural Population and Land Use in Agriculture

With a total land area of 3.2 billion hectares and a total population of 1.67 billion in 2014, the 57 OIC member countries accounted for almost one-fourth of the world's total land area and slightly below one-fifth of its population (22.7% and 23.2%, respectively). Only 8 OIC countries (Kazakhstan, Algeria, Sudan, Saudi Arabia, Indonesia, Libya, Iran and Niger, in decreasing order) account for 50.6% of total land area of OIC countries. The top five most populous OIC countries are Indonesia, Pakistan, Nigeria, Bangladesh and Egypt, representing 52.1% of total population of OIC countries.

In 2014, rural population in OIC countries accounted for 51.4% of their total population, compared to 51.0% in the other developing countries and 46.4% world average (Figure 1.1, right). 53.2% of the world population lived in urban areas in 2014 whereas about 48.1% of OIC total population resided in these areas. During the period 2000-2014, the total

population of OIC countries grew two times faster compared with the world average (2.2% vs. 1.1%).

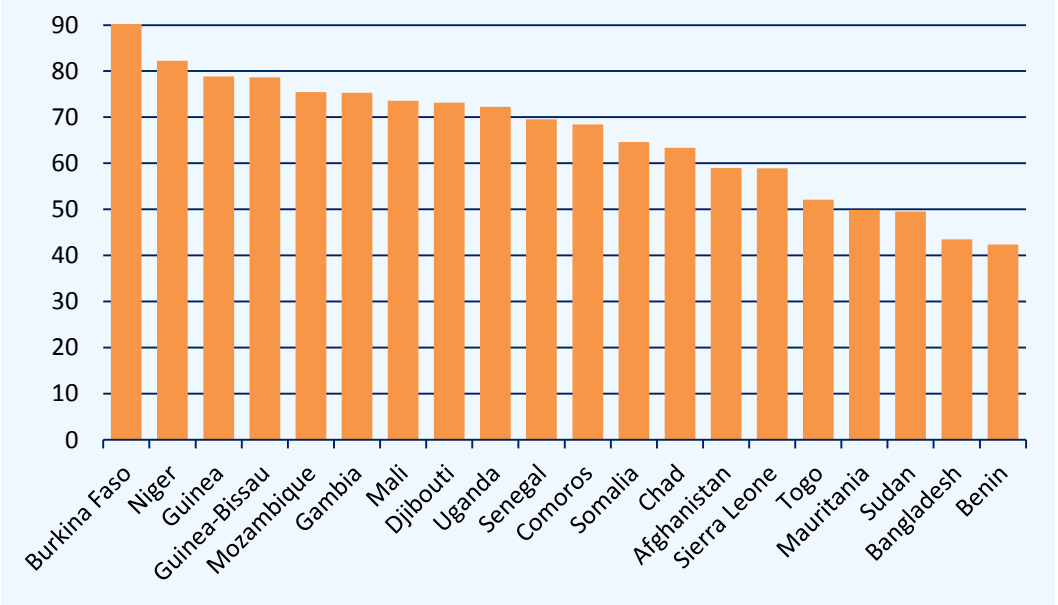
FIGURE 1.1
Structure of Population; Economically Active Agricultural Population (left) and Urban & Rural Population (right) in 2014 (as percentage of total population)



Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Table 1)*

FIGURE 1.2
Economically Active Agricultural Population, 2014 (as percentage of total population)

Share of the agricultural population is more than 50% of the total population in 16 OIC countries



Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Table 1)*

Agricultural Population

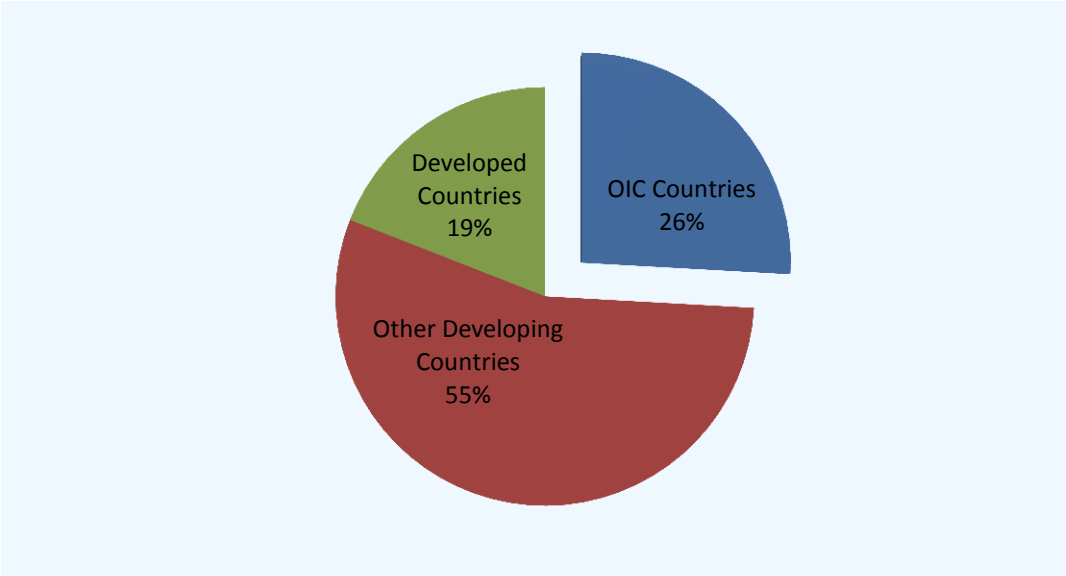
In 2014, the economically active agricultural population accounted for 238 million in OIC countries, corresponding to 14.2% of the total population and compared to 16.4% in 2000 (Figure 1.1, left). This ratio remained below that of the other developing countries (23.9%) and the world average (18.4%).

Yet, the economically active agricultural population is still accounting for more than 20% of the total population in 16 OIC countries, most of them are least-developed countries in Sub-Saharan Africa, and even reached more than 35% in some of these countries like Burkina Faso, Guinea, Mozambique, and Gambia (Figure 1.2).

Agricultural Land

In addition to the agriculture labour force, the effective and productive use of agricultural land is an essential element in the process of agricultural development. In this regard, the 57 OIC countries had a total agricultural land area of 1.4 billion hectares, corresponding to 47% of the total agricultural land area of other developing countries and 25.9% of that of the world (Figure 1.3). The share of agricultural land area accounted for 45.7% of total land area in OIC countries, compared to 40.3% in all developing countries and 40.0% in the world total. Considering the cultivated area, which is the sum of the arable land and permanent crops land, however, it is observed that the percentage of the cultivated land area in total agricultural area in OIC countries (26.2%) is still significantly below the averages of other developing countries (32.5%) and the world (31.1%).

FIGURE 1.3
Distribution of Agricultural Land in the World



26% of the world agricultural land belongs to OIC countries

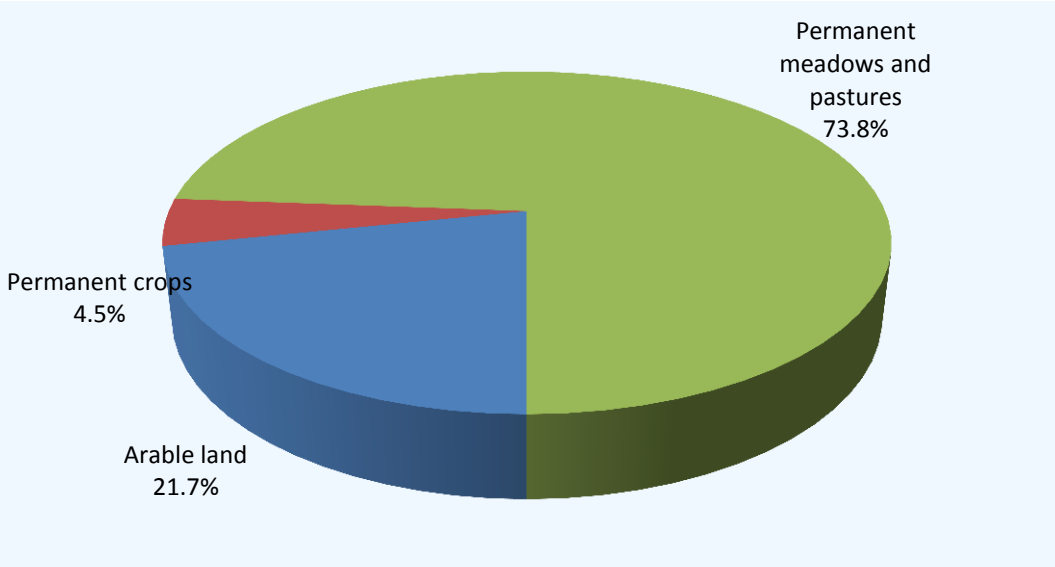
Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Table 2)*

The arable land area in OIC countries amounted to only 306 million hectares in 2013, corresponding to 21.7% of their agricultural area. In other developing countries, the arable land area accounts for 29.2% of the agricultural area and the world average is 27.8%. Thus, the percentage of the arable land of OIC countries in their total area was lower than that of the other developing countries and the world average. In contrast, the permanent crops land of OIC countries (62.8 million hectares) accounted for 34.7% of the total permanent crops

land in the world. Although the permanent crops land of OIC countries accounted for only 4.4% of their total agricultural land area, this ratio was slightly higher than that of the other developing countries (3.2%) and the world average (3.3%). On the other hand, as shown in Figure 1.4, the bulk of the agricultural land area in OIC countries (74.8% or 1.04 billion hectares) is permanent meadows and pastures, largely used for grazing of livestock.

FIGURE 1.4
Structure of Agricultural Land in OIC countries

Permanent meadows and pastures occupy the lion share of the agricultural land area in OIC countries



Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Table 2)*

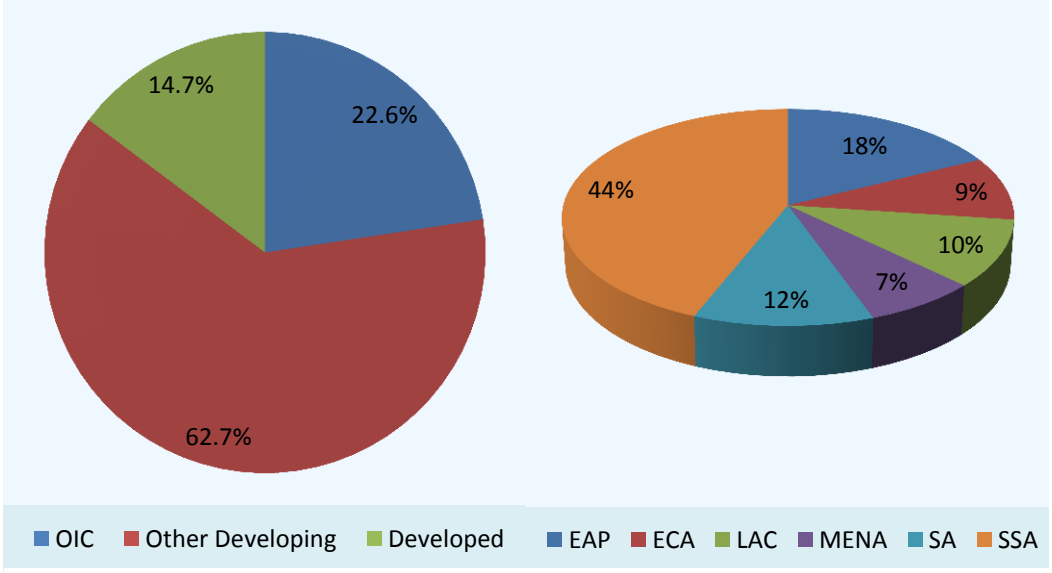
Land use in agriculture in OIC countries reflects large differences at individual country level. With large agricultural area relative to their total land area, some OIC countries, like Saudi Arabia (80.6%), Kazakhstan (80.4%), Turkmenistan (72.0%), and Somalia (70.3%) have very small arable land areas (less than 10% of their agricultural areas) and even negligible permanent crops land areas. In contrast, with small agricultural area relative to their total land area, some OIC countries have relatively large arable land areas in their agricultural areas, notably Bangladesh (84.3%), Pakistan (84.0%), Egypt (72.8%), and Suriname (72.1%), In contrast, in OIC countries like Mauritania and Djibouti the share of arable land in agriculture land was only around 1%. In this regard, the existing arable land areas in these countries are very valuable.

1.2. Water Resources and Their Use in Agriculture

Considering that the bulk of the world's water resources are used in agriculture and that the global demand for food is increasing rapidly, the role of water resources 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 West Asia and North-eastern Africa. Most of the OIC countries in these regions are facing severe water pressures due to limited opportunities for the exploitation of new water resources. These pressures are expected to increase in the face of increasing populations and the increased level of water use per capita associated with economic development. Therefore, the efficient use of water resource 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.

FIGURE 1.5
Average Precipitation in Depth: Share of OIC countries in the world (left) and shares of OIC sub-regions in OIC total (right), 2008-2014



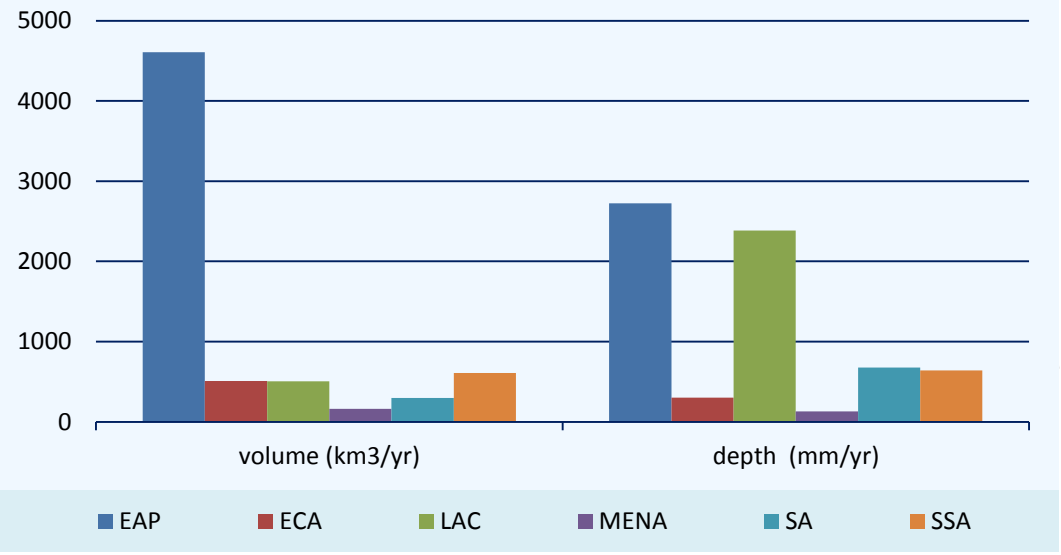
Source: *Food and Agriculture Organization (FAO) AQUASTAT Online Database (Annex Table A.3)*

Precipitation in depth

In the period 2008-2014, average precipitation in depth annually amounted to slightly over 47 thousands (mm/year) in OIC countries. This means that OIC countries, collectively, received 22.6% of the world's annual average precipitation and 36.1% of that of other developing countries (Annex Table A.3). Due to the wide range of climate conditions, average precipitation in depth represents uneven distribution among OIC sub-regions. According to Figure 1.5 (right), SSA ranked first among the sub regions corresponding to 44% of total precipitation in OIC countries. In contrast, countries in the MENA region, collectively received only 7% of total precipitation.

Taking into account the countries' agricultural lands and average precipitations together, uneven distribution of average precipitation among sub-regions in OIC countries becomes clearer. During 2008-2014, countries in EAP, on average, received precipitation of 2,724 mm per year (or 4,608 km^3/year), corresponding to 18% of total average precipitation recorded in OIC countries. In contrast, countries in MENA, on average, received the level of precipitation in volume which is almost one thirtieth of that of any country in EAP (Figure 1.6).

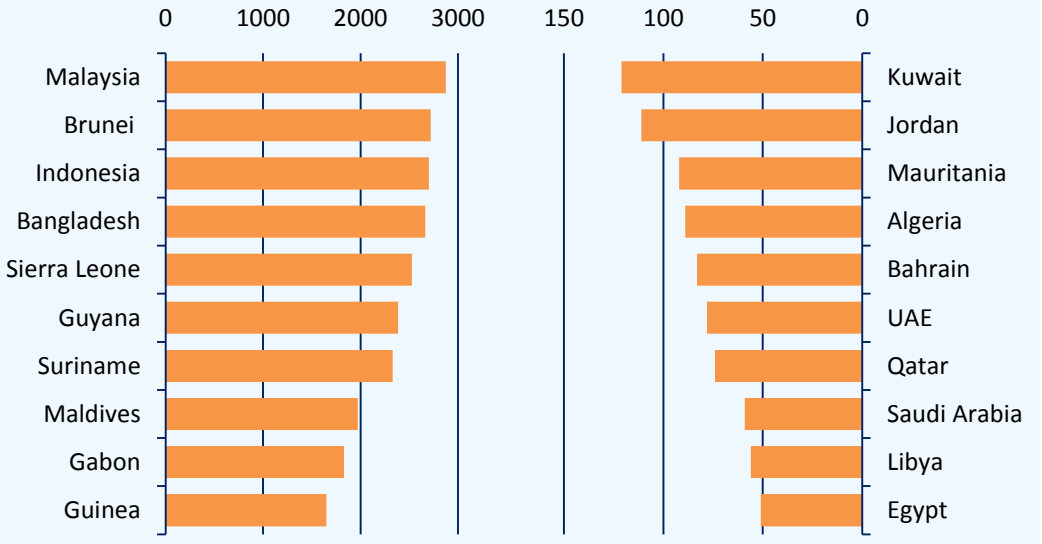
FIGURE 1.6
Average Precipitation (weighted by countries' agricultural lands), 2008-2014



Source: *Food and Agriculture Organization (FAO) AQUASTAT Online Database (Annex Table A.3)*

FIGURE 1.7
Average Precipitation in Depth (mm/year), the highest (left) and the lowest (right) 10 OIC countries, 2008-2014

Malaysia has the highest average precipitation in depth among the OIC countries



Source: *Food and Agriculture Organization (FAO) AQUASTAT Online Database (Annex Table A.3)*

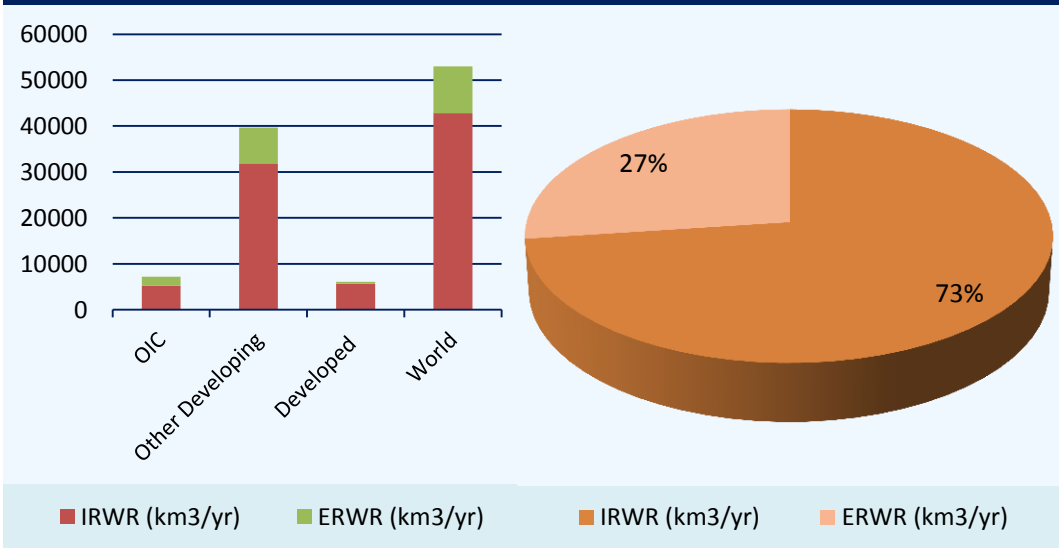
Renewable water resources

Having 7,229 km^3 per year during 2008-2014 period, OIC countries collectively account for 13.6% of total renewable water resources (TRWR) in the world. Compared to the level of other developing countries (39,688 km^3/year), share of OIC countries as percentage of developing countries seems relatively low with respect to its total population. As a matter of fact, the level of TRWR per capita (4,652m^3/year) in OIC countries was almost half of the level of the other developing countries. Compared to the world level (7,601m^3/year), TRWR

per capita in OIC countries was also significantly below than the level of the world (Annex Table A.3).

The structure of total renewable water resource among country groups differs. According to Figure 1.8 (right), 73% of world's total renewable water resources consists of internal renewable water resources (IRWR), and the rest is formed by external renewable water resources (ERWR). In developed countries, IRWR forms the highest percentage in TRWR, reaching the level of 93.4% (Figure 1.8, left). Compared to the other developing countries, the share of IRWR in TRWR in OIC countries is slightly below than that of other developing countries (80.2% and 72.9%, respectively). IRWR in OIC countries accounts for 12.3% of total IRWR in the world, and 16.5% in the developing countries. Additionally, ERWR in OIC countries covers 19.2% of total ERWR in the world and 25.0% of that of the developing countries (Annex Table A.3).

FIGURE 1.8
Structure of Renewable Water Source in the World (left) and in OIC countries (right), 2008-2014



IRWR makes almost 73% of total renewable water resources in the OIC countries

Source: *Food and Agriculture Organization (FAO) AQUASTAT Online Database (Annex Table A.3)*

Water scarcity

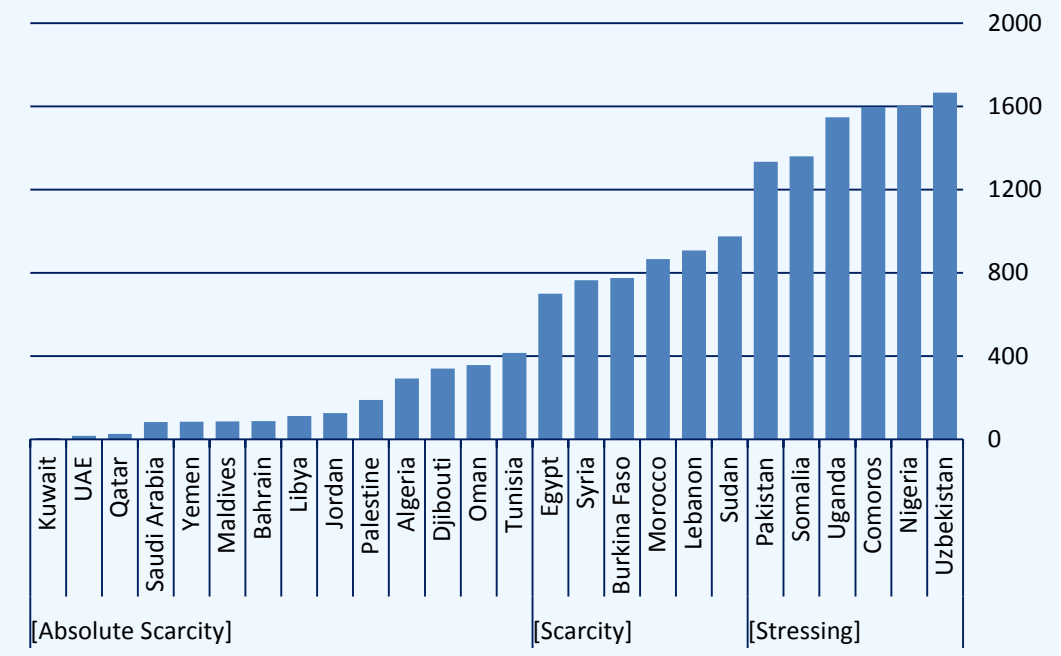
Water scarcity is defined as the imbalance of supply and demand of water. The minimum level of TRWR required for basic domestic, agricultural, and industrial activities is estimated at a threshold of 1700 m^3/year per capita. Countries or regions with TRWR/year per capita below this level are considered suffering *water stress*, those with TRWR/year per capita less than 1000 m^3/year are considered suffering *water scarcity* and those with TRWR/year per capita less than 500 m^3/year are considered suffering *water absolute scarcity* (UN-Water, FAO, 2007). According to the latest estimates, 26 OIC countries experience water stress and/or scarcity (Figure 1.9). Out of that, 6 countries experience water stress, 6 countries face water scarcity and the rest 14 countries suffer from water absolute scarcity. Countries with water stress and/or scarcity depend on external sources to provide their water need.

Water dependency

The term *water resources dependency ratio* indicates to what extent a country is dependent on its neighbouring countries in order to meet its water needs. According to this definition, it is observed that OIC countries are dependent on neighbouring countries for its 32.5% of

total water need per year in the period 2008-2014. This ratio was lower both in other developing countries (17.7%) and the world (22.6%). Figure 1.10 depicts OIC countries whose dependency ratios are higher than 50%. According to the latest data, 19 countries are eligible for the criteria. In particular, OIC countries in the Middle East and North-eastern Africa recorded the highest water resources dependency ratios.

FIGURE 1.9
Total Renewable Water Resources per Capita (m3/year), 2014



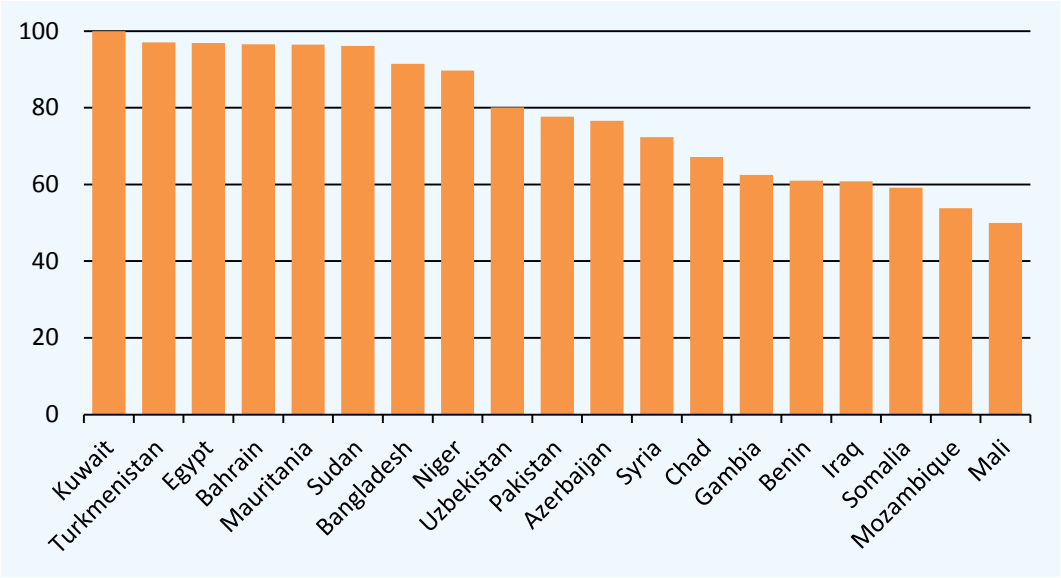
Source: *Food and Agriculture Organization (FAO) AQUASTAT Online Database (Annex Table A.3)*

Having full dependency on external sources, Kuwait ranks first, followed by Turkmenistan (97%), Egypt (96.9%), Bahrain (96.6%), Mauritania (96.5%), and Sudan (96.1%). There are eight main international river basins in OIC countries: 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. In this regard, 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, Turkmenistan on Amu Darya and Syr Darya Rivers.

Agricultural water withdrawal

Considering the rapid growth of their population, many OIC countries are still facing serious challenges in meeting the increasing demand for water for domestic use, particularly in agricultural activities. Compared to its share in total world population (23.2%), OIC countries, collectively, withdraws 23.8% of total water withdrawal in the world. That is partly due to inefficient use of water in agriculture (Annex Table A.4). As a matter of fact, agricultural water withdrawal in OIC countries accounts for 84.1% of total water withdrawal. Compared to the world average of 69.5% and the average of other developing countries of 75.6%, the percentage in OIC countries stands very high. In this regard, water withdrawal, expressed as a percentage of IRWR, is an indicator on the capacity of the country to rely on its own water resource (i.e. the pressure on the water resource). Total water

FIGURE 1.10
External Water Resource Dependency Ratio (at percentile scale), 2014



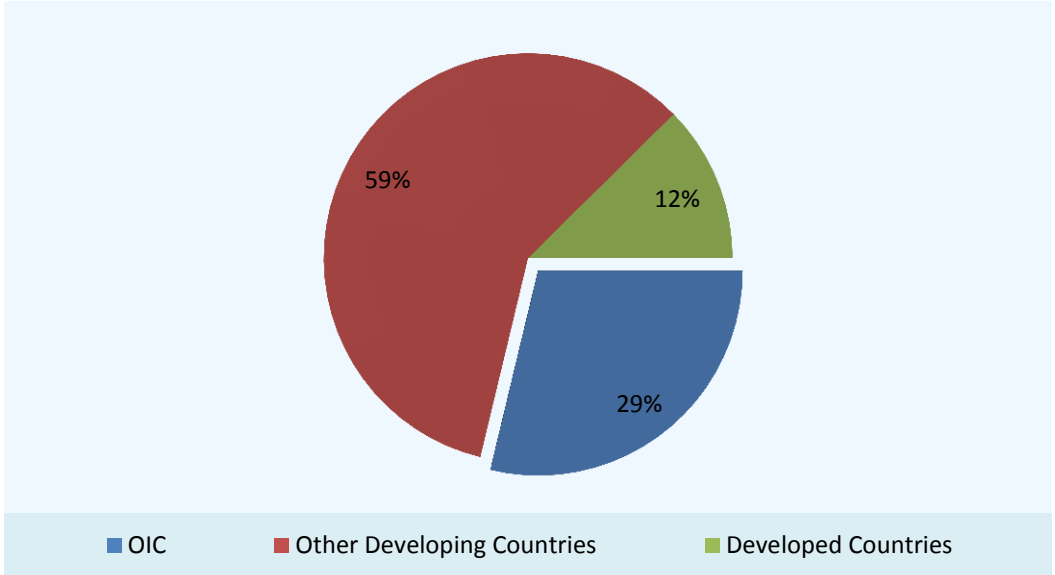
Kuwait and Turkmenistan have the lowest total renewable water resources per capita levels

Source: *Food and Agriculture Organization (FAO) AQUASTAT Online Database (Annex Table A.3)*

withdrawal in OIC countries accounts for 17.7% of total IRWR which is much above the levels of other developing countries and the world (6.7% and 9.2%, respectively).

As everywhere else, the bulk of total water withdrawal in OIC countries is used in agriculture. Agricultural water withdrawal in OIC countries accounts for 84.1% of their total withdrawal and for 10.9% of their TRWR. Agricultural water withdrawal in OIC countries amounted to 785 km^3/year, corresponding to 29% of total agricultural water withdrawal in the world (Figure 1.11). Yet, the distribution of agricultural water withdrawal within the OIC

FIGURE 1.11
Agricultural Water Withdrawal: Share of OIC Countries in the World, 2008-2014

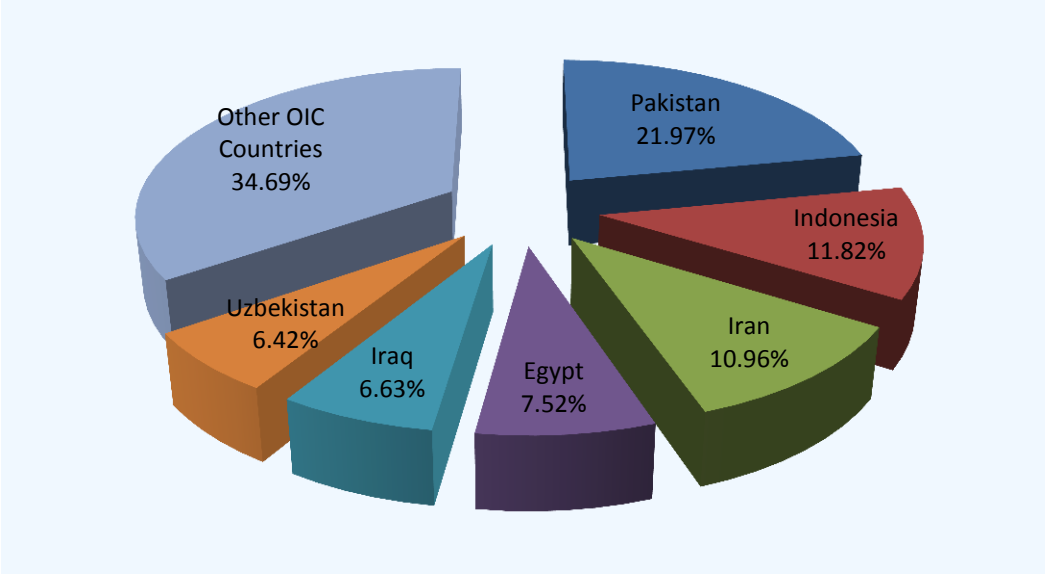


OIC countries withdraw 29% of agricultural water in the world

Source: *Food and Agriculture Organization (FAO) AQUASTAT Online Database (Annex Table A.4)*

group is far from being uniform. In absolute terms, 16 countries, collectively accounted for 91% of the total agricultural water withdrawal in all OIC countries, and only 5 countries of them accounted for 58% of total agricultural water withdrawal in OIC countries. Pakistan especially stands out with its high level of withdrawal, amounted to 172.4 km^3/ year, corresponding to 22% of total agricultural water withdrawal in OIC countries (Figure 1.12).

FIGURE 1.12
Agricultural Water Withdrawal: Shares of top countries among the OIC countries, 2008-2014



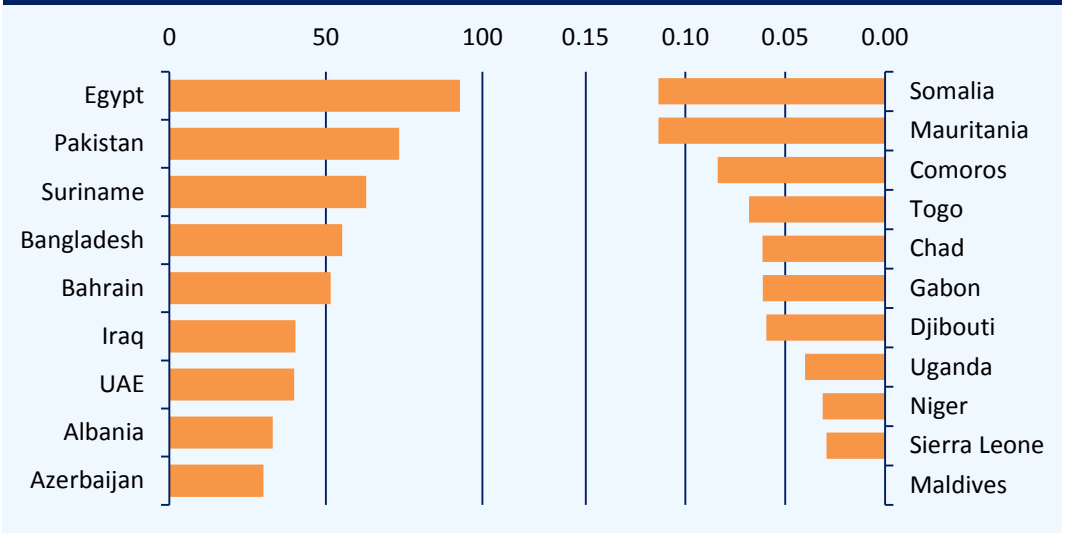
Source: *Food and Agriculture Organization (FAO) AQUASTAT Online Database (Annex Table A.4). Latest data year between 2008 and 2014 is considered for calculation.*

Irrigation

The bulk of agricultural water withdrawal is used in irrigation. In this respect, the terms "area equipped for irrigation", "irrigation area", "area under irrigation" are all refer to the area of land equipped to provide water, other than direct rainfall, to the crops. According to this definition, the total area equipped for irrigation in OIC countries covers 75.2 million hectares or 25.4% of that of the world, and accounts for only 5.3% of their total agricultural area, compared to the world average of 6.1%. Yet, the total area equipped for irrigation in OIC countries accounts for 25.7% of their arable land, the level which is higher than that of other developing countries (23.7%) and the world (21.5%).

At the individual country level, however, it is observed that the distribution of the irrigation area varies across countries. 15 countries, collectively, amounted 68.1 million hectares, corresponding to 90.6% of total irrigation area in OIC countries. As in case of agricultural withdrawal, Pakistan stands out with its share of irrigation area in OIC group, namely the country with its irrigation area of 19.3 million hectares, alone accounts for 25.6% of total irrigation area in OIC countries. On the other hand, shares of irrigation areas within countries' agricultural areas also differ, ranging from negligible levels (less than 0.1%) to 92.8%. Figure 1.13 neatly summarizes the shares of irrigation areas as a percentage of countries' agricultural areas. According to the figure, during 2008-2012 period, only 9 countries had shares reaching more than 20%. The percentage in 13 countries was lower than 0.2%, even in Maldives, there is no irrigation area. In contrast, while the area under irrigation accounted for more than 50% of the arable land in 20 OIC countries, this ratio was lower than 5% in 18 countries.

FIGURE 1.13
Irrigation Area as percentage of Agricultural Area: the highest (left) and the lowest (right) countries, 2008-2012



Egypt ranks first in terms of irrigation area as a percentage of agricultural area

Source: *Food and Agriculture Organization (FAO) AQUASTAT Online Database (Annex Table A.5)*

In fact, the part of the arable land area under irrigation has a crucial role in agricultural production in many OIC countries, particularly those suffering from scarcity in arid and semi-arid regions of the MENA. Therefore irrigated agriculture and the use of efficient irrigation systems and techniques have a very important and greater role in agricultural development and food production in these countries. In this respect, the available data on the irrigation techniques used in OIC countries indicate that *surface irrigation*, which is the most traditional and least water-saving technique, is by far the most widely used technique, practised on 82.1% of the total area equipped for irrigation, compared to other developing countries level of 89.3% (Figure 1.14, left). The ratio is more than 50% in 38 OIC countries, out of that 17 OIC countries, surface irrigation is single technique practised for irrigation. Consequently, huge amounts of the water diverted for irrigation in these countries are wasted at the farm through either deep percolation or surface runoff.

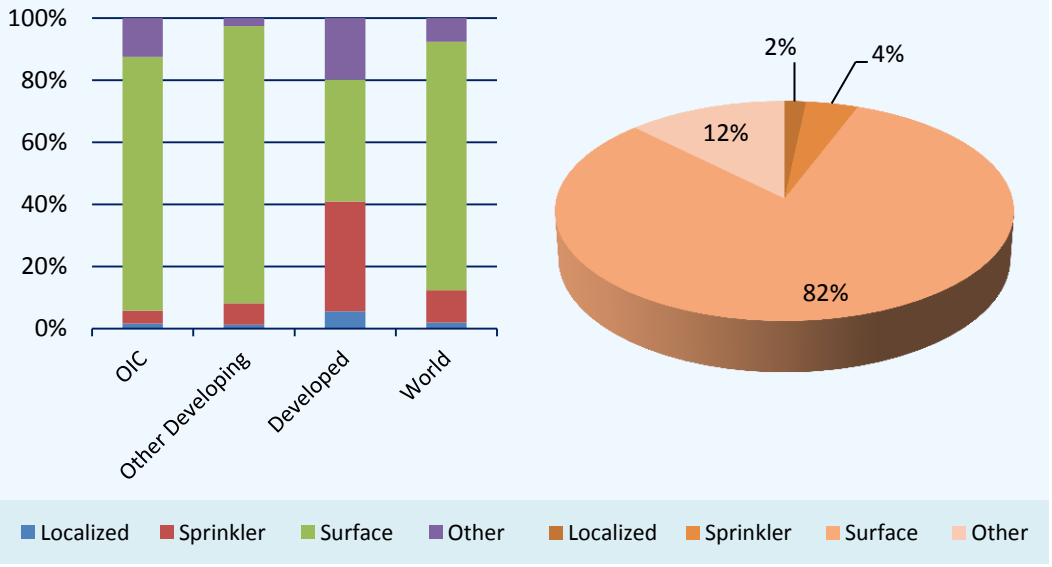
In contrast, *sprinkler irrigation*[1] is practised on 3.5% of the total area equipped for irrigation in OIC countries (Figure 1.14, right). This technique is more water-saving than surface irrigation, is practised on more than 20% of the irrigation area in only 7 OIC countries, notably Côte d'Ivoire (75.4%), Saudi Arabia (59.4%), Benin (41.7%), and Lebanon (27.9%). This ratio is almost negligible (less than 0.1%) in 27 OIC countries. On the other hand, *localized irrigation technique*[2], which is the most water-saving one, is practised on 1.3 million hectares, corresponding to only 1.7% of the total area equipped for irrigation in OIC countries; a ratio which is below the world average of 2%. Prevalence of this technique also varies across the OIC countries. United Arab Emirates and Jordan stand out with their remarkably high levels of use of this technique, reaching 86.3% and 81.2%, respectively. In

[1] It is a method of irrigation by applying water under pressure when the water is sprinkled in the form artificial rain through line carrying distribution components: rotary sprinklers, diffusers with permanent water streams and perforated pipes.
[2] It is a method of irrigation (with different techniques) when water is applied to and causing wetting of only part of the soil in the field at the base of the plant (plant root zone) in small but frequent quantities, i.e. drop by drop. It includes the following terms or systems: trickle irrigation, drip irrigation, daily flow irrigation, drop irrigation and sip irrigation. (For more information, see A. Phocaides, "*Technical Handbook on Presurrized Irrigation Techniques*", UN-FAO,2000).

addition to these two countries, the ratio was more than 10% in only 5 OIC countries, namely, Tunisia (16.9%), Kuwait (13.4%), Benin (12.4%), Bahrain (11.6%) and Qatar (10.9%). In contrast, the ratio was negligible in 34 OIC countries (less than 0.1%). In particular, the countries located in arid-regions, without adequate TRWR, choose to develop the localized and sprinkler irrigation techniques more intensively to save more water.

Surface irrigation is the most prevalent irrigation technique in OIC countries

FIGURE 1.14
Irrigation Techniques as percentage of total area equipped for irrigation in the World (left) and in the OIC countries (right), 2008-2012



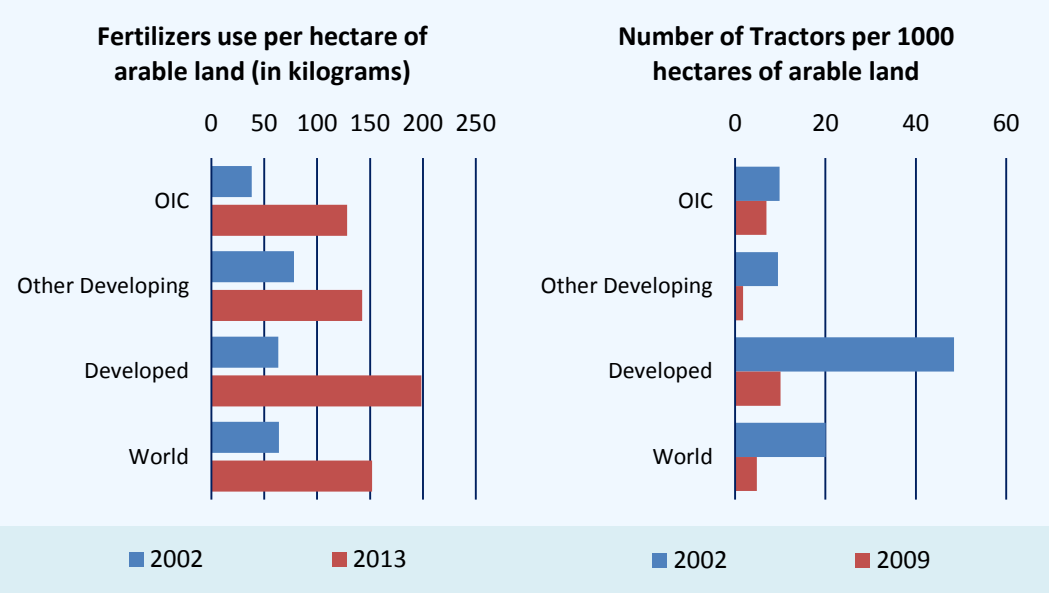
Source: *Food and Agriculture Organization (FAO) AQUASTAT Online Database (Annex Table A.5)*

1.3. Use of Fertilizers and Agricultural Mechanization

The average use of fertilizer per hectare of the arable land in OIC countries climbed from 38 kilograms in 2002 to 128 kilograms in 2013. However, as shown in Figure 1.15, the use of fertilizer in OIC countries is insufficient, particularly when compare to the world average and the average of the other developing countries. As of 2013, the average fertilizer use was recorded at 152 kilograms and 142 kilograms in the world and other developing countries, respectively. Developed countries, on the other hand, used 198 kg fertilizer per hectare that is 70 kg higher than the average of OIC countries. In this regard, OIC countries, on average, still use relatively less amount of fertilizer when compared with other country groups.

Figure 1.15 also presents the level of agricultural mechanisation by looking into the ratio of total number of tractor per 1000 hectares of arable land. In OIC countries, this ratio has declined from 9.81 in 2002 to 6.94 in 2009. Even though the total number of tractors used in agriculture has increased in OIC countries between 2002 and 2009, increase in size of arable land was much higher hence, causing a significant decline in number of tractor used per 1000 hectares of arable land. Developed countries and other developing countries also experienced a similar reduction in this ratio. As of 2009, the world average was 4.77 and the average of other developing countries was 1.72. In other words, compared with other developing countries and the world average, OIC countries stay in a better position collectively in terms of tractor use. Nevertheless, OIC countries still have insufficient agricultural mechanization relative to developed countries group where the same area of arable land is harvested by 10 tractors.

FIGURE 1.15
Fertilizer and Tractor Use in the World



OIC countries have insufficient fertilizer use ratio and low agricultural mechanization

Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis*

1.4. Agricultural Productivity

Although agriculture is known to be the primary economic activity for developing countries including OIC members, productivity seems not to be the primary concern for the industry. In part, this is due to the inefficient use of land in agriculture in many of these countries because of scarcity of water resource and the use of insufficient irrigation systems. It is also due to other factors, such as the increasing migration of agricultural population from rural to urban areas seeking higher incomes, particularly in the services sector.

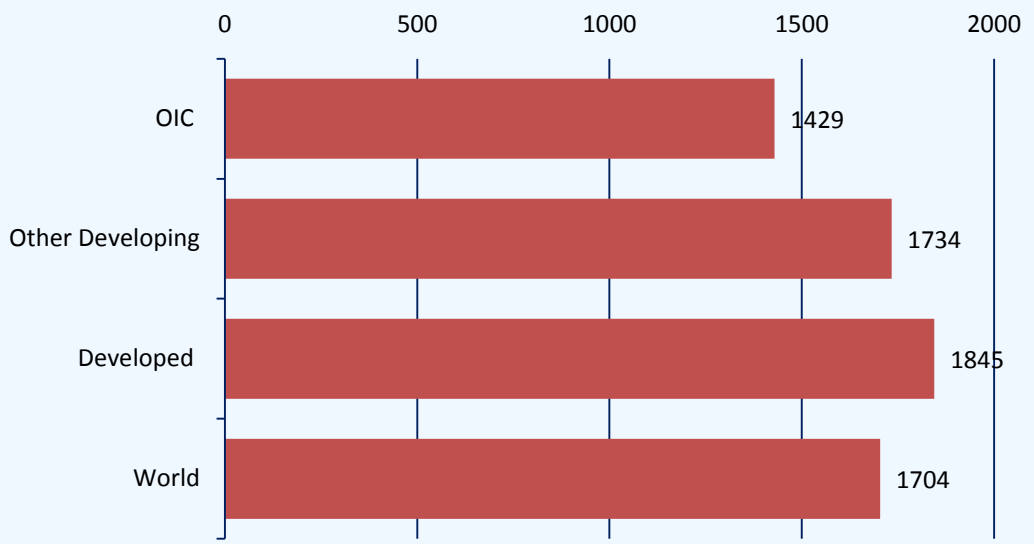
Land Productivity

Total arable land in OIC countries was calculated as 306 million hectares in 2013. On the other hand, total value of gross agricultural production reached to US$ 356 billion (constant 2004-2006 million US$ prices) in 2013. In this year, OIC countries produced 15.9% of the world total agricultural production in value. In this context, the level of land productivity in OIC countries was measured as US$ 1,429 per hectare of arable land in 2013. On the other hand, the average land productivity in other developing countries was equal to US$ 1,734 in the same year where the world average was calculated as US$ 1,704. These figures reveal that OIC countries, on average, have the lowest land productivity in absolute terms compared to other country groups (Figure 1.16).

At the individual country level, it is observed that land productivity levels vary significantly across the OIC countries. In 2013, there were 21 OIC countries with levels of land productivity more than the OIC average calculated based on the data available for 38 OIC countries. Among these countries, Brunei Darussalam ranks first with land productivity level of US$ 18,202 per hectare followed by Palestine and Malaysia (Figure 1.17). In contrast, there were 14 OIC countries with land productivity levels below 1,000 US$ per hectare. Maldives and Niger recorded the lowest land productivity levels among the 38 OIC with data in 2013.

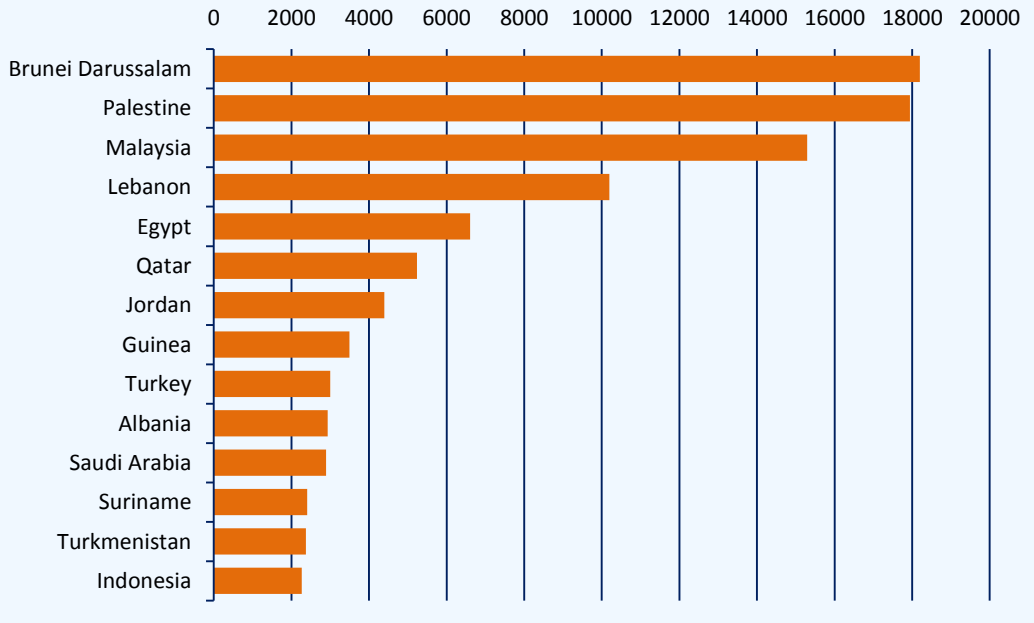
FIGURE 1.16
Land productivity in the World in 2013 (constant 2004-2006 US$)
(value of production per hectare of arable land)

Land productivity in the OIC counties is below the average of the world



Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis*

FIGURE 1.17
Land productivity in OIC Members in 2013 (constant 2004-2006 US$)
(value of production per hectare of arable land)



Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis*

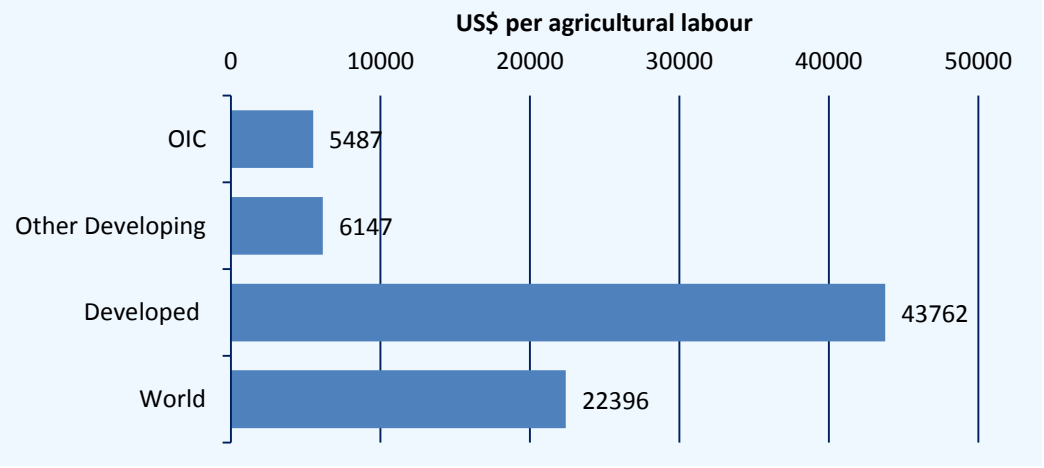
Labour Productivity

In terms of labour productivity, measured as gross agricultural production value per economically active population in agriculture, OIC countries and other developing countries lag well behind the averages of developed countries. As of 2013, an economically active person in agriculture in OIC countries, on average, could produce less than US$ 5,500 worth

of agricultural production compared to US$ 6,147 in other developing countries and US$ 43,762 in developed countries. In the same year, the world average of labour productivity was calculated as US$ 22,395 that far exceeded the average of OIC countries (Figure 1.18). In this regard, OIC countries need to intensify their efforts in order to improve the labour productivity level in the agriculture sector.

Figure 1.19 ranks the top OIC countries in terms of labour productivity in 2013. Among the OIC countries with available data, the best performing country in terms agricultural labour productivity was Saudi Arabia with a value of US$ 24,110) with over US$ 80,000 per person in agriculture, followed by Malaysia (US$ 8,777) and Tunisia (US$ 7,123). On the other side of the spectrum, in Azerbaijan labour productivity was only equal to US$ 956.

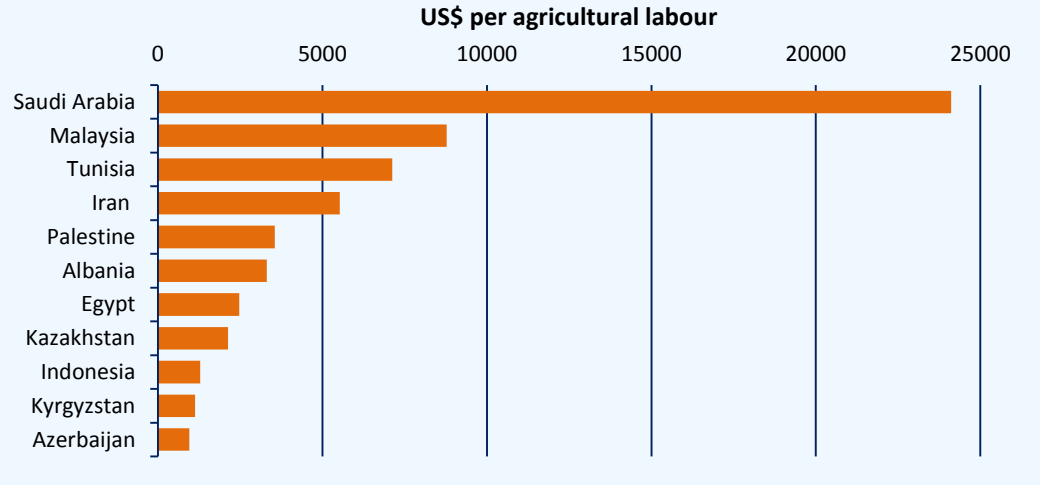
FIGURE 1.18
Labour Productivity in the World in 2013 (constant 2005 US$)
(Agriculture value added per worker)



Agricultural labour productivity in OIC countries is lower than the other groups

Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis.*
Note: Data were available for 69 countries in total where 11 of them are OIC, 28 of them are other developing and 30 of them are developed countries.

FIGURE 1.19
Labour Productivity in the OIC Members in 2013 (constant 2005 US$)
(Agriculture value added per worker)



Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis*

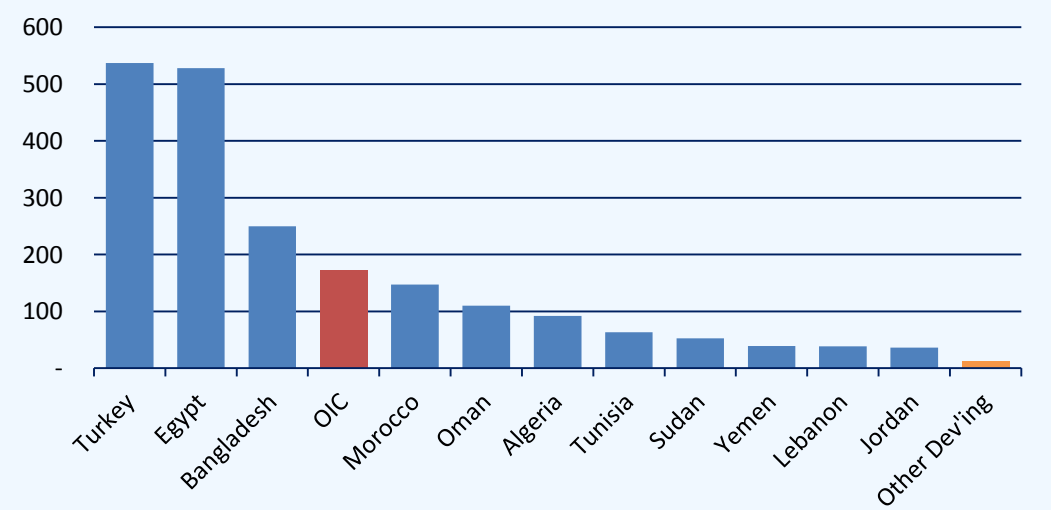
Agricultural Research and Development

Agricultural research and development (R&D) and subsequent improvements in technology are prerequisites for increasing agricultural productivity and generating income for farmers and rural workforce. Given the existing level of productivity in agriculture, more investment will be needed in developing countries to meet the challenges of global food security. Private sector play particarly important role, but much of the investment in developing countries is made by public sector. Therefore, greater collaboration between public and private sectors can facilitate better results for productivity and development.

According to the 2012 data, agricultural R&D expenditure by public sector varied significantly among the OIC countries with available data. 11 OIC countries, on average, spent US$ 172 per economically active person in agriculture compared to US$ 12 average of 17 other developing countries. At the individual country level, it is observed that Turkey spent the highest amount per active agricultural person with US$ 537, followed by Egypt (US$ 528) (Figure 1.20). On the other hand, R&D expenditure per agricultural person was less than US$ 50 in Yemen, Lebanon and Jordan.

Turkey has the highest amount of agricultural R&D spending per agricultural person

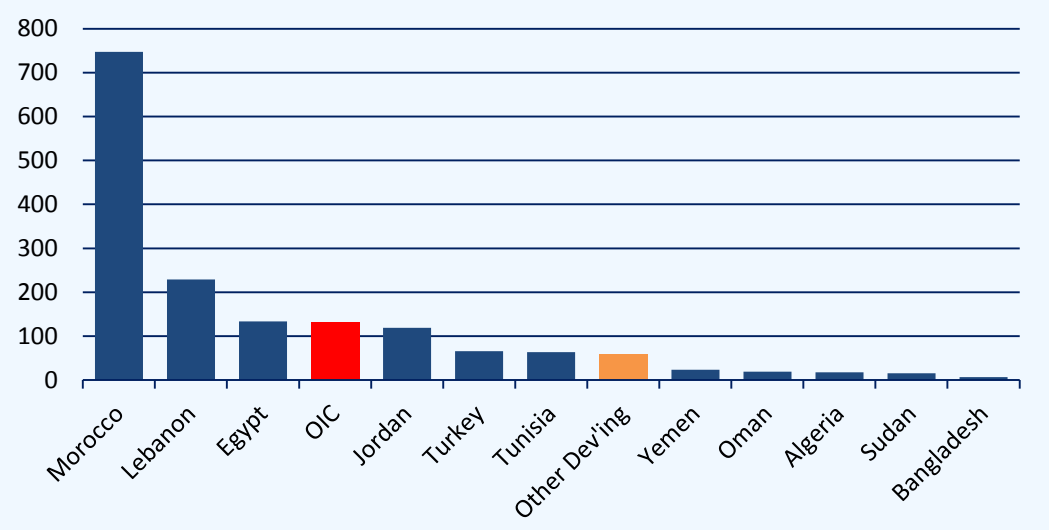
FIGURE 1.20
Agricultural R&D Spending per Agricultural Person by Public Sector, 2012 (2011 PPP $)



Source: *ASTI (Agriculture Science and Technology Indicators) Database, SESRIC Staff analysis*
Note: Data were available for 28 countries in total where 11 of them are OIC and 17 of them are other developing countries.

Data on agricultural research staff is also quite incomplete and available for limited number of countries. Despite these limitations, Figure 1.21 presents the top OIC countries as well as the averages of 11 OIC and 17 other developing countries for the year 2012. It is observed that the highest number of agricultural research staff working for public sector was available in Morocco with almost 747 researchers per 100,000 farmers, followed by Lebanon (229) and Egypt (133). On the other hand, Bangladesh has only 6.6 agricultural research staff per 100,000 farmers. On average, there were 130 researchers available per 100,000 farmers in OIC countries compared to 59 researchers in other developing countries. Box 1 provides an example of how research and development activities can be a defining factor in the development of the agricultural sector.

FIGURE 1.21
Agricultural Research Staff per 100,000 farmers, 2012



OIC countries have a higher agricultural research staff per 100,000 agricultural population than other developing countries

Source: *ASTI (Agriculture Science and Technology Indicators) Database, SESRIC Staff analysis*
Note: Data were available for 28 countries in total where 11 of them are OIC and 17 of them are other developing countries.

BOX 1
Road to Achieve the First MDG through R&D in Indonesia

Agricultural development in Indonesia has continued such as the achievement of rice self-sufficiency since 2007. Rice production in three consecutive years (2007, 2008, and 2009) has showed production increase at a higher level which is equal to more than 5% and also contributes to stabilizing the domestic food prices. Ministry of Agriculture of Indonesia has also focused on improving about 39 national prime commodities which consists of 7 food crops, 10 horticultural commodities, 15 plantation commodities, and 7 livestock commodities. Horticultural production increased in 2009 with respect to 2008; fruits rose by 1.5%, vegetables levelled up from 16.1 to 38%, horticulture also rose up in the range of 3 to 7.5%.

The **research and development activities** were the impetus of success in agricultural sector including; 196 high yielding varieties of rice; 46 varieties of corn; 64 varieties of soybean; 7 new strains of goats, sheep, chickens and ducks; 13 vaccine technologies; 8 types of antigen; 10 diagnostic kits and disease testing techniques; and 15 new high yielding varieties of sugarcane. Four goals were set to get over the challenges; fulfilling food requisite for all people, improving balance of household nutrition, and tackling the achievement of Millennium Development Goals.

1. The achievement of sustainable self-sufficiency for 5 (five) major commodities
2. The development of food diversification
3. The development of value added, competitive power and export
4. The development of farmers welfare

Indonesia has achieved the first of MDG's and, the prevalence rate of malnutrition children under five has shown a significant decrease, from 31% in 1990 to 18.4% in 2007.

Source: *Ministry of Agriculture, Republic of Indonesia.*

2.Agricultural Production and Trade

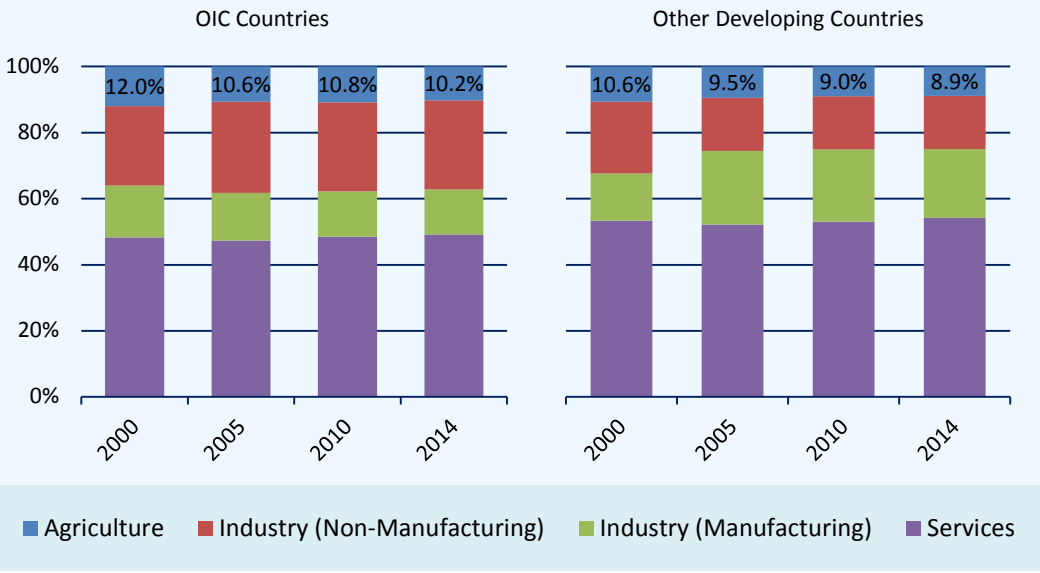
Agriculture is widely known to be the primary economic activity and assumed to play a major role in the economies of developing countries. However, this feature does not stand firm as far as its contribution to OIC economies is concerned.

2.1. Agricultural Production

The share of agriculture in the total GDP of OIC countries has gradually declined from 12.0% in 2000 to 10.6% in 2005 (Figure 2.1). With the breakout of the global financial crisis and contraction in the share of the non-manufacturing industry, the share of the agricultural sector has also started to decrease and reached 10.8% in 2010. Furthermore, with industrial activity recovery, the average share of agriculture in OIC economies contracted to 10.2% in 2014. A more stable trend was observed in other developing countries, where the average share of agriculture in the economy has remained around 9 to10% during the period in consideration.

At the individual country level, in 2014, the agricultural sector accounted for more than one third of the total value-added in 8 OIC countries; namely Somalia, Sierra Leone, Togo, Guinea-Bissau, Mali, Niger, Burkina Faso, and Comoros– all of which were listed among the LDCs in the same year according to the classification of the United Nations (UN). The share of agriculture in GDP varied substantially among the OIC countries, with the highest share of 60.2% in Somalia and the lowest shares below 1% in Brunei (0.8%), UAE (0.6%), Kuwait (0.4%), Bahrain (0.3%) and Qatar (0.1%).

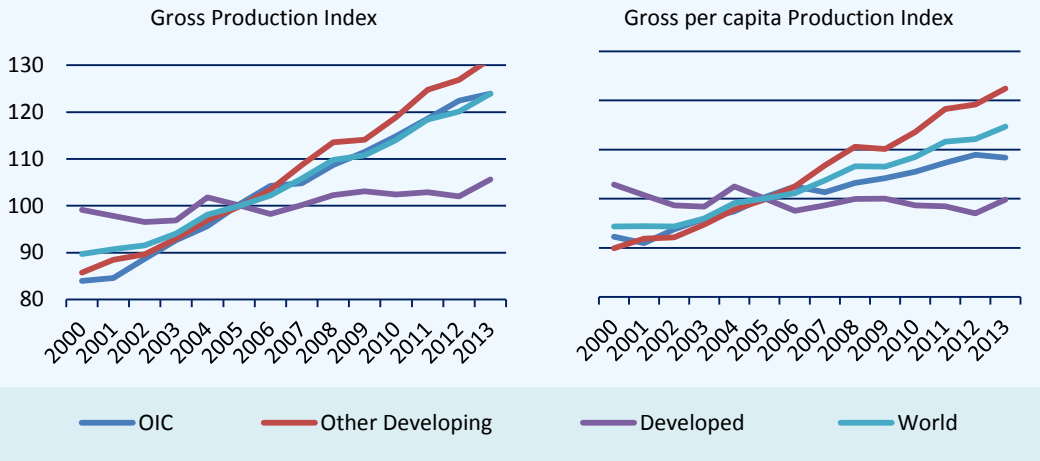
FIGURE 2.1
Value-added by Agricultural Sector (% of Total Value-added)



Source: *United Nations National Accounts Main Aggregates Database (Annex Table A.7)*

In terms of agricultural production index of the FAO, OIC countries, as a group, have recorded a comparable performance vis-à-vis other developing countries as well as the world during the period 2000-2013 and a much better performance when compared to the developed countries (Figure 2.2, left panel). Yet, as of 2013, there were 28 OIC countries which recorded a lower agriculture production index score than that of the world.

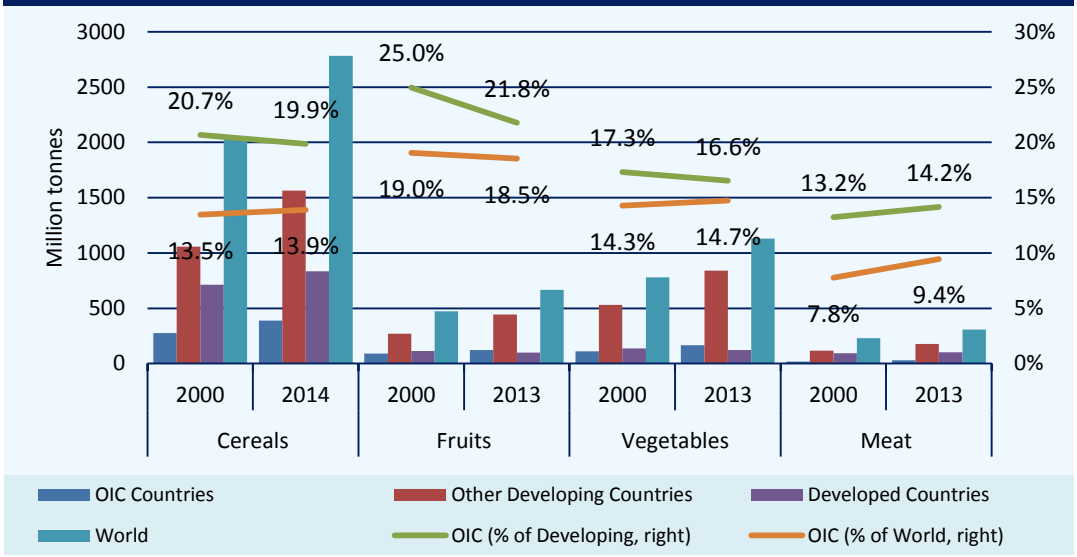
FIGURE 2.2
Agricultural Production Indices



Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Table A.8)*

Moreover, the index points to significant annual average increases in agriculture production in some OIC countries during the period under consideration. These include Sierra Leone with an average increase of 11.5%, Tajikistan with 7.1%, Algeria with 6.8%, Brunei Darussalam with 6.7% and Kuwait with 6.5%.

FIGURE 2.3
Agricultural Production (Cereals, Fruits, Vegetables and Meat)

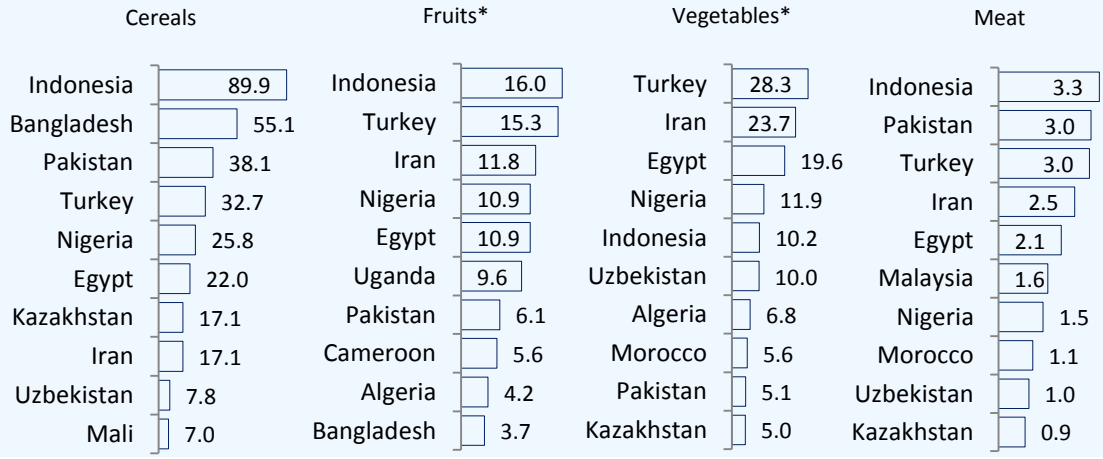


Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Table A.9)*

2.1.2. Gross Per capita Production Index

As far as the per capita agricultural production index is concerned, it is observed that, during the period under consideration, the average per capita agriculture production in OIC countries has experienced a modest increase as compared to other developing countries, as well as with the world as a whole (Figure 2.2, right panel). The stagnation in the per capita production trend, however, is strongly visible during 2008-2010 and this led to a significant

FIGURE 2.4
Top 10 Agricultural Producers (Cereals, Fruits, Vegetables and Meat, million tonnes)



Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis.*
** Fruits excluding melons and vegetables including melons. (Annex Table A.9)*

widening in the per capita production gap between OIC countries and other developing countries. At the individual country level, as of 2013, there were 38 OIC countries which reportedly had a lower per capita agriculture production index than the world average. In a similar vein, the index points to annual average increases in per capita agriculture production, during the period under consideration, of 8.2% for Sierra Leone, 5.1% for Algeria, 4.9% for Brunei Darussalam, 4.8% for Tajikistan, 4.2% for Morocco, 4.1% for Uzbekistan, and 3.7% for Kazakhstan and Azerbaijan.

2.2. Production and Utilization of Major Commodities

As for 2014, OIC countries accounted for 13.9% of the world, with a slight improvement from its 2000 levels of 13.5%, and 19.9% of the developing countries total cereals production (Figure 2.3). This corresponds to a production volume of 387.3 million tonnes in 2014. Again in 2013, with 123.6 million tonnes, the share of OIC countries in the world fruit production was recorded at 18.5%, decreasing slightly from 19.0% in 2000, and their cumulative share in the developing countries was recorded at 21.8% in 2013, decreasing from 25.0% in 2000. On the other hand, the total production of vegetables in OIC countries was recorded at 166.6 million tonnes in 2013. The share of OIC countries in the total production of vegetables in the world increased slightly from 14.3% in 2000 to 14.7% in 2013 whereas their share in

BOX 2
Policy-led Agricultural Growth in Turkey

Turkey, with its developing and growing economy, young and dynamic population, strategic location in the world, has become one of major countries in the field. Turkey has developed conspicuously from 2002 to 2014. The agricultural sector maintains its position as the leading sector of its development. Turkey's exports of agriculture and food products have reached US$17billion in 2014; accounting for about 10% of the country's total exports of US$158billion in 2014.

In the global ranking of agricultural sector sizes, Turkey's agricultural sector was ranking 11th in 2002. It joined the top ten in 2015. In Europe it was 4th and became 1st in 2010.

While the contribution of agriculture to national income was US$ 23.7 billion in 2002, it reached US$ 62.7 billion in 2012, pointing to a 1.7 fold increase over the last 9 years. The export of agricultural products has also increased from US$ 4 billion in 2002 to US$ 15.3 billion in 2011. Turkey ranks among the top 5 in the production of 30 products and in the exportation of 20 products worldwide.

Some of the Policies in Place

Interest Free Financing in Agriculture
The agricultural credit interest rates, which were 59% in 2002, became interest free for irrigation and livestock activities and decreased to 5% in other agricultural activities.

Reforms in Agricultural Support
Totally over 43 billion TL support payments were paid to farmers in 2003-2011 period.

Agricultural Basin Model
Totally 30 agricultural basins have been identified through evaluation of approximately 528 million data based on climate, soil, topography, land classes and land usage types.

Decreased fertilizer and pesticide subsidies
Fertilizer and pesticide subsidies have been curtailed and remaining price supports have been gradually converted to floor prices.

Land Reclamation
The South-Eastern Anatolia project is a hydraulic dam that incorporates integrated sustainable regional development, developing irrigation by doubling irrigable land. In just one province where the project was as of yet incomplete, cotton production more than doubled from 150,000 metric tons to 400,000 metric tons. The project also seeks to achieve power production, infrastructure development and increase in aquaculture output.

Supports for Certified Seed and Seedling
Use of certified seed increased from 150 thousand tons to 500 thousand tons between 2002 and 2011.

Period for Agricultural Insurance
In order to cover the loss of producers affected from natural disasters, an agricultural insurance scheme was initiated in 2006.

Incentives for livestock breeding
New livestock support schemes were introduced. The farmers dealing with organic livestock breeding have supported by payments 50% higher than before.

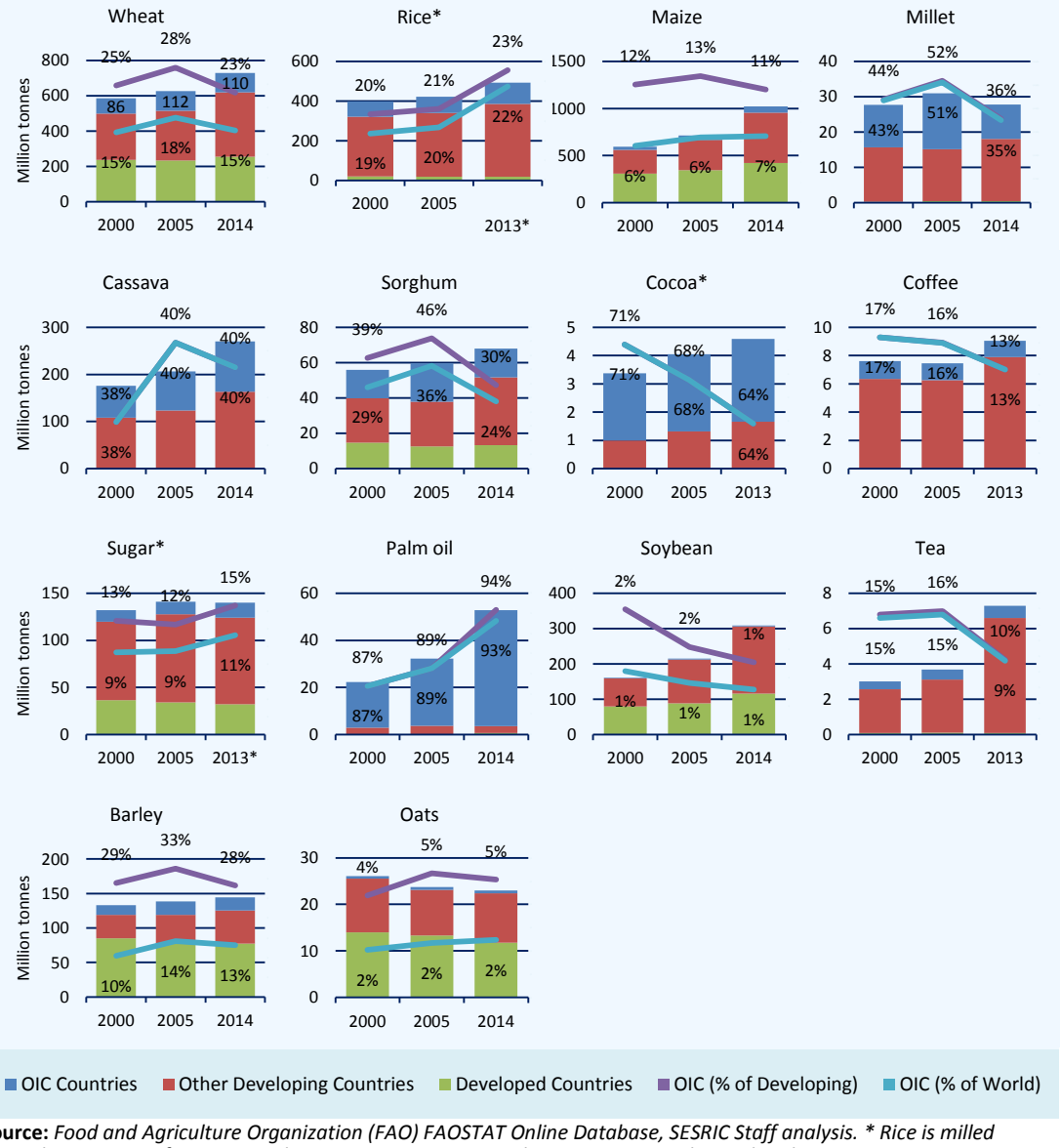
Agricultural Information System
The Ministry has developed an information system, inclusive of an agricultural census covering 54 provinces and to be extended to 81.

Source: *Ministry of Food, Agriculture and Livestock, Republic of Turkey*

developing countries' production decreased from 17.3% in 2000 to 16.6% in 2013. As far as meat production is concerned, OIC countries have seen improvements in their shares in the world as well as among developing countries. With 29.0 million tonnes in 2013, OIC countries registered 9.4% and 14.2% shares in total meat production of the world and developing countries, respectively, which were above their 7.8% and 13.2% levels recorded in 2000, respectively.

It is also observed that the total OIC agricultural production concentrated in a few member countries and only ten countries accounted for the 80.7%, 76.2%, 75.7% and 69.0% of the total production of cereals, fruits, vegetables and meat in 2013 (Figure 2.4). Indonesia is leading in 3 out of 4 product groups, namely, cereals, fruits and meat. Although such level of concentration is somewhat an undesirable outcome, case studies reveal some of the successful policies implemented by governments to foster agricultural development in countries which collectively dominate the OIC's agricultural production (see, e.g., Box 2).

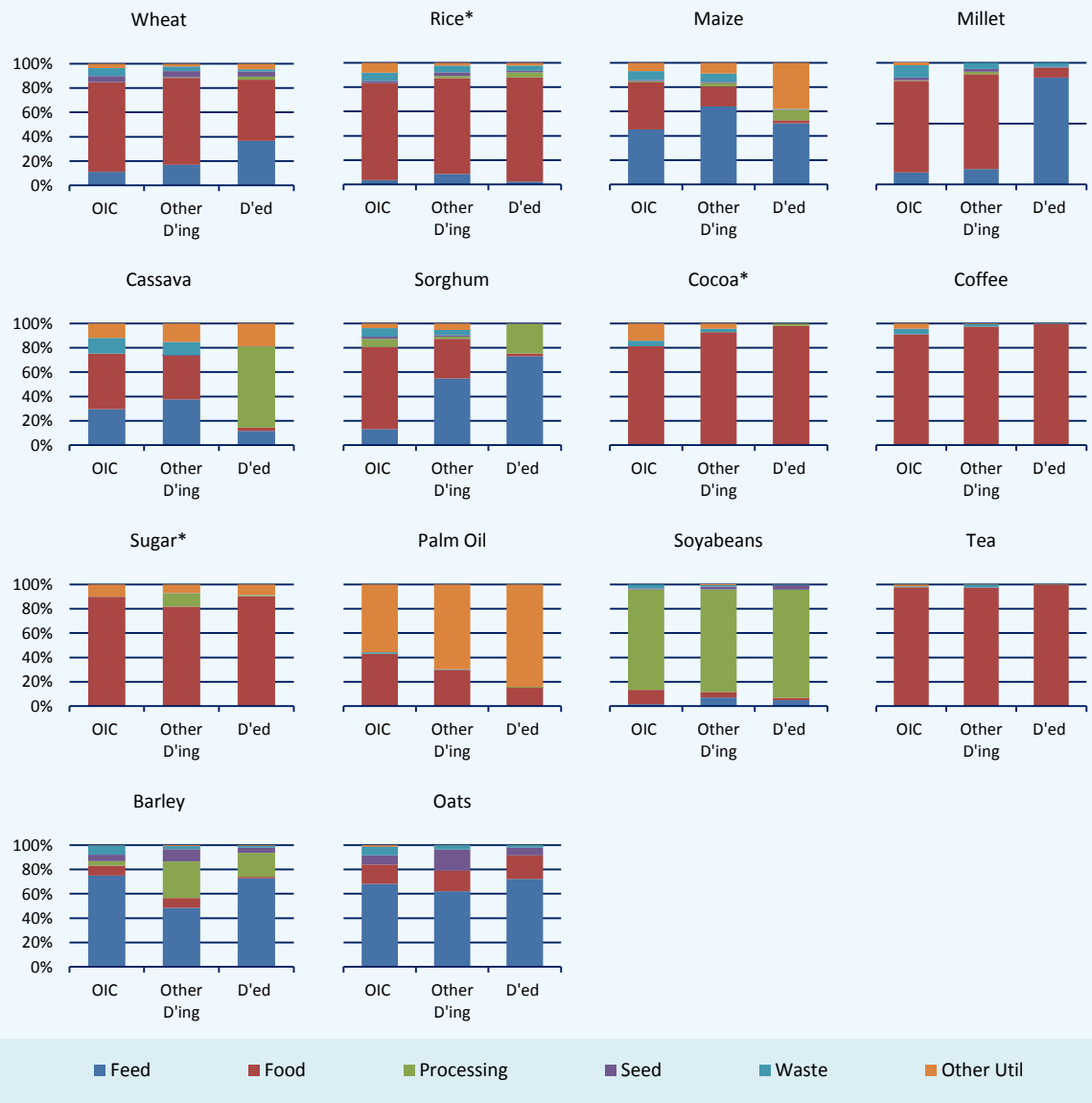
FIGURE 2.5
Production of Major Commodities



Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis. * Rice is milled equivalent. Cocoa refers to cocoa beans. Sugar is raw equivalent. Rice, Sugar - latest data between 2011-2013*

Figure 2.5 shows the production volume of major agricultural commodities in OIC countries and their corresponding shares in other developing as well as the world. The OIC countries have exhibited highest shares globally in the total production of palm oil (93%), cocoa (64%), cassava (40%), sorghum (24%), and millet (35%) – as compared to other major commodities in Figure 2.5. For commodities such as sugar, rice, cassava, palm oil and oats, OIC countries have been able to improve their share in both other developing countries as well as the world since 2000. On the contrary, a decrease in their shares was the case for millet, sorghum, cocoa, coffee, tea and soybean during the period under consideration. In all cases, except for coffee and millet, the member countries as a whole have increased the volume of production – with the most significant increases being observed in palm oil (155.4% increase from 19.3 to 49.3 million tonnes), maize (102.1% increase from 33.4 to 67.5 million tonnes), cassava (58.1% increase from 67.8 to 107.2 million tonnes), wheat

FIGURE 2.6
Utilisation of Major Commodities (2011-2013)



Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis*
** Rice, cocoa and sugar refer to milled equivalent, cocoa beans and raw equivalent, respectively.*

(27.5% increase from 86.3 to 110.0 million tonnes), and tea (52.8% increase from 0.4 to 0.7 million tonnes).

Figure 2.6, on the other hand, offers a look at the average shares of available types of utilisation of major agricultural commodities for the most recent years for which data is available between 2011 and 2013. For majority of these commodities, food and feed are apparently the primary methods of utilisation. In 2013, 97.7% of tea, 91.2% of coffee, 90.0% of sugar, 79.7% of rice, 73.5% of wheat, 75.2% of millet, 81.4% of cocoa, 67.8% of sorghum, and 45.8% of cassava supplies were domestically utilised as human food products in OIC countries. On the other hand, again in the same year, 74.9% of barley, 68.2% of oats, 45.2% of maize, and 29.4% of cassava supplies were utilised domestically for feeding livestock and poultry. Besides food and feed, significant portions of the commodities such as palm oil (55.9%) and cocoa (14.2%) were used for non-food purposes. Majority of soybeans (82.4%), on the other hand, were processed before used for other purposes.

TABLE 2.1

OIC Countries among Top-20 Largest Producers of Major Agriculture Commodities Worldwide (2014)

Commodity	Country (World Rank)
Barley	Turkey **(5),** Morocco **(13)**, Kazakhstan **(14)**.
Cassava	Nigeria **(1)**, Indonesia **(3)**, Cameroon **(13)**, Mozambique **(15)**, Benin **(16)**, Sierra Leone **(17)**, Uganda **(19)**.
Cocoa Beans	Côte d'Ivoire **(1)**, Indonesia **(3)**, Nigeria **(4)**, Cameroon **(5)**, Uganda **(14)**, Togo **(15)**, Sierra Leone **(16)**.
Coffee	Indonesia **(3)**, Uganda **(11)**, Côte d'Ivoire **(13)**.
Maize	Indonesia **(8)**, Nigeria **(14)**, Turkey **(19).**
Millet	Niger **(2)**, Mali **(4)**, Burkina Faso **(5)**, Nigeria **(6)**, Chad **(8)**, Senegal **(9)**, Pakistan **(13)**, Uganda **(15)**, Sierra Leone **(16)**, Guinea **(17).**
Natural Rubber	Indonesia **(2)**, Malaysia **(6)**, Côte d'Ivoire **(7)**, Nigeria **(10)**, Cameroon **(15)**, Gabon **(19).**
Oats	Kazakhstan **(18),** Turkey **(20)**
Palm Oil	Indonesia **(1)**, Malaysia **(2)**, Nigeria **(5)**, Côte d'Ivoire **(8)**, Cameroon **(15)**, Sierra Leone **(20)**.
Rice	Indonesia **(3)**, Bangladesh **(4)**, Pakistan **(13)**, Egypt **(14)**, Nigeria **(16)**
Sorghum	Nigeria **(2)**, Burkina Faso **(9)**, Niger **(10)**, Cameroon **(11)**, Mali **(13)**, Egypt **(14)**, Chad **(15)**, Yemen **(16),** Uganda **(19).**
Soybeans	Indonesia **(13)**, Nigeria **(15),** Kazakhstan **(19)**.
Sugar	Pakistan **(5)**, Egypt **(17).**
Tea	Turkey **(6)**, Iran **(7)**, Indonesia **(8)**, Bangladesh **(12)**, Uganda **(14)**, Mozambique **(18).**
Wheat	Pakistan **(8)**, Turkey **(11)**, Kazakhstan **(12)**, Egypt **(15),** Iran **(16).**

Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis*

2.3. Top Producers of Major Agriculture Commodities

Notwithstanding the low level of development in the agriculture sector and the relatively low share of OIC countries in the global agricultural production, 25 member countries are among the top 20 producers of some major agricultural commodities worldwide (see Table 2.1). These commodities vary from cereals such as wheat, barley, rice and maize to

tropical/temperate zone commodities such as palm oil, cocoa, coffee, rubber and sugar. However, for many of these countries, particularly those in which the bulk of their exports concentrate on a few of such agricultural commodities, price fluctuations in the international commodity markets may pose additional risks and challenges. In addition, exporting these primary commodities with low or no value added mainly due to inappropriate processing facilities is another challenge related to the competitiveness of their commodities in the international trade markets. In this respect, investments in agriculture processing facilities can be a critical step in addressing the challenges ahead of agricultural development, protecting farmers as well as creating additional jobs.

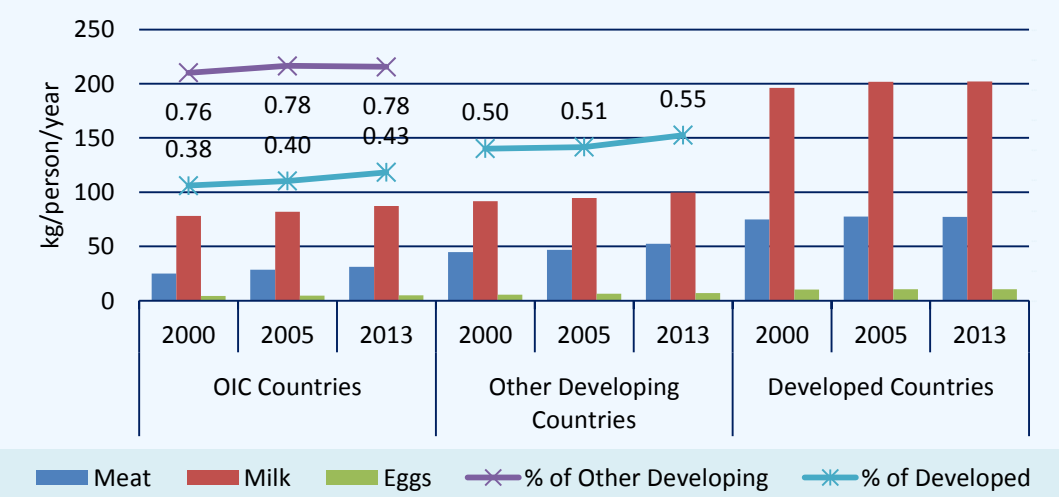
2.4. Livestock and Fisheries

Rapid growth and technological innovation have led to profound structural changes in the livestock sector, including: a move from smallholder mixed farms towards 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. On the other hand, fisheries and aquaculture continue to make crucial contributions to the world's wellbeing and prosperity. They constitute an important source of nutritious food and animal protein for much of the world's population. In the view of the foregoing, this sub-section reviews recent trends in the consumption, production and trade of livestock and fisheries products in OIC countries, wherever applicable, with comparisons to other country groups.

2.4.1. Livestock

Consumption of livestock products in developing countries, measured as per capita consumption in kilograms during a specific year, has increased significantly over the past decade. Figure 2.7, in this regard, depicts the recent trends in the per capita consumption of major livestock items, namely, meat, milk and eggs. Apparently, OIC countries suffer from relatively low levels of consumption in livestock products. Meat consumption, for instance, has increased from 25.0 to 31.3 kg/person over the period 2000-2013. Yet, this figure is still

FIGURE 2.7
Per capita Consumption of Livestock Products

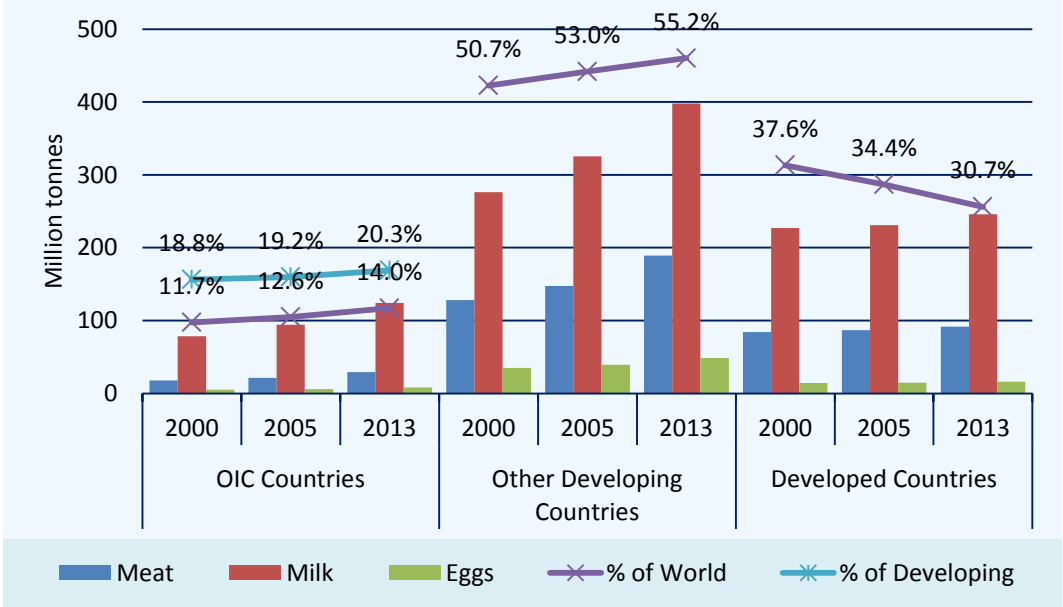


Notes: Milk excludes butter
Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis*

much lower than 52.4 and 77.2 kg/person levels observed in other developing countries and developed countries, respectively. Although OIC countries' milk consumption, with an average annual consumption level of 87.4 kg/person, compares fairly to other developing countries (99.8 kg/person), this figure is much lower than the average consumption level of developed countries (above 202.1 kg/person). A similar argument holds true for the egg consumption as well. In 2013, per capita consumption of eggs in OIC countries was recorded at 4.8 kg, which is significantly lower than the averages of other developing countries (7.0 kg) and developed countries (10.6 kg). Overall, the ratio of average per capita livestock products consumption in OIC countries to that in other developing countries is calculated as 0.78 in 2013, which points to a slight improvement in the position of OIC countries against the latter since 2000 (Figure 2.7). The ratio of average per capita consumption in OIC countries to that in developed countries has registered notable improvement, increasing from 0.38 in 2000 to 0.43 in 2013.

On the production side, developing countries have apparently responded to growing demand for livestock products by rapidly increasing their production (Figure 2.8). Between 2000 and 2013, OIC countries as a group have increased their meat, milk and eggs production by 64.0% (from 17.8 to 29.2 million tonnes), 58.3% (from 78.5 to 124.3 million tonnes) and 62.7% (from 5.1 to 8.3 million tonnes), respectively. Accordingly, their share in overall production of livestock produce in the world has also improved. In 2013, OIC countries accounted for 14.0% of the world total production of livestock products, registering an increase over its year 2000 value of 11.7%. During the same period, other developing countries have also kept a similar pace and, as a result, the share of OIC countries in developing countries has remained relatively stable around 19%. As far as the drivers of the production growth are considered, the current report concludes that supply-side factors have enabled expansion in livestock production. Cheap inputs, technological change and scale efficiency gains in recent decades have resulted in declining prices for livestock products.

FIGURE 2.8
Production of Livestock Products



Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis*

Growth in livestock trade has been facilitated by increasing consumption of livestock products and economic liberalization. Developments in transportation, such as long-distance cold-chain shipments (refrigerated transport) and large-scale and faster shipments, have made it possible to trade and transport animals, products and feedstuffs over long distances. This has allowed production to move away from the loci of both consumption and production of feed resources. Increasing trade flows also have implications for the management of animal diseases and a number of food-safety issues. In the view of this, Table 2.2 offers a comparative look at the trends in the trade of major livestock products. Two critical observations can be made as follows: first, OIC countries are over-dependent in imported livestock products, except for eggs, and, second, this dependency has grown rapidly. During the period 2000-2013, the total trade deficit of OIC countries in meat has more than doubled by increasing from 1.6 to 4.0 million tonnes. This was largely due to the rapid expansion of poultry meat imports and, therefore, trade deficit in poultry (2.7 million tonnes in 2013 vis-à-vis only 0.9 million tonnes in 2000). Yet, a less optimistic situation is observed in Table 2.2 for dairy products. As of 2013, OIC countries were net importers of dairy products with a 14.7 million tonnes trade deficit in these products. This figure is even larger than what is observed in other developing countries (7.7 million tonnes in 2013). Overall, as of 2013, OIC countries accounted for 4.6% of world total livestock produce export, which is more than three times as large as the 2000 level of 1.3%, and 17.4% of imports (which was 14.1% in 2000). These numbers correspond to 10.9% and 29.2% of the developing country exports and imports, respectively, again in 2013.

TABLE 2.2

Trade in Livestock Products (2000, 2005 and 2013)

	Exports			Imports			Trade Balance		
	2000	**2005**	**2013**	**2000**	**2005**	**2013**	**2000**	**2005**	**2013**
OIC Countries	*(thousand tonnes)*			*(thousand tonnes)*			*(thousand tonnes)*		
Total Meat	109	260	892	1.698	2.609	4.939	1.589	2.349	4.047
Poultry	43	129	584	903	1.434	3.251	860	1.305	2.667
Dairy[1]	1.042	2.819	6.155	10.871	14.579	20.897	9.829	11.760	14.742
Eggs	117	136	474	113	114	502	-4	-22	28
Other Developing C.	*(thousand tonnes)*			*(thousand tonnes)*			*(thousand tonnes)*		
Total Meat	8.234	14.509	21.567	7.925	10.418	16.217	-309	-4.091	-5.350
Poultry	3.453	5.411	8.996	4.017	4.652	5.971	564	-759	-3.025
Dairy[1]	22.617	29.409	39.084	23.507	27.461	46.799	890	-1.948	7.715
Eggs	379	567	845	408	515	785	29	-52	-60
Developed C.	*(thousand tonnes)*			*(thousand tonnes)*			*(thousand tonnes)*		
Total Meat	16.143	16.683	21.609	13.496	16.077	19.123	-2.647	-606	-2.486
Poultry	5.277	5.403	7.526	2.637	3.783	5.514	-2.640	-1.620	-2.012
Dairy[1]	47.199	52.044	71.101	31.867	36.625	41.561	-15.332	-15.419	-29.540
Eggs	459	459	796	378	475	752	-81	16	-44
OIC Countries	*%*			*%*					
as % of Developing	3,9	6,7	10,9	28,5	31,1	29,2			
as % of World	1,3	2,8	4,6	14,1	15,9	17,4			

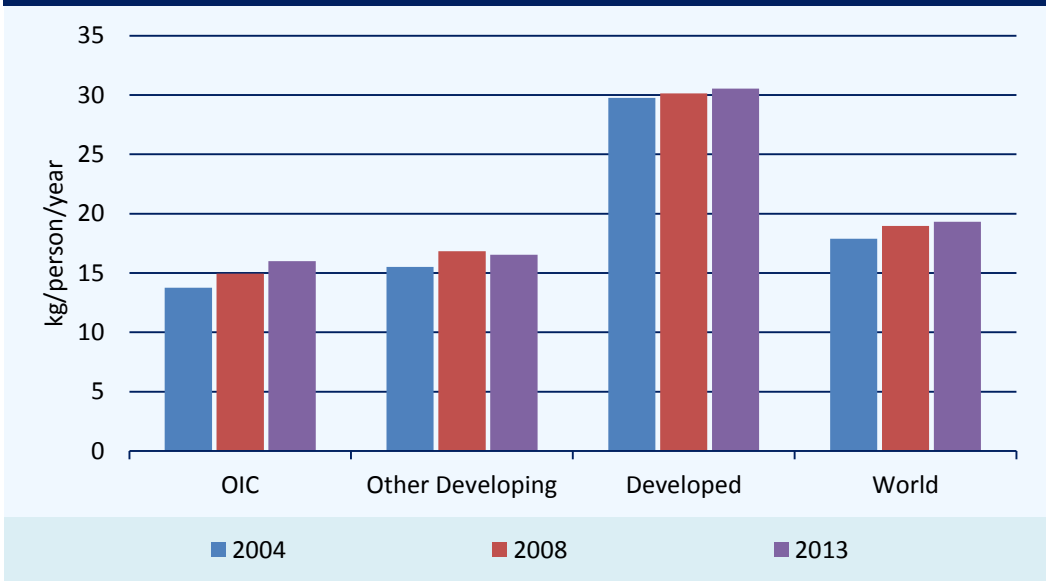
Notes: [1] Milk equivalent. **Source:** *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis*

2.4.2. Fisheries

Data from Fisheries and Aquaculture Department of the FAO reveals that capture fisheries and aquaculture supplied the world with about 191 million tonnes of fish in 2013. With sustained growth in fish production and improved distribution channels, world fisheries production has grown significantly during the last decade, with an average growth rate of 2.4% per annum during the period 2004–2013. This outpaced the average increase of 1.1 % per annum in the world's population during the same period. Accordingly, there have been improvements in the world per capita food fish consumption.

Figure 2.9 shows the development in the per capita consumption of fisheries produce in OIC countries, in comparison to other country groups as well as world, for the period 2004-2013. During this period, the average per capita consumption in OIC countries has increased from 13.8 to 16.0 kg – registering a 16.1% increase. Other developing countries experienced a similar pace of growth and their per capita consumption went up from 15.6 to 16.5 kg during the same period, registering a 6.5% increase. In developed countries, per capita consumption increased from 29.8 to 30.6 kg where the world average climbed from 17.9 to 19.3 kg in the same period, representing an 8% increase.

FIGURE 2.9
Per capita Consumption of Fisheries Products

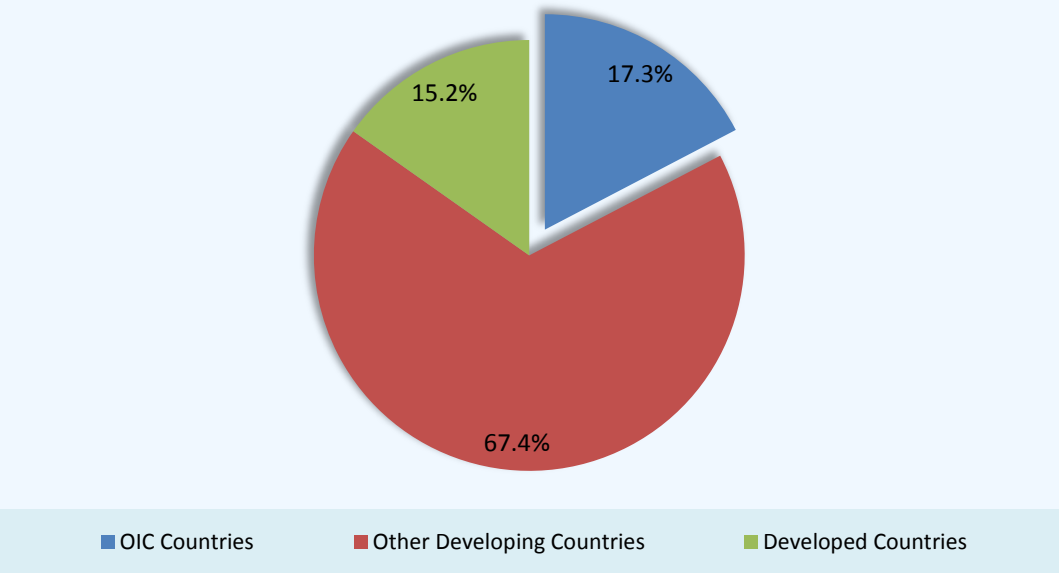


Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis*

As of 2013, OIC countries accounted for 17.3% of the total fisheries production in the world (Figure 2.10). This is much below the 67.4% share of other developing countries. In the same year, developed countries accounted for another 15.2% of the total production. Yet, 17.3% share of OIC countries in the total fisheries marks a sizeable improvement over 10.7% observed in year 2000. Developed countries, on the other hand, have seen their share contracting from 22.7% in 2000 to 15.2 % in 2013, as shown in Figure 2.10.

Figure 2.11 depicts the total volume of aquatic species caught by different country groups according to the fishing area (i.e., inland or marine) and fishing method (i.e., capture or aquaculture). In this context, it is observed that inland fisheries production has expanded rapidly (almost doubled) from 27.4 to 56.4 million tonnes between 2000 and 2013 (a 106% increase), whereas marine production has remained relatively stable (i.e., 134.6 million

FIGURE 2.10
Share in Fisheries Production (2013)



Source: *FAO Yearbook of Fishery and Aquaculture Statistics Online Database, SESRIC Staff analysis*

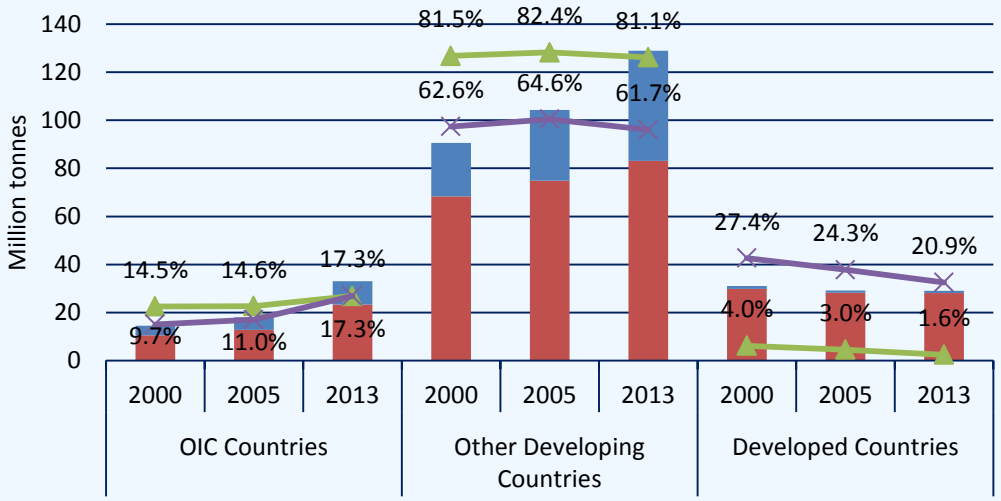
tonnes in 2013 vis-à-vis 109.1 in 2000 which marks a cumulative increase of only 23.4%) (Figure 2.11, top). As a result, the share of inland production has seen significant improvements across the board against marine production during the examined period. As also observed from the figure, OIC countries improved their share in world inland fisheries production from 14.5% in 2000 to 17.3% in 2013. Yet, a significant improvement is visible in the case of marine production, whereby OIC countries have increased their overall share in global marine fisheries production from 9.7% to 17.3% over the same period. The aforesaid shares correspond to 9.8 and 23.3 million tonnes of fisheries production in OIC countries in 2013 for inland and marine fishing areas, respectively. On the other hand, other developing countries continued to produce the bulk of the global inland and marine production, with 82.4% and 64.6% shares in 2013, respectively.

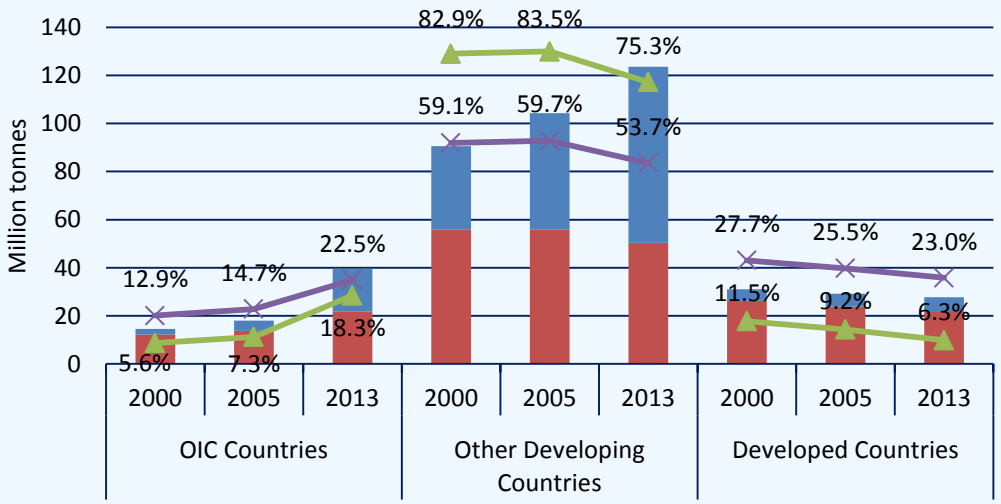
A similar argument also holds true for aquaculture fisheries production against capture as well. World aquaculture fisheries production is reported by the FAO to have more than doubled from 41.7 million tonnes in 2000 to 97.2 in 2013 (a 132.9% increase) (Figure 2.11, bottom). On the contrary, total capture production has been stable slightly above 90 million tonnes during the same period. OIC countries, with an increase from 2.3 to 17.8 million tonnes, have increased their shares remarkably in world total aquaculture fisheries production from 5.6% to 18.3% during 2000-2013. The share of OIC countries in global capture production, on the other hand, has also improved and reached 22.5% in 2013. As of the same year, other developing countries accounted for 75.3% and 53.7% of world total aquaculture and capture fisheries production, respectively.

Table 2.3 provides the trends in the trade of fisheries for different product groups. In 2011, the total fish exports originating from OIC countries reached 2.0 million tonnes. On the contrary, OIC countries imported 4.0 million tonnes of fish in the same year – running a net trade deficit of 2.0 million tonnes. Fish constitutes the largest share in the OIC fisheries trade. However, the deficit in OIC fish trade has grown substantially between 2000 and 2011 (almost tripled), constituting the bulk of the overall trade deficit of OIC countries in fisheries trade. In terms of trade volume, fish is followed by crustaceans and mollusc with export

volumes of 0.4 and 0.3 million tonnes in 2011, respectively. Other developing countries, however, are apparently major originators of developing country fishery product exports whereas the significant portion of their exports goes to developed countries who are the largest importers.

FIGURE 2.11
Production of Fisheries by Fishing Area and Fishing Method





Notes: The production figures cover all species items, fishing areas, production purposes (i.e. commercial, industrial, recreational and subsistence purposes). The harvest from mariculture, aquaculture and other kinds of fish farming is also included.
Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis*

TABLE 2.3

Trade in Fishery Products (2000, 2005 and 2011)

	Exports			Imports			Trade Balance		
	2000	2005	2011	2000	2005	2011	2000	2005	2011
OIC Countries	*(thousand tonnes)*			*(thousand tonnes)*			*(thousand tonnes)*		
Fish[1]	961.9	1569.3	1989.6	1523.6	2417.4	4002.8	561.7	848.0	2013.2
Crustaceans[2]	271.0	392.5	441.6	53.9	78.8	182.4	217.1	313.7	259.1
Molluscs	257.7	221.6	284.7	30.3	31.9	61.5	227.4	189.7	223.2
Meals	43.1	111.0	156.3	310.5	194.1	364.6	267.3	83.1	208.3
Oils	9.9	25.4	28.9	12.7	13.7	41.4	2.8	11.7	12.6
Aquatic plants	35.3	83.1	165.8	2.6	5.7	9.6	32.6	77.4	156.3
Inedible	3.1	4.3	6.8	8.0	15.9	19.0	4.9	11.7	12.2
Other Developing C.	*(thousand tonnes)*			*(thousand tonnes)*			*(thousand tonnes)*		
Fish[1]	6334.1	8217.9	10951.8	4055.4	7170.1	8504.8	2278.7	1047.8	2447.0
Crustaceans[2]	1087.7	1656.1	2193.2	155.1	289.1	343.4	932.5	1367.1	1849.8
Molluscs	1050.2	1395.2	1763.3	370.3	401.3	647.4	679.9	993.9	1115.9
Meals	2900.7	3061.0	2144.3	1826.6	2165.0	1608.1	1074.2	896.0	536.2
Oils	499.1	362.2	445.3	225.6	105.9	174.4	273.5	256.2	271.0
Aquatic plants	165.0	147.2	183.5	45.6	94.3	222.1	119.4	52.8	38.6
Inedible	166.3	107.9	71.0	91.6	108.1	106.9	74.7	0.2	35.9
Developed C.	*(thousand tonnes)*			*(thousand tonnes)*			*(thousand tonnes)*		
Fish[1]	8540.8	9888.7	10713.2	9862.1	11014.3	11599.9	1321.3	1125.6	886.7
Crustaceans[2]	680.0	850.4	838.1	1929.2	2445.5	2536.5	1249.1	1595.1	1698.4
Molluscs	978.2	894.0	1022.5	1721.2	1952.0	2097.1	743.0	1057.9	1074.6
Meals	1186.4	1087.0	763.4	2308.5	1947.1	1369.4	1122.1	860.1	605.9
Oils	381.8	328.0	456.2	628.7	661.0	696.0	246.9	332.9	239.8
Aquatic plants	49.9	73.1	80.5	227.9	242.6	253.8	178.0	169.5	173.3
Inedible	393.8	464.9	350.6	956.5	845.9	855.1	562.6	381.0	504.5

Notes: [1] Includes fresh, chilled, frozen, dried, salted, smoked as well as prepared or preserved fish types. [2] Includes live, fresh, chilledas well as prepared or preserved crustaceans and molluscs.

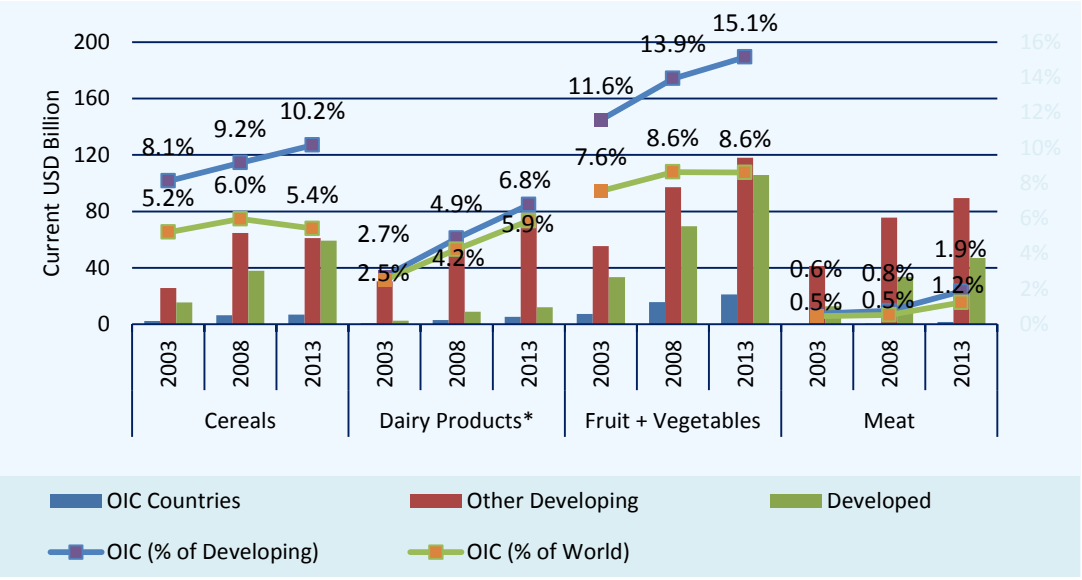
Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis*

2.5. Trade in Agriculture Products

As observed from Figure 2.12, the total cereal exports of OIC countries amounted to US$ 6.9 billion in 2013, accounting for only 5.4% of the world total cereal exports. This share points to a slight increase over its 5.2% level observed in 2003, but a contraction compared to its 6% level in 2008. The share of OIC countries in the total cereal exports of developing countries has also increased to 10.2% in 2013, compared to 8.1% in 2003 and 9.2% in 2008. As far as dairy products are concerned, it is observed that exports of OIC countries reached US$ 5.3 billion in 2013 – significantly increasing its share in both that of developing countries (from 2.7% to 6.8%) and world as a whole (from 2.5% to 5.9%). The total exports of fruits and vegetables originating from OIC countries accounted for 15.1% and 8.6% of developing countries and world exports in 2013, respectively, increasing from US$ 7.3 billion in 2000 to US$ 21.1 billion in 2013. With the lowest share in total exports of both developing countries as well as world, as compared to other product groups, total meat exports from OIC countries accounted for only 1.9% and 1.2% of that of the developing countries and the world, respectively, in 2013.

Overall, with insufficient agricultural production capacity to meet the food demand of their rapidly growing populations, OIC countries, as a group, rely heavily on agricultural imports, particularly of food products. This picture of dependency becomes even clearer when the share of OIC countries, as a group, in total imports and exports of agricultural products of

FIGURE 2.12
Exports of Major Agricultural Product Groups (2003-2013)



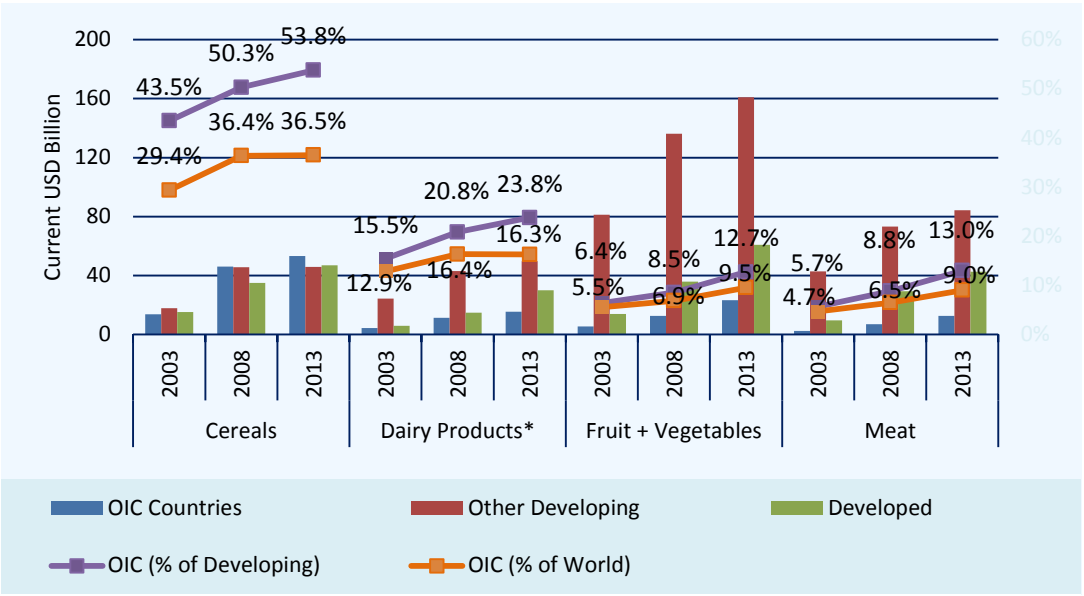
Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Table 10).*
** Dairy products including eggs.*

world and developing countries are considered together. As shown in Figure 2.13, with US$ 53.3 billion, OIC countries accounted for more than half (53.8%) of total cereals imports of developing countries in 2013, and more than one-third (36.5%) of the world total. Both shares have increased over the last decade – marking an increase in dependency on the import of cereal products. In a similar vein, total dairy product imports of OIC countries, amounting to US$ 15.5 billion in 2013, had a share of 23.8% in that of the developing countries in the same year, and 16.3% in that of the world. On the other hand, between 2003 and 2013, OIC countries increased their fruit and vegetables imports from US$ 5.6 to US$ 23.4 billion while their share in the total imports of developing countries and the world also increased. The share of OIC countries in the world total fruit and vegetables imports has increased from 5.5% to 9.5% during 2003-2013 whereas their share in that of developing countries has increased from 6.4% to 12.7% in the same period. As for the meat imports, it is observed that OIC countries have increased their collective share in meat imports of both developing countries (from 5.7% to 13.0%) and the world as a whole (from 4.7% to 9.0%) during the period under consideration by importing 12.6 billion worth meat.

In terms of trade concentration, Figure 2.14 shows the agricultural export and import volumes in top 5 OIC countries. The bulk of the total agricultural exports and imports of OIC countries is concentrated in a few member countries. More specifically, top 5 OIC exporters in each product category shown in Figure 2.14 accounted for 84.9%, 67.2%, 64.1%, and 79.3% of total cereal, dairy product, fruit & vegetables, and meat exports of OIC countries in 2011, respectively, whereas, top 5 importers accounted for 43.9%, 45.7%, 42.8% and 56.4% of the import volume related to each of these major product groups, again respectively.

As a result of the relatively high dependence of many OIC countries on imports of agricultural products, OIC countries as a group registered significant trade balance deficits in all of these products (Figure 2.15). After trade balance in fruits and vegetables turned to deficit, OIC countries become dependent on imports in all main four agricultural product groups and this dependency has increased significantly over the last decade. In 2013, total cereal trade deficit of OIC countries reached US$ 46.4 billion, compared to US$ 11.6 billion in

FIGURE 2.13
Imports of Major Agricultural Product Groups (2003-2013)

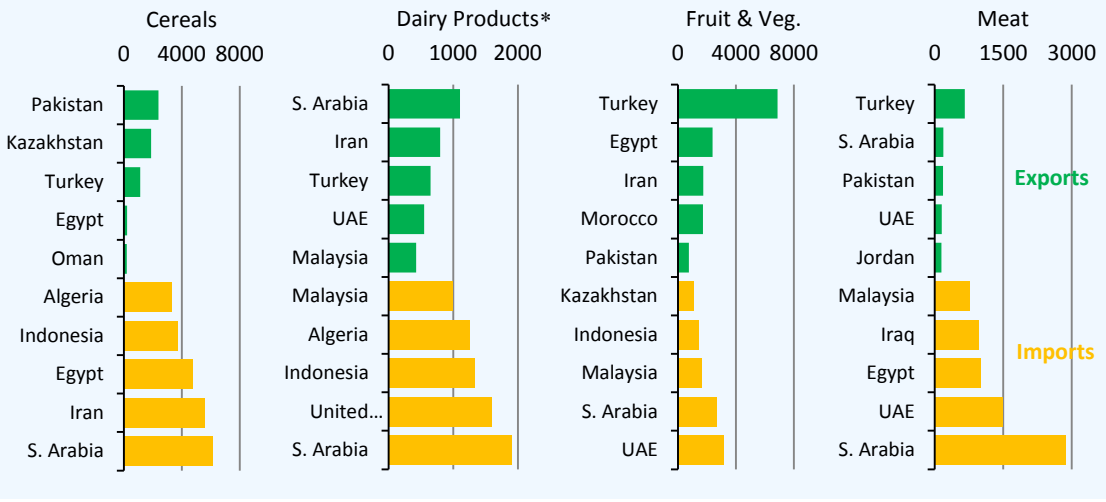


Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Table 11).*
* Dairy products including eggs.

2003. In the same year, OIC countries trade deficit in dairy products amounted to US$ 10.3 billion compared to only US$ 3.6 billion in 2003. The majority of surpluses in cereal and dairy product trades are run by developed countries. On the other hand, between 2003 and 2013, OIC trade deficit in meat products has increased more than four-fold and reached US$ 10.9 billion in 2013. On the contrary, OIC countries were able to record a trade surplus, though small, in fruit and vegetables until 2011, but it turned to deficit in 2012. As of 2013, net import of OIC countries reached US$ 2.3 billion in this category. Other developing countries and developed countries emerge as the major net exporters and importers of fruit and vegetables, respectively.

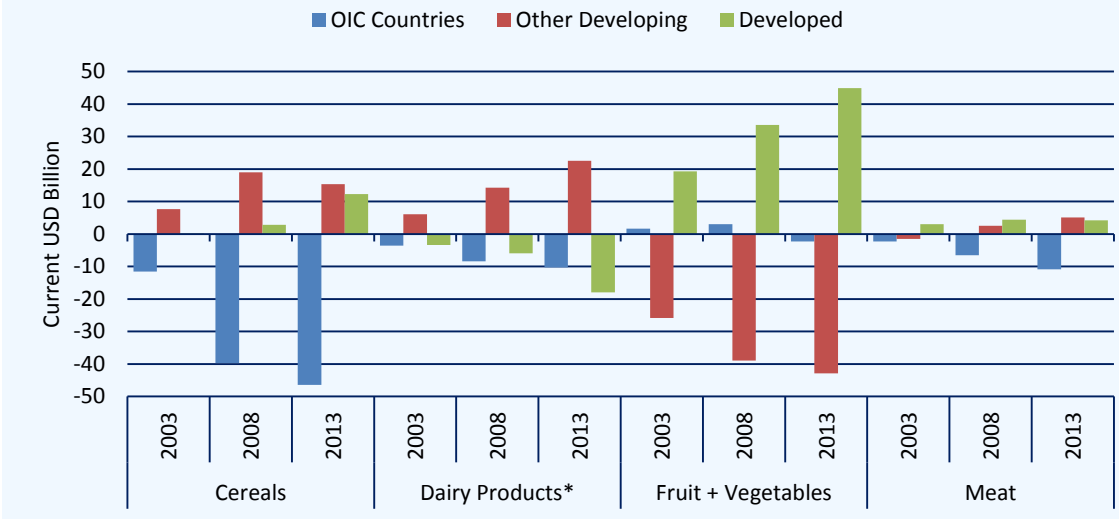
Overall, when all agricultural products are concerned, it is observed that OIC countries, as a group, have more than quadrupled their trade deficit from US$ 15.9 billion in 2003 to US$ 69.9 billion in 2013. This indicates that the domestic production of agricultural products, mainly food, in most OIC countries does not increase in equal pace with the increase in population and, hence, with the increase in the demand for these products. This led to a widening of the production-consumption gap, which has to be bridged through an increase in imports. Moreover, inadequate rainfall coupled with other adverse climatic conditions, has exacerbated the situation of food scarcity in OIC countries. Many OIC countries have been facing severe food emergencies and are classified by FAO as food-deficit countries. This, in turn, makes these countries highly vulnerable to external shocks in international food prices through, inter alia, increasing their food import bills and trade deficits, posing serious negative impacts on health and education, and consequently worsening the state of food security through increasing the number of undernourished people. Some and more of these issues will be discussed in Section 6 of this report.

FIGURE 2.14
Top 5 Exporters and Importers of Major Agricultural Product Groups (US$ million, 2013)



Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis.*
* Dairy products including eggs.

FIGURE 2.15
Trade Balance in Major Agricultural Product Groups



Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis.*
** Dairy products including eggs.*

3. Impacts of Climate Change on Agriculture

Climate change is one of the most crucial contemporary environmental challenges with serious negative social and economic consequences. Triggered both by natural and human induced reasons, climate change is underway since centuries with increasing frequency and intensity in recent times. During the last few decades, human activities related mainly to industrial production, agriculture and transportation emerged as the major contributors to the concentration of greenhouse gases (GHGs) in the atmosphere. And increasing concentration of GHGs emissions is causing global warming (i.e. increase in the Earth's surface mean temperature) which is one of the most common manifestations of climate change. In addition, timing and amount of rainfall is changing, level of precipitation become highly variable and occurrence of extreme weather events like floods, draughts, cyclones and storms is more often compared to the past. Changes in these important variables have severe negative implications for human beings as they affect negatively the availability of basic necessities like food and water and deteriorate the health conditions.

Against this backdrop, the year 2015 has become a turning point in global efforts to transform the social and economic development into a more sustainable one. In this context, the global community reached agreement in September 2015 on a set of 17 sustainable development goals to be achieved by 2030, including climate change. In addition, 196 countries met at the United Nations Framework Convention on Climate Change (UNFCC) 21st Conference (COP 21) in order to establish a new "Paris Agreement" on climate change with the ambition of limiting changes in global temperatures to below 2^{o}C or 1.5^{o}C warming in 2100 compared to pre-industrial levels. The "Paris Agreement" aims also to establish a

framework in order to provide technological and financial support for developing countries to accelerate the transition towards low carbon and climate resilient development paths.

Undoubtedly, agriculture sector is extremely vulnerable to the climate change mainly due to its higher dependence on climate and weather conditions. Climate change can affect agriculture sector through various channels: temperature rise, variation in rainfall and precipitation distribution, carbon concentration, extreme weather events like floods, drought and storms, and intensification of pest growth. The level and extent of effects on agriculture production are highly uncertain and various climate models used for the estimation of effects produced results with significant variations. However, these variations are mostly for the short to medium term periods (up to the period 2030-2050) and in the long run most of the models predicted aggregate negative impact of climate change on agriculture sector across the globe (IPCC, 2014). Impacts of climate change on agriculture sector are uneven at global level and some regions are expected to be more affected than the others. In general, developing countries located mainly in arid, semi-arid and dry sub-humid regions are more vulnerable compared to the developed countries due, mainly, to their existing warm climate and higher variability of rainfall and precipitation.

Being a substantial part of the developing world, OIC countries are no exception and most of them are expected to experience high losses in agriculture production due to climate change. The most vulnerable are the low income and poor member countries from Africa and Asia mainly due to their geographic location, higher prevalence of undernourishment and low financial capacity to adapt and mitigate the negative impacts of climate change. In this context, this chapter aims to highlight the impacts of climate change on some important agriculture related variables in the regions where a majority of OIC countries are located.

3.1. Increase in Temperature

The world is getting warmer and there are clear indications that despite all efforts we are not on track to limit the average global temperature to 2 degrees Celsius (^oC), an aim recognized in the United Nations Climate Convention's Cancun Agreements. Globally GHG emissions are on rise. According to the latest estimates, GHG emissions amounted to about 52.7 gigatonnes of carbon equivalent ($GtCO_2e$) in 2014, 20% higher than they were in 2000 (UNEP, 2015). On the other hand, these emissions are 11% higher than where emissions need to be in 2020 in order to ensure global temperatures do not rise by more than 2^oC. Provided the current emission trends and political commitments to cut the emissions, average global temperature is expected to reach in the range of 3.5^oC to 5^oC by the end of this century (UNEP, 2015). The increase in temperature will be larger on the land than over the ocean (IPCC, 2014).

Crops are highly sensitive to the temperature. And the length of their growing season and timing of development process is strongly influenced by it. The response of crop yield to higher temperature, however, is not homogenous across the world. In cold regions, where yield is limited by insufficient warmth, it could have positive impacts on the yield whereas crops will respond negatively with decrease in yield especially in semi-arid tropic and sub-tropic regions where temperature is already tending to be close to crops tolerance level (Antón, J. et al., 2012). Another related impact of higher temperature on crops is known as evapotranspiration. In this process, increase in temperature affect the ability of plants to get and use moisture while causing increase in evaporation from the soil. As a result, plants increase transpiration and loose more moisture from their leaves. This phenomenon negatively impacts the plants life cycle and production capacity.

At the global level, generally developing countries are expected to be more exposed to these negative impacts compared to the developed countries and, thus, their agriculture

production is expected to decline significantly. Impacts are estimated to be the strongest across Sub-Saharan Africa, South East Asia, and South Asia where majority of OIC countries are located. In these regions, yields of the dominant regional crops may fall significantly once temperatures rise by 3°C or 4°C. According to the World Bank, in Sub-Saharan Africa median yield losses of 5% are projected for 1.5-2 °C warming, 15% for 2-2.5 °C warming and 15-20% for the 3-4 °C warming. On the other hand, significant change in cropping areas is expected even under relatively modest levels of warming in this region. And a 1.5–2°C warming by the 2030s–2040s could lead to about 40–80% reductions in present maize, millet, and sorghum cropping areas for current cultivars. By 3°C warming, this reduction could grow to more than 90%. In a 4°C world, summer temperatures in South Asia are estimated to increase by 3°C to 6°C by 2100. And crop yields are projected to decrease around 10-30% for 3-4.5°C warming. Since 1980, rice and wheat yields have declined by approximately 8% for every 1°C increase in average growing-season temperatures in this region (World Bank, 2013).

Being located in already dry and warm areas, most of the OIC countries will suffer negative impacts of climate change due to increase in temperature as even 1°C increase in local temperature may result in 5-10% decline in yields for major cereal crops in semi-arid and tropic areas.

3.2. Variation in Rainfall and Precipitation

Globally, water resources are vulnerable to the climate change due to its impacts on rain fall, melting of snow and level of precipitation. Climate change is projected to reduce renewable surface water and groundwater significantly in most dry subtropical regions. In fact, OIC countries recorded an average value of 4,652m^3 of total renewable water resources per inhabitant per year, a rate which is significantly lower than that observed in non-OIC developing countries (9,373m^3 per inhabitant per year). In many regions of the world, increased water scarcity under climate change will present a major challenge for climate adaptation. At the OIC regional level, water scarcity is a fact of life in the arid and dry region of the Middle East and North Africa. OIC countries in this region have average annual total renewable water resources that stand at 913m^3 per capita, a rate which is below the threshold of 1,000m^3, and this puts them among the countries facing chronic water shortages (SESRIC, 2015). In addition, OIC countries in Europe and Central Asia, OIC countries in South Asia, and OIC countries in Sub-Saharan Africa have limited average annual total renewable water resources per capita recorded, respectively, at 3,319m^3, 4,164m^3 and 4,180m^3 (SESRIC, 2015).

Rain fed agriculture is a major source of food especially in the developing countries. According to the estimates of the International Water management Institution, it accounts for more than 95% of farmed land in Sub-Saharan Africa, 90% in Latin America, 75% in the Near East and North Africa; 65% in East Asia, and 60% in South Asia. Climate change is expected to bring severe disruption in rainfall patterns and consequently in rain fed agriculture. In general, the situation is going to be worst in semi-arid and dry areas with significant reduction in crop yield and increase in crop failures. In Sub-Saharan Africa, average annual rainfall is projected to increase mainly in the Horn of Africa (with both positive and negative impacts), while parts of Southern and West Africa may see decreases in rainfall. In Cameroon, a country highly dependent on rain-fed agriculture, a 14% reduction in rainfall is projected to cause significant economic losses, of up to around US$ 4.65 billion (World Bank, 2013). In South Asia, some climate induced changes in precipitation and delays in the start of monsoon season are expected. Given the fact that summer monsoon is critical to agriculture in Bangladesh, India, Nepal and Pakistan, climate change will cause significant decrease in agriculture production in this region (Vincent Gitz, 2012).

Irrigation based agriculture systems are also vulnerable. Given the fact that 40% of the world's crop yields are based on irrigation and almost half of this is from the basins of rivers originating in the Himalayas alone, effects of water scarcity can be an estimated reduction of world food production by 1.5% by 2030 and at least by 5% in 2050 (UNEP, 2015). Glaciers are an important source of water for irrigation in the Central Asia, parts of the Himalayas Hindu Kush, China, India, Pakistan and parts of the Andes. Nearly 35% of the crop production in Bangladesh, Bhutan, China, India, Myanmar, Nepal and Pakistan is based on irrigation, providing food for 2.5 billion people. However, melting of glaciers due to global warming will cause significant decrease in water supply for irrigation in these areas (IPCC, 2014).

Variation in precipitation level is another manifestation of impacts of climate change on water resources. Precipitation plays an important role in crop production by providing needed soil moisture. And decrease in precipitation level will lead to decrease in agriculture production. In fact, the production losses will be more significant in already dry and arid countries including many OIC countries. Climate change related variations in precipitation will also affect the levels of water storage in lakes and reservoirs in member countries. This could cause major problems for lakes, such as Lake Chad, which has already decreased in size by about 50% in the last 40 years. For the Niger River basin there is a predicted 10% change in precipitation, potential evaporation and runoff. In MENA, the average annual runoff will decline by as much as 27% by 2050. While with continuing increase in temperature, water flow in the Euphrates may decrease by 30% and that of the Jordan River by 80% before the turn of the century (AFED, 2009). This will aggravate the water shortage problem and lead to significant loss of agriculture productivity.

A majority of the OIC countries are located in dry and arid areas with a relatively small portion of the world total water resources compared to their population and land area (see Section 1 for details). Given the fact that water resources are already under great stress in 26 member countries and climate change will further exacerbate water availability in these areas, more member countries will face increasing water scarcity and subsequent decline in agriculture production.

3.3. Sea Level Rise

As seawater continues to warm, global average sea level will rise during the twenty-first century faster than the past decades. It is estimated that sea level may rise up to 69 cm by 2100 as water temperatures raise and glaciers and ice sheets melt in the Andes, Himalayas, Greenland and Antarctica (Ice2sea, 2013). In addition, in 2046–2065 (relative to 1986–2005), global average sea-level rise will be in the range of 0.17 to 0.32 m and 0.22 to 0.38 m for the lowest and highest GHG concentration pathways, respectively (UNEP, 2015). There will be also a significant increase in the frequency of future sea-level extremes in some regions. Sea level rise will damage the agriculture sector by flooding the crop land, increasing salinity of soil and contaminating the freshwater resources. Countries such as Vietnam, Bangladesh and Egypt where large portions of agricultural production are in low-lying coastal areas and small island nations like Maldives could see significant production loss from flooding and saline intrusion (IPCC, 2014). According to the estimates of UN Environmental Program, some 950 million hectares of salt-affected lands occur in arid and semi-arid regions, corresponding to nearly 33% of the potentially arable land area of the world. Globally, some 20% of irrigated land (450,000 km^2) is salt-affected, with 2,500–5,000 km^2 of lost production every year as a result of salinity (UNEP, 2009).

Sea level rise can seriously affect a number of OIC countries where economic activities and agriculture sector are concentrated in the coastal areas. Agriculture sector in Egypt will be highly vulnerable and only one meter rise in sea level would put 12% of its agricultural land

at risk. An elevated sea level will also exacerbate the flood impacts of the large rivers, especially the Niger and Nile. Some of the most vulnerable regions are the Nile delta in Egypt, the Ganges-Brahmaputra delta in Bangladesh, and the island of Maldives and Bahrain (AFED, 2009). A considerable increase in salt water intrusion is expected for some member countries in East Asia and Pacific Region. For a 100 cm sea-level rise by 2100, the land area affected by saltwater intrusion is expected to increase by 7–12% under 4°C warming in the Mahaka River region in Indonesia (World Bank, 2013).

3.4. Extreme Weather Events

Climate change alters the frequency of extreme weather events like heat waves, floods, cyclones, droughts, and land sliding. According to the findings of the IPCC report (2012), "a hottest day that occurs once in 20 years is likely to become a one-in-two year event, except in the high latitudes of the northern hemisphere, where it is likely to be one-in-five years. A high daily rainfall that has typically occurred once in 20 years is likely to happen every 5 to 15 years. The average tropical cyclone maximum wind speed is likely to increase, but the global frequency of tropical cyclones is likely to decrease or remain unchanged. Increased dry weather is predicted for southern Africa, north-eastern Brazil, central Europe, Mediterranean countries and central North America."

There is evidence that current warming trends and resulting extreme weather events around the world have already begun to impact agriculture. Some examples of economic losses caused by climate extremes are as follow (DKN, 2012):

- During the period 1950-2004, about 207 extreme events were recorded in the Asia Pacific region, causing damages worth around US$14.2 million.
- During the European heat wave of 2003, the (uninsured) economic losses for the agriculture sector in the European Union were estimated at €13 billion.
- A record drop in crop yield of 36% occurred in Italy for maize grown in the Po Valley, where extremely high temperatures prevailed in 2003.
- In Mozambique, flooding in 2000 resulted in the loss of 167,000 hectares of agricultural land with 277,000 hectares of crops destroyed. The World Bank estimates that total direct losses as a result of the floods amounted to US$ 273 million.
- Extreme events after a crop is grown can also impact agricultural production, for example wildfires in Australia in 2009 destroyed almost 430,000 hectares of forests, crops, and pasture, and over 55 businesses.

Agriculture is vulnerable and exposed to climatic extremes triggered by the climate change. There will be potentially large negative impacts in developing countries including some OIC countries especially in Sub-Saharan Africa and Asia mainly due to their higher reliance on agriculture, poor infrastructure and minimal capacity for the disaster management. In this context, FAO's recent analysis of 78 post-disaster needs' assessments in 48 developing countries between 2003–2013 shows that 25% of all economic losses and damages caused by droughts, floods as well as storms in developing countries are affecting the agriculture sector (FAO, 2015).

According to the latest report from the World Bank, heat extreme, draughts and flood are expected to occur more frequently across the world. In South East Asia, under 2°C warming, heat extremes will cover nearly 60–70% of total land area in summer which could climbed up to 90% with 4°C warming. There has been increase in occurrence of draughts in Sub-Saharan Africa since 1950. With a 4°C warming, there is a likelihood of extreme draught in southern Africa and severe drought in central Africa, increased risk in West Africa, and possible decrease in East Africa by 2080. Similarly, in South Asia drought would occur in

north western India, Pakistan and Afghanistan whereas there would be substantial increase in the length of dry spells in eastern India and Bangladesh. In addition, 1.5 million people are expected to be affected by the coastal floods in the coastal cities of the Bangladesh by 2070. By 2100, around 8.5 million more people will be exposed to coastal flooding in South East Asia (World Bank, 2013).

3.5. Pest Intensification and CO_2 Concentration

Another major impact of climate change on the crops will come from intensification of pests and pathogens. Climate and weather conditions play an important role in their distribution and proliferation. More precisely, climate change may increase the impact of pests by allowing their establishment in areas where they could previously not establish. For instance, the increase of temperatures in the Mediterranean Basin allows the establishment of tropical species that were not able to thrive in the region (UNEP, 2015). In addition, climate change also affects the efficiency of pesticides often used to control them by changing the conditions on the ground. For example, one of the most important factors which play a significant role in pesticide effectiveness, persistence, and transport is timing and volume of rainfall which induced by climate change will become highly uncertain in future. There is clear evidence that climate change is altering the distribution, incidence and intensity of animal and plant pests and diseases. Climate induced warming will help some pests not only to survive winter and shift to higher altitudes but also earlier occurrence of attacks in spring and increased number of annual generation. Under the climate scenarios with more winter rain in the Sahel region of Africa, it may provide better breeding conditions for migratory plant pests such as desert locust that are totally dependent on rain, temperature and vegetation, with catastrophic impacts on crop and livestock production. In cool temperate regions, where insect pests and diseases are not serious at present, damage is likely to increase under warmer conditions. In addition, most agricultural diseases have greater potential to reach severe levels under warmer conditions.

According to the latest estimates, global carbon-dioxide (CO_2) emissions from fossil-fuel and industry were estimated at 35.5 gigatonnes of carbon equivalent ($GtCO_2$) for 2014 (UNEP, 2015). The higher level of CO_2 in the atmosphere is an important variable which affects agriculture productivity through photosynthetic mechanism. Hence, concentration of CO_2 in the atmosphere, due to increase in GHG emissions, will certainly affect the crops and their productivity. However, so far the aggregate impacts of CO_2 concentration on agriculture sector are highly ambiguous as different crops show difference response to this phenomenon. Generally scientists are unanimous that an increase of atmospheric CO_2 levels can help to increase crop productivity in C3 crops like wheat, rice, and soybeans. But the extent of the increase in productivity depends on many other factors like crop species and soil fertility conditions. On the other hand, productivity of the C4 crops such as sugar-cane and maize, which account for about one-fourth of all crops by value, will certainly decline (Celine, 2007). The positive impacts of elevated CO_2 on the crops are highly uncertain and depend largely on the associated impacts of high temperatures, changed patterns of precipitation, and possible increased frequency of extreme events such as droughts and floods, on the crop yields. Therefore, it's not very much clear that how much certain will be the beneficial effects of Carbon fertilization on global food production.

4.Agriculture Development: Major Obstacles and Challenges

This chapter delineates the major obstacles and challenges that OIC countries, as a group, encounter in the domain of agriculture that have kept agricultural productivity in OIC countries at lower levels compared to the world average and the average of other developing countries.

4.1. Inefficient Land Use

One of the major issues constraining sustainable agricultural development in many OIC countries relates to inefficient land use, which is of paramount importance in the process of agricultural development. In 2014, OIC countries accounted for 25.9% of the world agricultural land area while its contribution to the world's total agricultural production was only 14.3%. The share of agricultural area accounted for 45.7% of total land area in OIC countries, compared to 40.3% in developing countries and 40.0% in the world. However, the corresponding cultivated area within this agricultural area in OIC countries is only 26.2%, while the rate in developing countries is 32.5% and the world average is 31.1%. Likewise, the share of arable land in OIC countries corresponds to 21.7% of their total agricultural area which is again far below the rate in developing countries and the world average, which are 29.2% and 27.8%, respectively. Inefficiencies in land use can be attributed to the fact that many OIC countries bear the problems of inefficient land markets due to insecure property rights, poor contract enforcement and stringent legal restrictions that limit the performance of land markets. This is a major problem in OIC, and particularly in least developed member countries, where land tenure security is not established. Ensuring access to land and

providing control over land for poor and marginalized rural households is significant for promoting agricultural growth, and in return, to mitigate poverty in the least developed

BOX 3

Using Evidence-based Policy to Address Challenges in Agricultural Technology Adoption

Billions of dollars are spent every year on development programs, but until recently there was relatively little rigorous evidence on the true impact these programs have on the lives of the poor. Different programs targeted at the same policy outcome can have very different results, but without clear evidence on their final impact there is little guidance for policymakers on which program to choose. In recent years, rigorous impact evaluations of social programs have emerged as a robust tool to guide social policy in developing countries. In particular, randomized impact evaluations that allow for precise measurement and attribution of impact can help policymakers identify programs that work and those that do not, so that effective programs can be promoted and ineffective ones can be discontinued. Recent years have also seen greater awareness of the need to use such evidence in policy decisions.

Randomized Evaluations

While rigorous impact evaluations using different methodologies can provide critical insights into policy, randomized evaluations (REs) are particularly well suited for a number of reasons:

REs measure impact rigorously. REs compare the outcome of interest (for example, adoption of fertilizer) of beneficiaries who received a program (the treatment group) to another group (the comparison group) that is similar in all respects except that it did not receive the program (for example, fertilizer offer at harvest time).

REs can provide key insight into why programs succeeded or failed. Researchers can design evaluations in a way that the different treatment arms, administrative data collected and quantitative and qualitative surveys provide key information on the underlying mechanisms that contribute to the success or failure of a program

REs provide practical information to help facilitate and guide scale-ups. Because REs are performed in real-world situations, often with implementing partners who could themselves expand the program if it were proven effective, they can yield many valuable practical insights beyond simple estimates of program effectiveness.

Barriers to Adoption and Evidence

Investment in agricultural technology, which led to the Green Revolution of the 1960s and 70s and continues the development of new products today, currently struggles with a profound adoption gap particularly among smallholder farmers. Increased technology adoption, broadly defined to include adoption of improved agricultural practices, crop varieties, inputs and associated products such as crop insurance, has the potential to contribute to economic growth and poverty alleviation amongst the poor. More specifically adoption of new agricultural technologies by farmers can help to better manage scarce water resources, adapt to climate change, and increase yields.

In a well-functioning economy where markets perfectly capture all costs and benefits, and individuals are fully informed and unconstrained, farmers will adopt a technology if they make a profit from adopting it. Of course, most economies of the world are very far from the well-functioning ideal. Movement away from this ideal creates constraints on the adoption of even profitable technologies.

Source: *MIT, The Abdul Latif Jameel Poverty Action Lab (J-PAL)*

member countries. Studies show that excessive inequality in land ownership reduces access to land and creates inefficiencies in land productivity (Binswanger and McCalla 2009). While traditional tenure systems have been good, rising population density, urbanization and political instabilities in some OIC countries will exacerbate the pressure on available land area for agriculture even further in the near future. Lack of asset ownership to serve as collateral in some OIC countries also creates problems in securing bank loans, which would

pave the way for additional investments in agriculture as its availability helps to eliminate asymmetric information and moral hazard risks for lenders. (Foster &Rosenzweig, 2010)

4.2. Low Productivity

With more than half of their population living in rural areas and most of them depending on agriculture for income and survival, enhancing agricultural productivity in OIC countries is crucial for poverty alleviation and economic development. Agricultural output can be increased either through expending cultivated land area or through increasing crop yield. Considering that there is a limited room left for further land expansion in OIC countries apart from Turkey, Sudan, Uganda and Mozambique, the last two being located in the Guineau Savannah zone where some 400 million more arable lands could be used for agriculture, increasing agricultural output has been increasingly dependent on intensifying production per hectare (Morris, Binswanger and Byerlee, 2011). In this context, agricultural productivity measured as output obtained per unit of input, depends on the quantity and quality of inputs such as the extent to which natural and human resources are efficiently used.

The performance of agriculture sector in OIC countries is poor largely because of the persistent under investment by the public sector. Paradoxically, countries that are most strongly dependent on agriculture have most significantly reduced support to agriculture (SESRIC, 2010). It is observed that agriculture in many OIC countries has been replaced by industrial activity where the average share of agriculture in the overall GDP of OIC countries decreased from 17.6% in 1990 to 10.2% in 2014. Studies show that this trend of underinvestment from governments started during the 1980s and 1990s when the World Bank's structural adjustment loans promoted reforms in agriculture and finance (Mittal, 2009). As an example in Sub-Saharan Africa around 60% of total population lives in rural areas that are directly dependent on agriculture, nevertheless the share of agriculture within total government spending is only 4% (WORLDMUN, 2013). As reflected in Bangladesh, deregulation of the financial sector after the World Bank's structural adjustment loans ended up with closure of rural bank branches, thereby adversely affecting financing for agriculture, which is also the case in many other developing countries (Chowdhury, 2002). Therefore, lack of funding allocated for agriculture sector by the governments is probably the biggest obstacle for developing more effective and efficient farming practices in OIC countries.

Labor productivity in OIC countries, which has been rising since the last decade, is higher than that of the other developing countries but it is lower than the world average. However, like any other variables in agriculture labor productivity is highly diverse within the OIC countries. In absolute terms, countries in the MENA region record relatively high labor productivity figures but due to poor water resources and arid weather conditions agriculture production in this region is still very limited. On the other hand, in the SSA despite natural endowments are quite suitable for agricultural production, labor productivity is very low due to high level of subsistence farming, and low levels of mechanization and fertilizers use. Similarly, in terms of land productivity OIC countries are lagging behind the other developing countries and the world average. In 2013, the average value of production per hectare of arable land in OIC countries was only US$ 1,429 compared to US$ 1,734 in other developing countries and US$ 1,704 of the world average. Poor land productivity in OIC countries can be attributed to the fact that farmers continue to use outdated farming methods that are waste of human and physical capital due to misuse and insufficient use of fertilizers and mechanization. Although the use of fertilizers increased from 38 kg per hectare of arable land in 2002 to 128 kg in 2013, it is still far below the amount used in other developing countries (142kg) and the world average (152 kg). One of the main challenges in increasing the amount of fertilizers use is the persistent poor or lack of infrastructure in many OIC

countries, which keeps transportation cost as high as 77% of the value of exports, considering that poor access to markets and high transportation costs has a negative impact on input prices (World Bank, 2009). This in return not only limits the consumption of fertilizers but at the same time curbs the adoption of high yield crops. Besides, with prices for fertilizers and other inputs more than doubling since 2006, farmers in the least developed countries face an additional challenge in increasing production. The case of Malawi, which managed to increase its corn production from 1.2 million tons in 2005 to 3.7 in 2007, is a stark example in showing the prominent role of fertilizers subsidy program in improving the productivity of agriculture (Mittal, 2009).

4.3. Agriculture Mechanization

Low level of average machinery and technology utilization in OIC countries is another impediment for agricultural productivity since there is a strong correlation between agricultural productivity and investment rates per agricultural worker. According to the latest data in 2011, government spending on agriculture as a percentage of GDP in OIC countries was 6.8% while in the other developing countries it was 9.5%. On average, farmers in OIC countries use one tractor per 142 hectares of arable land, compare to one tractor per 207 hectares of arable land in the world. New technology adoption, which would pave the way for agricultural productivity, is also bound to the availability of an accessible and well-functioning financial market. Lack of credit particularly in rural areas limits the ability of farmers to expand and improve productivity since farmers often cite lack of capital as the main reason for not adopting technologies that could improve their productivity (Croppenstedt, Demeke and Meschi, 2003). Constrains regarding access to financing again brings 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 incentive to invest in beneficial technologies that would improve their agriculture productivity (Jack 2011). As a result, lack of mechanization and new technology utilization in agriculture in OIC countries not only reduces agricultural productivity but also prevents long-term agricultural practice.

4.4. Scarce Water Resources and Lack of Modern Irrigation System

In arid and semi-arid regions where many OIC countries are located water is simultaneously a scarce resource and it is highly volatile from year to year. Considerable rainfall in OIC group is confined in a handful of countries such as Malaysia and Brunei Darussalam that receive around 3,000 mm and 2,722 mm per year, respectively. On the flip side, most of the Arab countries located in the MENA region receive levels of average precipitation below 100 mm per year. In terms of TRWR per capita, OIC countries have on average only 4,652 m^3/year, compared to 9,373 m^3/year in other developing countries and world average of 7,601 m^3/year. In fact, 26 OIC countries are suffering from water stress and/or scarcity, 14 of them suffering from absolute water scarcity. In return agricultural water withdrawal in OIC accounts account for 84.1% of total water withdrawal, compared to the world average of 70% and 75.6% average of other developing countries. Considering that access to water and existence of irrigation systems is a major determinant of land productivity, irrigated land's productivity is more than double that of rain-fed land's-, stability of yields effective and efficient management of scarce water resources constitutes the most formidable challenge to agriculture in the majority of OIC countries.

Current overuse and degradation of water resources and growing consumption by the non-agriculture water consumers will surge the cost of water, and tighten its availability for

agriculture even further. Moreover, taking into account that agricultural production in most parts of the OIC group remains dependent on irrigation systems, and that only 26.7% of total agricultural area is equipped with an irrigation system, it is clear that investments in irrigation systems is a major challenge to be tackled by OIC countries. On the other side, where agricultural irrigation is intensive such as in Pakistan, Egypt and Iraq, salinization has emerged as a major problem because 82% of the agricultural area in OIC countries is irrigated through surface irrigation. Surface irrigation is the least efficient irrigation technology, causing huge amounts of water diverted for irrigation to waste due to deep percolation and surface runoff. More efficient technologies such as sprinkler irrigation and localized irrigation technique are in practice only on 4% and 12%, respectively, of the total area equipped for irrigation throughout the OIC countries. Additionally, some OIC countries, such as Pakistan, use unlined irrigation canals as a source of water for agriculture causing lots of water to waste since water canals not lined with concrete expose to sunlight resulting in water evaporation and/or underground water losses (WORLDMUN, 2013). On the other hand, given that some OIC countries provide irrigation water free, while what other member countries charge rarely cover operation and maintenance costs, the sustainability of the current irrigation system is another challenge. Adding to this, rising OIC population and urbanization rates, as well as the repercussions of the global climate change, will push already tight water resources of OIC countries to the limits. Therefore, efficient and effective use of water resources through the right and a comprehensive irrigation system is one of the major priority areas that need to be tackled in order to increase agriculture productivity, hence provide the right tools to cope with food security and poverty alleviation in OIC countries.

4.5. Lack of Agriculture Insurance

Agriculture is often characterized by high variability of production outcomes because of the unpredictability of climatic, biological and price variables. In many OIC countries, agriculture is particularly exposed to various climatic risks such as long periods of droughts and contamination of pests. In fact, extreme weather events that might get more common in near future due to climate change will make agriculture in these countries even more vulnerable, causing irreversible costs to farmers. Therefore, agricultural insurance as well as other risk management tools can encourage farmers to engage into more productive farming practices since exposure to risks restrains farmers from indulging in activities and investments with higher expected income because farmers in general do not have alternative income sources to rely on during low output and harvest failure. Studies show that asset failures in rural areas in developing countries hit mostly children since due to selling assets to survive shocks in agriculture most of the time families have to take their children out of school. As a result, lack of agriculture insurance not only could exacerbate already high illiteracy rate among children in rural societies but it also could lead to intergenerational transfer of poverty in the long-run (Mahul&Skees, 2007).

However, although, agriculture remains to be the main economic activity and the major source of livelihood for the majority of OIC countries, the main risk management tool in many of these countries remains to be merely diversifying income sources through planting a variety of crops. Introduction of agricultural insurance in OIC countries is a challenge because it is a low priority for many poor farmers. Unlike in the developed countries, farmers in OIC countries will not buy agricultural insurance when their priorities are first to buy production inputs such as seeds, fertilizers, and financial instruments due to high opportunity cost of their limited financial resources. What is more, in OIC countries insurance products alone will not solve the problem since as previous experience in Bangladesh, Malawi, Senegal, and elsewhere indicates agricultural insurance cannot operate

in isolation from other challenges (Mahul&Stutley, 2010). Therefore, agriculture insurance can only be promoted when agricultural inputs are available consistently, and when marketing channels are available for agricultural outputs.

In developed countries agricultural insurance is as much about income transfers as it is about risk management. Whereas, many OIC countries cannot afford to make income transfers given the large portion of their populations engaging in agriculture (World Bank, 2005). Therefore, in the absence of private insurance, agriculture insurance will be too expensive to execute in OIC countries, especially in budget constrained least developed and low income member countries. Therefore, the challenge for OIC countries will be to promote a cost-effective risk layering method of agricultural production risks, in which small and recurrent risks are retained by farmers or groups of farmers, less frequent but more severe losses are transferred to the domestic insurance industry, and catastrophic losses are transferred to the international reinsurance market (Mahul&Stutley 2010).

Another impediment is that agriculture industry in OIC countries is highly fragmented across different regions. Thus it is a challenge to design agricultural insurance programs in a way to address the specific needs of farmers in different regions depending on their scale and degree of market access because 'one size fits all' programs are deemed to be ineffective in this heterogeneity. In this context, for commercial agriculture involvement of private sector, it will be necessary to provide customized agriculture insurance tools, whereas for traditional farmers who produce to meet their own livelihoods, rural financial institutions and safety net programes needs to be in place (Mahul&Stutley, 2010). Therefore, while planning for any agriculture insurance policies, policy makers in OIC countries need to address market and regulatory imperfections and establish proper legal and regulatory frameworks in order to encourage participation by the private insurance sector.

Another precondition for the development of a sustainable agricultural insurance will be to tackle technical challenges inherent in OIC countries since poor or wrong estimations regarding production risks and/or financial costs will lead to useless interventions. To this end the capacity of OIC countries to collect and measure weather and agriculture data in a timely and accurate manner and to disseminate them to the farmers and insurers will be crucial. At this juncture, the role of national statistical offices will be significant in collecting data both for policy making and agriculture insurance purposes.

4.6. Climate Change

Agriculture is highly vulnerable to the adverse impacts of the global climate change since higher temperatures, lower precipitation level, CO_2 concentration, and extreme climatic events such as drought or floods, can lead to reduced crops yields or even crop failures. Studies show that, with the current or increasing greenhouse gas emissions, average global temperature is expected to reach in the range of 3.5^{o}C to 5^{o}C by the end of this century (UNEP, 2015). According to modelling results, highest increases in temperature are estimated to occur in arid and semi-arid regions, particularly in the Mediterranean region of North Africa and the extreme south of Africa (World Bank, 2009) where many OIC countries are also located. The same region will also have to bear the negative impact of climate change on renewable water resources, as global climate change will reduce precipitation by 10 to 30% (IPCC 2007). In addition, according to the FAO's calculations, global water scarcity will increase by 20% where again arid and semi-arid regions will suffer the most (FAO AQUASTAT 2011). When considering the impact of all of these on agriculture production, it is estimated that the share of agriculture in the overall GDP is going to drop by 2% to 9% due to more frequent droughts and volatile weather conditions (World Bank, 2007).

The negative impacts of climate change in OIC countries will predominantly influence agrarian economies due to the critical role of agriculture in their overall GDP, as well as member countries where rain-fed agriculture is the norm such as in the Sub-Saharan Africa region. Considering that 26 OIC countries are subject to water stress and/or scarcity and that more than 84.1% of water consumption in OIC countries goes to agriculture, lower levels of precipitation and increased water evaporation will severely hamper agricultural production. Moreover, lower levels of precipitation will also hamper agricultural productivity since precipitation moisturizes soil, which consequently plays a key role for the productivity of crops. Productivity of crops might also fall due to increases in salinization of soil, nutrient depletion and erosion as around 950 million hectares of salt-affected land occur in arid and semi-arid regions every year (UNEP, 2009).

Another challenge that climate change will inflict on agriculture activities in OIC countries is the likelihood of proliferation of pests. This is because contagion and intensity of pesticides is highly depended on timing and amount of precipitation, which will be highly volatile in this case due to climate change (FAO, 2008). Previous experience indicate that pests have had significant negative impact on crop yields in Sub-Saharan Africa where it caused annual losses of US$12.8 in yield of eight principal crops, which has the potential to reduce yields in developing countries by around 50% (SESRIC, 2010). When all these above mentioned adverse impacts of climate change are taken into account, agricultural capacities of OIC countries will have to be reinforced to adapt to climate change through new technology utilization, more R&D in order to create more climate-resilient crop varieties, more comprehensive and efficient irrigation system, water storage facilities and investing in better functioning markets.

4.7. Agricultural Research and Biotechnology

Agricultural research and biotechnology is important for developing new crops and new agricultural practices, and thus it is at the heart of long-term agricultural growth and development. It has, therefore, the potential to substantially contribute to poverty reduction through a positive impact on food production, postharvest losses and the nutritional value of food. However, the amount of budgets allocated to agricultural R&D in OIC countries are far from promising as the gap of R&D in biotechnology between developed and OIC countries is widening due to short supply of public and private funds available in OIC countries. Most of the OIC countries depend on public spending for R&D in agriculture but over the last years, budgets for R&D have declined significantly. During the period 2005-2011, agricultural spending of public sector in OIC was around US$12 billion while in other developing countries it was US$51 billion, which corresponds to US$2.3 billion per year in OIC countries compared to US$7.5 billion per year in other developing countries. In terms of agricultural spending per agricultural person, with an average of only US$5.2, OIC countries are lagging behind the average of the other developing countries of US$7.5. What is more striking is that only 9 out of 57 OIC countries have an average agricultural spending per person higher than the OIC average. In fact national government funding for agricultural research fell by 27% in the SSA between 1981 and 2000, and many governments allocate less than 1% of their national budget to agriculture R&D (Mittal, 2009). Consequently, technological and scientific infrastructure capacities of OIC countries are weak to undertake rigorous R&D efforts that will support agricultural productivity. A study conducted in Nigeria regarding the ability of seventeen existing institutions to carry out research in modern biotechnology shows that 40% of the institutions are not fully productive because of shortages in electricity and inadequate tissue cultures supply (Ozor, 2009) – a situation which is easily visible in other OIC countries as well. Research in biotechnology is a specific area, which requires a sufficient number of high caliber scientists to be able attain the promised benefits for agriculture.

However, many OIC countries are still in shortage of such scientists. Total number of agricultural research staff working for public sector in OIC countries is 22,352 while in other developing countries the number is 41,607. Nevertheless, in terms of the number of agricultural research staff per 100,000 farmers, OIC countries collectively have a higher rate compared to other developing countries where the number for OIC is 131 while for the other developing countries it is 59. However, this ratio represents uneven distribution across the OIC countries, as in only 3 OIC countries the ratio is more than the OIC average, while Bangladesh has only 7 agricultural research staff per its 100,000 farmers.

BOX 4
Evidence-based Policy-making: Seven Challenges to Adoption of Agricultural Technologies

MIT J-PAL reports seven market inefficiencies that lower expected profits from agricultural technology adoption as follows (see also Annex Table 19):

1- *Credit Market Inefficiencies*

Many farmers cite a lack of financial capital as a major reason for not adopting beneficial technologies. In many developing countries, and particularly in rural areas, **access to financial services**, including credit and formal saving mechanisms, is limited. Even where financial services are available, they are often highly disadvantageous to smallholder farmers. On the other hand, poor farmers, who typically lack valuable assets to use as **collateral for loans**, may be particularly ill-suited to access financing, however substitutes for traditional forms of collateral are emerging. For example, "supply contracts" for farm outputs (where lenders are repaid with future production) have been used to provide loans to smallholder farmers. A frequently used collateral substitute is group liability, which relies on social capital for collateral and is typically viewed as an innovation that reduces monitoring costs and lowers default rates. The benefits of making credit more available to smallholder farmers may be enhanced by **targeting** those who most stand to gain. In addition to the challenges created through the lack of financial services available to small farmers, low **financial literacy** can pose as another constraint. Furthermore, financial decisions are often subject to **psychological biases** such as lack of self-discipline. For example, in multiple settings, financial products that allow individuals to commit themselves to future saving or investment at the moment when they have cash available, such as immediately following the harvest, improve technology adoption.

2- *Risk Market Inefficiencies*

Farmers may see adoption of new technologies as risky, especially early in the adoption process when proper use and average yields are not well understood. Allowing farmers to experiment with the technology on a small scale before adopting it (**trialability**) minimizes the amount of risk and uncertainty associated with adopting a new technology for the first time. Besides, a number of different tools and strategies, such as insurance or safety nets, could reduce the amount of **risk and uncertainty** that a farmer takes on when adopting a new technology. Furthermore, financial institutions may be hesitant to provide insurance because they fear that only the farmers who take on risky (and on average, bad) investments would ever buy insurance (i.e. **adverse selection**). Additional research is needed to understand how the design and marketing of insurance products can eliminate **moral hazard** problem and help farmers overcome the risks of adopting new technologies.

While insurance is an important way for farmers to reduce their risk, improved seeds could also function as a mechanism to reduce risk faced by farmers. These **risk reducing technologies** are especially important as climate change affects global weather patterns. Researchers in *Sierra Leone*, for example, are exploring how high-yielding rice varieties with shorter growing seasons may help to reduce hunger in the lean seasons between harvests[1]. By adding seeds with risk tolerance or different growing seasons, farmers mitigate risks brought on by weather shocks, helping to improve food security.

[1] Annan, J, Dixon, C, Glennerster, R, Kimmins, F, and Suri, T. "Promoting Adoption of New Rice Varieties: Addressing the Costs of Early Adoption in Sierra Leone." Work in progress.

Another major challenge is the limited available capacity for technological spillover across OIC countries since varying socio-economic conditions and structures among OIC countries impede the development of OIC wide agricultural research strategies. Nevertheless, despite these structural discrepancies, means to complement each other should be sought as each of the distinct clusters in agriculture within the OIC have specific comparative advantages where some are rich in labor force while others are rich in natural resources. Hence,

BOX 4 – *cont'd.*

3- *Informational Inefficiencies*

A farmer's choice to adopt a new technology requires several types of information. These types of information may come from external sources (agricultural extension workers and markets), from observing the decisions and experiences of neighbors, and from the farmer's own experience. Research suggests that **constraints to information** access can be lowered by improving incentives for those delivering information, reducing the cost of acquiring information, and improving the design of information provision (content, source and presentation). Advances in information technology, such as cellular telephones and SMS, offer great potential for lowering the costs of regular information provision. In *Mozambique*, researchers are experimenting with tying extension delivered through SMS to a mobile banking system, which includes a labeled savings account for agricultural inputs.[2] Researchers in *Pakistan* are developing an online platform that allows cattle farmers to share information about the quality of veterinary, in particular vaccinations and artificial insemination.[3] Another way to think about reducing the costs of acquiring the information is to bundle that information with another service, especially one that may be viewed as valuable to farmers. BRAC in *Uganda* is working with researchers to evaluate the effectiveness of traditional extension services when it is combined with access to microfinance, focusing in particular on women farmers.[4] Information delivered through agricultural extension services often conveys findings from demonstration plots, which is not always applicable to other contexts. Thus, **appropriateness of information** is also crucial. A study from *Indonesia* found that even when farmers are using a new technology (in this case farming method) their understanding of the benefits was low. When results of the benefits of the method were reported back to them, farmers' continued adoption increased.[5] On the other hand, survey research suggests that **spreading** of simple innovations tend to be more quickly than complex ones because they are more adaptable to individual needs and preferences.

4- *Externalities*

Agricultural technologies that create positive spillovers or externalities often remain at low levels of adoption because some or all of the benefits from these technologies accrue to individuals other than the adopting farmer. Similarly, the first farmers to adopt a new technology in a village may generate positive externalities for other farmers—sometimes in the form of information about how the technology is best used. As mentioned above, in an experiment in *Sierra Leone*, researchers are trying to improve take-up of improved rice seed by subsidizing the first farmers to adopt the seed in a village.[1] In *Uganda*, Dupas, Chassang, and Snowberg are exploring different ways to incentive farmers to experiment with a simple watering device.[6]

In all of these cases, as long as individual farmers are not rewarded for the benefits that they generate for others, they will invest less in a new technology than is preferable from the point of view of society. Many strategies for addressing externalities have been used in developed countries, but rarely have they been applied to agricultural contexts in developing countries. Approaches that require extensive monitoring, such as taxes on the production of an externality, are typically more difficult to implement, while approaches that alter input prices hold greater promise. Because women often bear the brunt of many externality problems related to agriculture, it has been argued that women may be in a better position to manage natural resources, such as water resources, as which they are the primary users.

[2] Batista, C, and Yang, D. "Promoting Correct Fertilizer Use through Information and Commitment Savings using Mobile Banking in Mozambique." Work in progress.
[3] Berman, E, and Callen, M. "Coordinating Farmers with Cellphones: Technology Innovation in Livestock Extension Services in Pakistan." Work in progress.
[4] Bandiera, O, Burgess, R, Deserranno, E, Rasul, I, and Sulaiman, M. "Women Farmers and Barriers to Technology Adoption: A Randomized Evaluation of BRAC's Extension Program in Rural Uganda." Work in progress.
[5] Hanna, Rema, Sendhil Mullainathan, and Joshua Schwartzstein. "Learning Through Noticing: Theory and Experimental Evidence in Farming." Working Paper, Harvard University, February 29, 2012.
[6] Dupas, P, Chassang, S, and Snowberg, E. "Selective Trials for Agricultural Technology Evaluation and Adoption: A Pilot." Work in progress.

establishment of agricultural integration is one of the greatest tasks awaiting solution within the OIC, which will not only increase intra-OIC trade in agriculture but will also open the doors for synchronized R&D efforts in agriculture, and eventually enable technology spillover across OIC countries.

4.8. Grain Storage Houses

Another challenge for agriculture development in most OIC countries is the post-harvest losses due to lack of proper grain storage facilities. According to existing evidence, Africa alone suffers 20-30% of post-harvest losses valued at 4 billion dollar annually (Morris, Binswanger and Byerlee, 2011). Overall, post-harvest losses lead to high food prices through removing part of the supply from the market, which explains why many smallholders in OIC countries are net purchasers of food even though they grow enough for their own consumption. Additionally in absence of effective grain storage facilities, farmers in need of cash are forced to sell crops immediately right after harvest to avoid post-harvest losses from storage pests and pathogens. As a result, farmers sell their crops when prices are low and cannot use their harvest as collateral to access credit which consequently undermines their food security and aggravates poverty. Therefore, it is now increasingly accepted that dealing with post-harvest losses along the food chain through grain storage houses provide a more cost effective and environmentally more sustainable mean to provide food security. This is because the investment required to reduce post-harvest losses is relatively modest and return on that investment rises rapidly as the prices of commodity increase. As an example, in the SSA according to estimates reducing post-harvest losses by only 1% would provide US$ 40 million gains annually (Morris, Binswanger and Byerlee, 2011). Nevertheless,

BOX 4 – *cont'd.*

5- Input and Output Market Inefficiencies

Farmers who would benefit from technology adoption may be unable to access or pay for the technology due to inadequate **infrastructure**, missing supply chains or unprofitably high prices. Infrastructure, such as roads and irrigation, plays a key role in facilitating technology. Cross-country evidence on the effect of infrastructure on agricultural productivity shows a positive relationship between productivity and the development of roads and irrigation. Improved transportation is also associated with diffusion of technology, better use of inputs and better prices for farmers. Farmers may be failing to adopt technologies, because they may not be profitable. Lack of profitability may be a result of inappropriateness or cost. It is becoming clear that the quality of the inputs may also be limiting the willingness of farmers to take up a new technology. Researchers in *Uganda* are beginning to explore the degree to which counterfeit fertilizers dominate the market and whether those lower quality products are sold to consumers in a discriminatory way.[7] Adoption constraints may be overcome by interrupting the cycle of poorly functioning input and output markets that lead to low demand for agricultural technologies and hinder market function. Targeted subsidies can stimulate demand and generate the initial volume required to set up distribution networks and lower costs. Charging for publicly provided inputs including agricultural extension may help raise revenue and eliminate wastage. However, charging may also result in exclusion of the poor. Contracting with groups of farmers (as opposed to just individuals) may also reduce the risk of reneging. Groups of farmers are more likely to enter into mutually beneficial agreements if defection can be caught through reliable monitoring. In many developing countries, value chains are highly fractured. The ability of a farmer to access a market is often determined by the traders who purchase their crops at the farmgate. In *Sierra Leone*[8] and *Senegal*[9], researchers are exploring different contract arrangements with traders of cocoa and onions, respectively. Early results from the work in *Sierra Leone* find that traders with price incentives deliver higher quality cocoa, but that higher prices do not filter down to farmers.

[7] Yanagizawa-Drott, D, and Svensson, J. "Does Poor-Quality Hinder Agricultural Technology Adoption? Evidence from the Market for Fertilizers in Uganda." Work in progress.
[8] Casaburi, L, Reed, T, and Suri, T. "Contract Structure and Export Quality in Sierra Leone." Work in progress
[9] Bernard, T, de Janvry, A, and Mbaye, S. "Incentive Contracts for the Sale of High Value Crops by Smallholder Producers in Senegal." Work in progress

the traditional storage house facilities currently utilized in OIC countries are not always effective because traditional methods do not protect well against emerging pest such as the larger grain borer (LGB). Moreover, due to deforestation, building traditional storage house facilities requires lots of wood supply which is limited in many OIC countries. On the other hand, introduction of new storage types such as sealed stores, metal oil drums, tanks made of iron, and metal silos are expensive for some OIC countries. Moreover, technical aspects of grain storage houses alone will keep adoption rates low, and will not be sustainable in the long-run. While in developing countries many grain storage houses projects have achieved a measure of success in improving post-harvest losses, very few have achieved large-scale improvement, primarily due to a lack of commercial incentive investing in and scaling up such initiatives.

Beside the technology of storage facilities, their relevance to local conditions, such as availability of local materials, existing financial and market constrains, and their acceptability by farmers due to cultural reasons are other key factors that determine the dissemination of grain storage houses among rural farmers. As an example, adoptions of metal silos in Mozambique failed due to an inadequate local capacity for fabrication, and in Malawi metal silos provided to farmers free of charge were not used since farmers preferred to keep their grains inside their houses due to existence of theft. For a full realization of post-harvest loss elimination efforts, a value chain approach that links farmers to markets and a greater involvement of private sector needs to be realized. This will encourage trade which will reduce the need to store grain on farms and thus reduce the post-harvest losses (Morris, Binswanger and Byerlee, 2011). To this end, another existing constraint is the provision of infrastructure such as roads and electricity, which will make grain storage houses affordable, and pave the way for market access, thereby make the value chain approach feasible.

BOX 4 – *cont'd.*

6- Land Market Inefficiencies

Functioning land markets allow the transfer of land to those who can use it most productively, which creates an incentive for investments in productivity-improving agricultural technologies. Insecure property rights create few incentives for farmers to invest in new technologies. Rigorous research on interventions that improve technology adoption by decreasing land market problems is scarce. Where land reform or land titling has been implemented, the results have been mixed, and sometimes benefit certain groups, such as men, more than others. In *Mali*, Beaman and Dillon are exploring the impacts of a large irrigation project that includes clarification of land tenure as well as communal water management systems.[10]

7- Labour Market Inefficiencies

New technologies may have different labor requirements. Some technologies save labour for the adopting household while others require additional labour. This determines their level of adoption and who adopt them. Approaches that make it easier to find employment and to hire and supervise labor, can help households make better decisions about how to allocate labour. Lowering supervision costs and developing labour contracts that do not require external enforcement can also help local labour markets function more smoothly. In turn, this could increase individual incentives to adopt new agricultural technologies. Because of the seasonality of labour markets, approaches that smooth labor demand and wages throughout the agricultural crop cycle may be particularly useful. Safety nets, such as public work programs, can help maintain demand and ensure that labor is valued throughout the year in agricultural areas.

[10] Beaman, L, and Dillon, A. "Irrigation and Property Rights for Farmers in Mali." Work in progress

5. Development of Agro-Food Industries

A distinct characteristic of most developing economies is the relative importance of agricultural sector in their economies. Traditionally, agricultural sector has been viewed as having a minor role in the process of development compared to manufacturing. However, following the increasingly sophisticated preferences regarding nutrition, health and environment as well as the growing role of research and technology in agricultural product development, agriculture itself has become an industry with notable diversity and scope. Consequently, the industrialization of agriculture and development of agro-processing industries generated an entirely new type of industrial sector.

Over the years, agro-industry has increasingly occupied a dominant position in the manufacturing sector in many developing countries and contributed significantly to their growth. This industry involves in the post-harvest activities such the transformation, preservation and preparation of agricultural production for intermediary or final consumption. The food industries are by far the most important component of agro-industrial activities in both developed and developing countries. Compared to non-food agro-industries, the food industries are generally more homogenous and are easier to classify than the non-food industries since their products all have the same end use.

However, growing complexity of inputs, the impacts of innovation process and new technologies and sophistication and the growing range of the transformation processes make it increasingly difficult to draw clear distinction between what should be considered strictly industry and what can be classified as agro-industry.

This chapter reviews the importance of agro-processing industry for development, analyse the state of the industry in OIC countries and discusses some major policy issues in promoting the competitiveness of the agro-food industry.

5.1. Importance of Agro-Industry for Development

Industrial development largely takes place when countries use their abundant resources for industries that require intensively these resources. The industries that are likely to succeed in developing countries are indeed those that make relatively intensive use of the abundant raw materials and unskilled labour and relatively less intensive use of seemingly scarce capital and skilled labour. In this connection, the relative abundance of agricultural raw materials and low-cost labour in developing countries creates a potential for agro-industrial development in these countries.

Industries relying mostly on agricultural raw materials have in fact the characteristics that make them especially suitable for the settings of many developing countries. Even though a proper infrastructure and skilled labour are what these countries are missing, the readily available raw materials at reasonable costs provide an enormous opportunity to these countries as these materials represent a significant proportion of total costs for such industries. Furthermore, for many agro-industries, a small plant may be economically efficient, which is another important factor in developing countries where the domestic market is limited by low purchasing power and sometimes by the small size of the market itself.

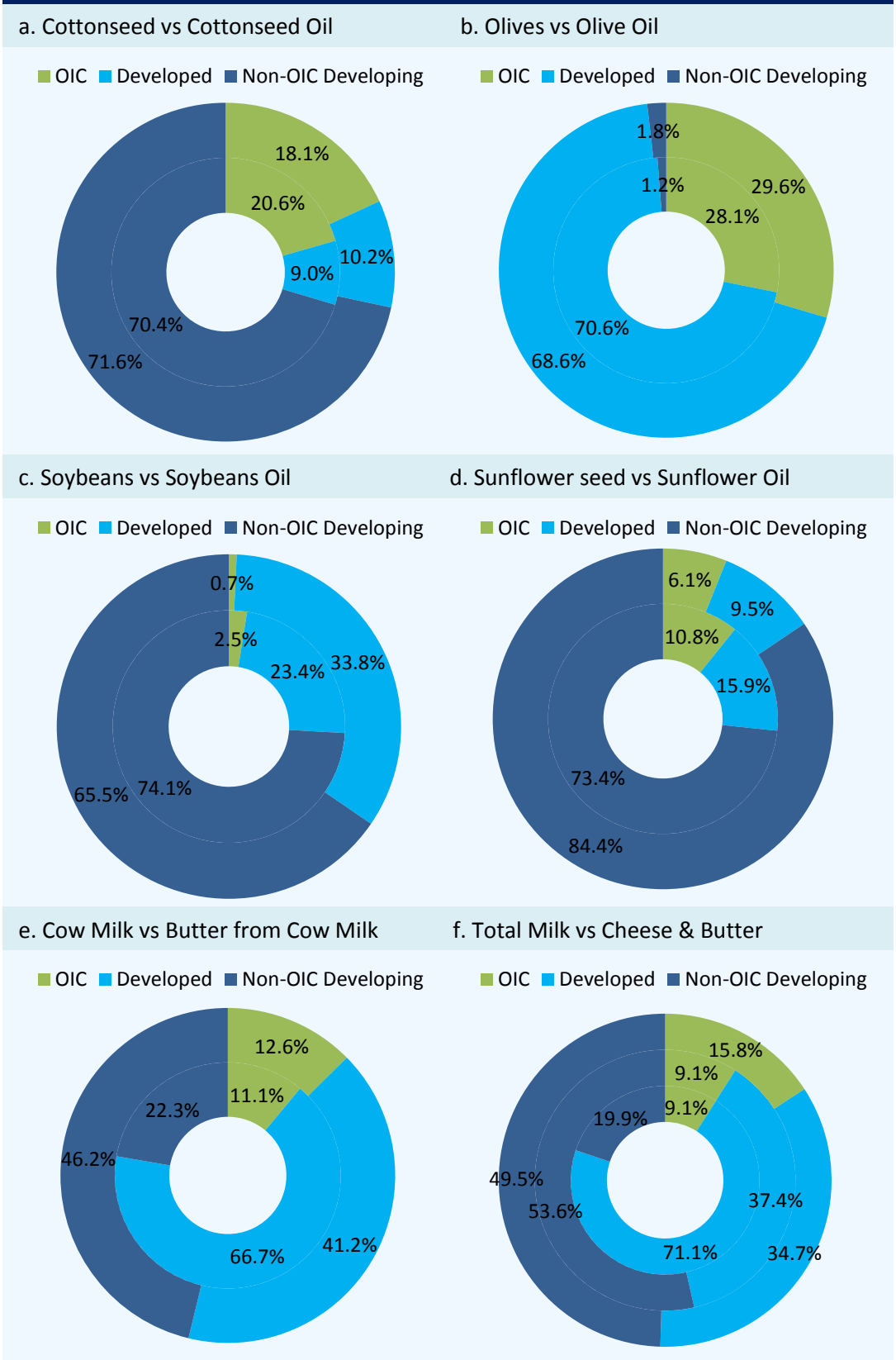
Agro-industries carry significant importance for development due to several reasons. In this regard, most importantly, agro-industries generate strong backward and forward linkages, promoting demand for and adding value to primary agricultural production and creating employment and income along the processing-distribution chain. More specifically, agro-processing enterprises generate demand for agricultural raw materials; this in turn creates work opportunities at the farm level and contributes to increased demand for agricultural inputs such as fertilizers and feeds. Similarly, economic activity is generated in the downstream areas of logistics, distribution and service provision.

Agro-industry provides capital and services to farmers, promotes entrepreneurship, raises demand for agricultural products and connects farmers with markets through the handling, processing, marketing and distribution of agricultural products. Consequently, productivity and quality of agricultural production, economic stability for rural households, food security and innovation throughout the value chain can be enhanced. Efficient agro-industry can therefore spur agricultural growth, and – accompanied by a strong link with smallholders – reduce rural poverty.

Agro-industries occupy a dominant position in manufacturing sector of developing countries. Contribution of agro-industries to total manufacturing is 61% in agriculture-based countries, 42% in countries in transformation and 37% in urbanized developing countries (Wilkinson and Rocha, 2008). Agro-industries also play a central role in employment generation, being characterized by a marked presence of women in their workforce. The “non-traditional sector” (vegetables, fruit and fish products), which is currently the most dynamic in terms of exports from developing countries, is characterized by high levels of female employment, a percentage that can range from 50% to as high as 90% (Wilkinson and Rocha, 2008).

Under these circumstances, the development impacts of agro-industries can be summarized as follows. Agro-industries:

FIGURE 5.1
Primary and Processed Ago-Industrial Production in OIC Countries



Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database, SESRIC Staff analysis*

- Improve food supplies by preventing quantitative and qualitative losses;
- Improve supplies of forestry products and other non-food agricultural products through better utilization of raw materials;
- Increase self-reliance by reducing imports;
- Provide employment, especially in rural areas;
- Reduce income disparities;
- Stimulate rural development;
- Assure better market opportunities to the producer;
- Increase foreign exchange earnings through export of finished and semi-finished products;
- Reduce population migration to urban areas;
- Increase opportunities for investment in rural and urban areas.

Due to its overwhelming importance for developing countries, the agro-industrial development should be promoted by allocating adequate resources for development and utilization of raw material selection and socially appropriate technologies. Development and strengthening of institutional infrastructure, training of personnel in the areas of technology, management, entrepreneurship, research and development are all important factors in improving the product quality and safety in fostering agro-industrial development. The establishment of regional inter-country cooperation and strengthening of the national centres to select appropriate technologies would fill an important gap in the development of food and agricultural products processing industries.

5.2. State of Agro-Food Industries in OIC Countries

Agro-food industry is often the main industrial activity and a major contributor to production, export earnings and employment in many developing countries. As being a substantial part of developing countries, some OIC countries rely also heavily on agricultural sector. In this section, the state of agro-food industry in OIC countries is analysed by comparing primary and processed crop and livestock production. Then, by using the UNIDO Industrial Statistics Database at the 4-digit level of ISIC (INDSTAT4), the performance of OIC countries will be analysed with respect to five major indicators in agro-food industries, namely employment, number of enterprises, wages, output and value added.

5.2.1. Processed Crops and Livestock

Figure 5.1 compares the share of OIC countries in primary and processed crop and livestock production in total world production in 2013 for six different product categories. Data compiled from the FAO statistical database comprises 210 countries including also 56 OIC countries. The outer circles present the shares of primary products and inner circles present the share in processed products.

In three out of six product categories, OIC countries have higher share of processed products. These are cottonseed oil, soybeans oil and sunflower oil. While OIC countries produce 18.1% of cottonseed, they account for 20.6% of total cottonseed oil production. Similarly, while their share in soybean and sunflower production is 0.7% and 6.1%, their share in total world production of their oil derivatives is 2.5% and 10.5%, respectively. On the other hand, OIC countries as a group seem to be losing its share in processing olive and milk products. While they account for 29.6% of total olive production, they account only 28.1% of olive oil. Again, while they account for 15.8% of total milk production, they account only 9.1% of cheese and butter production in the world.

This indicates that in some products OIC countries have the capacity to process what they already produce and to benefit from value addition during procession of agricultural

products. However, in some others OIC countries lack the capacity to process the goods they produce and lose valuable earnings that could be gained from value added during processing of the goods.

While being very insightful, this analysis provides only limited information on the state of agro-food industries in OIC countries. Processing is only one link in a continuous chain between raw material production and final consumption. In what follows, some important indicators of agro-food industries are highlighted for OIC countries for which data are available.

5.2.2. Indicators of Agro-Food Industries

Due to data constraints, analysing the development of agro-food industries is often a challenging task for many developing countries, including OIC countries. As one of the main sources of industrial development statistics, United Nations Industrial Development Organisation (UNIDO) produces industrial statistics databases for the variables including number of establishments, employment, wages and salaries, output and value added. The databank is built around the International Standard Industries Classification (ISIC) code system, which classifies industry under 151 manufacturing sectors and sub-sectors including food, textiles, iron and steel.

By taking only food industries classified in the database, Figure 5.2 compares OIC countries with other developing and developed countries with respect to five major indicators in agro-food industries. The data represents the averages of the latest data available for 25 OIC countries, 47 other developing countries and 32 developed countries between 2006 and 2010.[3] All value data are downloaded from UN Statistics in national currency at current prices. The data are converted from national currency into constant U.S. dollars using the average period exchange rates as given in the IMF International Financial Statistics (IFS) and consumer price indexes given in the IMF World Economic Outlook (WEO) databases.

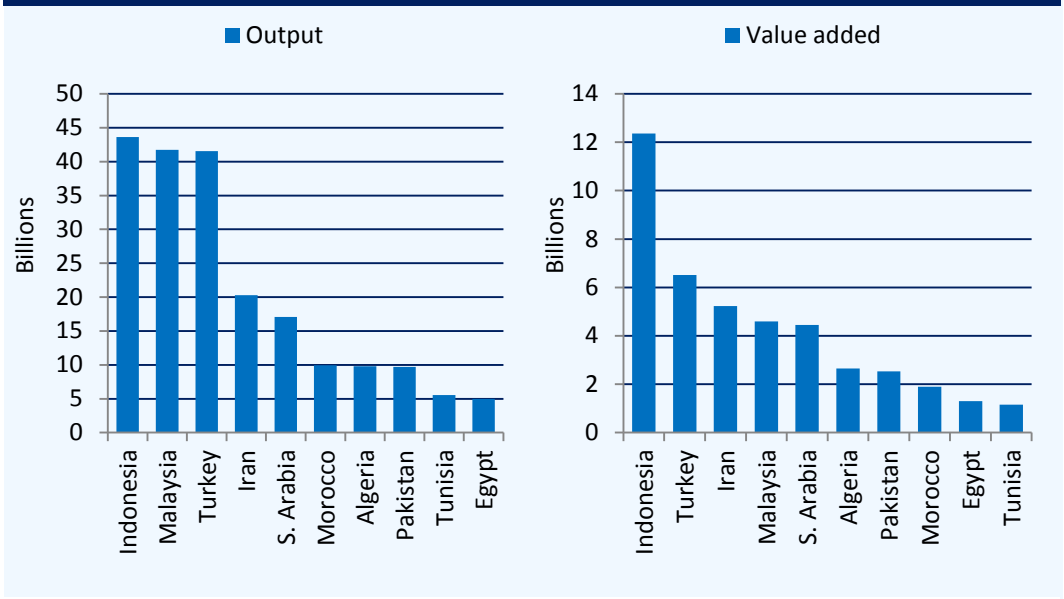
The agro-food industries play a major role in employment creation and income generation. As shown in Figure 5.2, OIC countries for which the data are available have on average higher shares in three indicators of agro-food industries compared to the averages of other countries, indicating higher importance of the sector for these economies. The highest discrepancy between OIC and non-OIC countries exists in the share of industry in total output, which is 15.9% in OIC countries and only 10.2% in other developing countries. Similarly, agro-food industries represent on average 15.3% of total employment in manufacturing industries in 25 OIC countries compared to only 10.2% in other developing countries. Wages in agro-food industries represent accordingly a higher share of total payments, 12.1% of wages paid in all manufacturing industries in OIC countries compared to 9% in other developing countries.

On the other hand, 15.3% of total enterprises are operating in agro industries in OIC countries compared to 19.5% in other developing countries. Finally with respect to the relative importance of the industry in value-added, 12.7% of total value-added in manufacturing industries comes from agro-food industries in OIC countries, compared to 15.3% in other developing countries and 10.5% in developed countries.

[3] These countries are Afghanistan (2010), Albania (2010), Azerbaijan (2010), Cameroon (2008), Egypt (2010), Indonesia (2009), Iran (2009), Jordan (2010), Kazakhstan (2007), Kuwait (2010), Kyrgyzstan (2010), Lebanon (2007), Malaysia (2010), Morocco (2010), Oman (2010), Pakistan (2006), Palestine (2010), Qatar (2010), Saudi Arabia (2006), Senegal (2010), Syria (2010), Tajikistan (2008), Tunisia (2008), Turkey (2009), and Yemen (2006).

Although the data are available for 30 OIC countries, coverage in terms of years and indicators varies from country to country and this makes it difficult to make time-series analysis. Therefore, instead of showing the trend in OIC countries in agro-industrial development, the countries with highest values are depicted by using the latest year available data for each indicator. Figure 5.3 depicts the top OIC countries in terms total output and value added in agro-food industries for the latest year available during the period 2005-2012. Indonesia, Malaysia and Turkey are the top OIC countries in terms of agro-industrial production, with each producing around 42-44 billion USD worth of agro-food. They are followed by Iran (20 billion, USD) and Saudi Arabia (17 billion USD). In terms of value addition, Indonesia is by far the most productive country, with 12.4 billion USD value added production in agro-food industries. It is followed by Turkey (6.5 billion USD), Iran (5.2 billion USD), Malaysia (4.6 billion USD) and Saudi Arabia (4.4 billion USD).

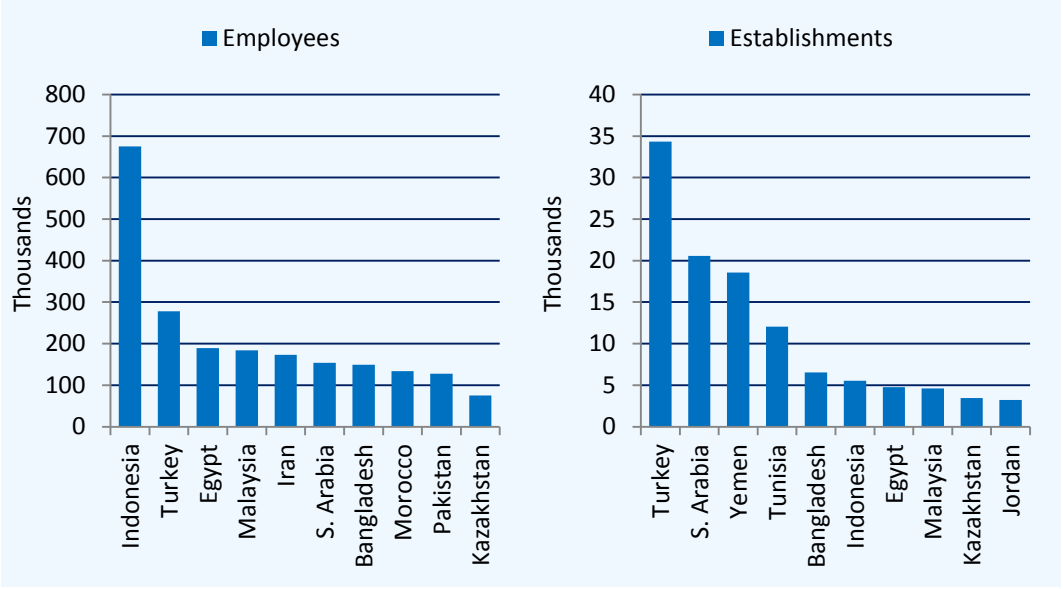
FIGURE 5.3
Output and Value-added in Agro-food Industries, Top OIC countries



Source: *UNIDO, INDSTAT4 2015 Edition.* Note: *Latest year available after 2005.*

Figure 5.4 depicts the top OIC countries in terms of number of employees and enterprises in agro-food industries. With 675 thousand employees, Indonesia is again by far the largest employer of agro-food industries among the 30 OIC countries for which data are available. The second largest employer is Turkey with 278 thousand employees, followed by Egypt, Malaysia and Iran, with employee numbers ranging between 170 thousand and 190 thousand. On the other hand, Turkey has the largest number of enterprises in agro-food industries with over 34 thousand establishments. It is followed by Saudi Arabia (20.5 thousand), Yemen (18.5 thousand), Tunisia (12 thousand) and Bangladesh (6.5 thousand). Although Indonesia has the largest number of employees, it has only 5.5 thousand establishments in agro-food industries. While for every 8 workers there is an enterprise in Turkey, this number exceeds 122 workers in Indonesia. By supporting entrepreneurship, Indonesia can increase the number of firms involved in agro-food industries, which is likely to improve the productivity as well.

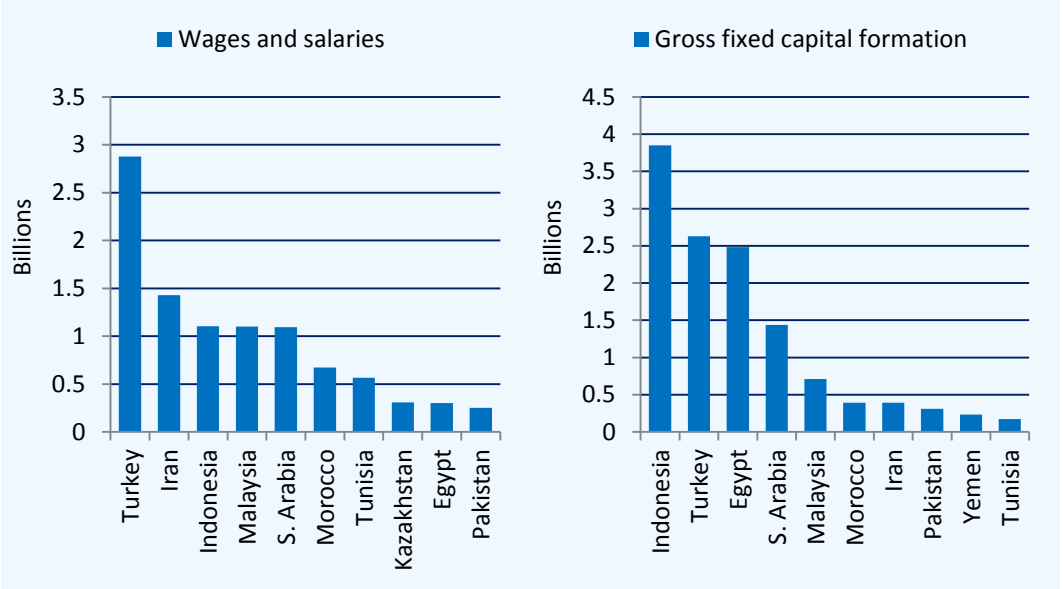
FIGURE 5.4
Employment and Number of Enterprises in Agro-Food Industries, Top OIC countries



Source: *UNIDO, INDSTAT4 2015 Edition.* Note: *Latest year available after 2005.*

In terms of wages, Turkey is the top OIC countries paying the largest amount of wages for agro-food production. While total wages in Turkey exceeds 2.8 billion USD, it is 1.4 billion USD in Iran and 1.1 billion USD in Indonesia, Malaysia and Saudi Arabia. However, average wage per worker exceeds 10,000 USD in Turkey; it is only around 1,600 USD in Indonesia. On the other hand, Indonesia is the top country in gross fixed capital formation (3.8 billion USD), followed by Turkey (2.6 billion USD), Egypt (2.5 billion USD), Saudi Arabia (1.4 billion USD) and Malaysia (0.7 billion USD). This analysis indicates that OIC countries show distinct

FIGURE 5.5
Wages and Gross Fixed Capital Formation in Agro-food Industries, Top OIC countries



Source: *UNIDO, INDSTAT4 2015 Edition.* Note: *Latest year available after 2005.*

patterns in terms of output, employment and wages. This has also implications for productivity in agro-food industries in these countries.

5.2.3. Productivity in Agro-Food Industries

Productivity, measured here as value added per employee, provides further insight on the importance of agro-food industries for developing countries. Table 5.1 list the countries with respect to the productivity level in four major categories of agro-food industries as well as productivity in total manufacturing for the latest data available. The shaded boxes indicate that the countries are more productive in this category of agro-food industries compared to their productivity in total manufacturing. If the natural resource abundant member countries and Kyrgyzstan are excluded, it is observed that all other countries have higher productivity at least in one of the subcategories of the agro-food industries. Productivities differ significantly between the countries as well as sub-sectors. Particularly productive countries in agro-food industries are Azerbaijan, Bangladesh, Gambia, Indonesia, Malaysia, Pakistan and Palestine, when compared with their productivities in total manufacturing. In terms of absolute values, Azerbaijan, Iran and Oman have productivity levels above 30.000 USD,

TABLE 5.1

Productivity in Agro-food vs Manufacturing Industries

Country	Year	Processed meat, fish, fruit, vegetables, fats (151)	Dairy products (152)	Grain mill products, starches, animal feeds (153)	Other Food Products (154)	Total Manufacturing	Total Productivity in Agrofood industries	Productivity in Agro-food / Manufacturing
Albania [1]	2012	6,691	6,271	9,518		9,348	7,920	0.85
Azerbaijan	2009	61,515	49,307	57,958	16,709	24,696	33,258	1.35
Bangladesh	2006	13,461	7,409	3,645	3,329	3,124	4,885	1.56
Egypt	2006	10,559	14,275	6,088	5,187	10,572	6,864	0.65
Gambia [2]	2004	2,607				930	2,607	2.80
Indonesia	2009	27,123	23,422	16,987	11,487	16,919	18,319	1.08
Iran	2011	31,932	30,963	38,021	26,713	47,587	30,163	0.63
Iraq	2012		2,969			11,265	2,969	0.26
Jordan	2011	37,166	20,434	18,680	10,646	27,849	18,003	0.65
Kuwait	2012	24,072	40,570	23,530	14,607	85,789	20,607	0.24
Kyrgyzstan	2010	15,501	10,079	11,795	9,290	18,854	10,901	0.58
Lebanon	2007	22,299	16,088	57,760	19,151	27,438	21,195	0.77
Malaysia	2008	31,025	31,232	27,671	15,748	18,342	24,930	1.36
Morocco	2012	8,530	28,691	25,364	18,576	19,307	14,188	0.73
Oman	2010	35,172	40,346	82,297	27,506	103,992	35,798	0.34
Pakistan	2006	41,155	19,208	16,092	12,240	16,251	19,837	1.22
Qatar [2]	2010	22,655				110,924	22,655	0.20
Palestine	2009		16,237			13,392	16,237	1.21
Turkey	2008	25,848	15,847	33,986	24,235	28,394	24,868	0.88
Yemen	2009	15,533	22,737			21,293	16,678	0.78

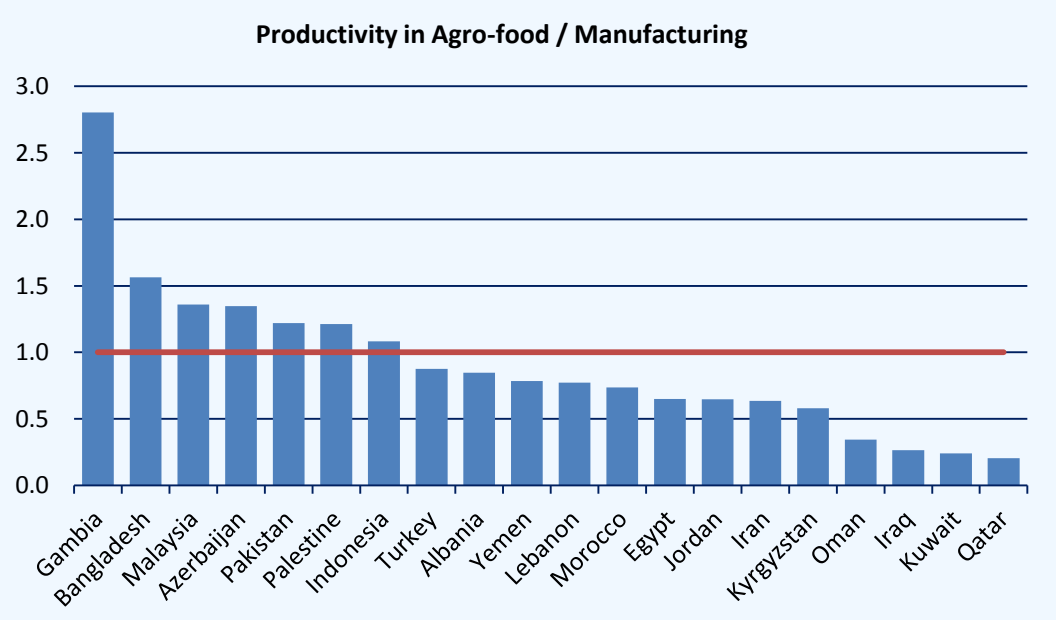
Source: *UNIDO, INDSTAT4 2015 Edition. Notes:* [1]153 includes also 154. [2] 151 includes also 1520, 153 and 154.

reflecting their absolute competitiveness in certain categories of agro-food industries. Oman with over 82.000 USD value-added per worker in grain mill products stands out the most productive country in a specific category of agro-food industries. Bangladesh is around four times more productive in the sub products category of 151 compared to its productivity in total manufacturing. On the other hand, in terms of aggregate productivity Albania, Bangladesh, Egypt, Gambia and Iraq with values below 10.000 USD appear to be relatively less productive.

On average, in most countries productivity levels in food processing are above the manufacturing average, making it one of the more efficient economic sectors in the member countries. This also identifies the agro-food sector as one of the largest industrial activities in low and middle income countries in terms of value adding.

Figure 5.6 compares the relative productivity in agro-food sector with the productivity total manufacturing in OIC countries for which data are available. Countries with average score of higher than 1 are the countries that are more productive in agro-food industries. Gambia, Bangladesh, Malaysia, Azerbaijan, Pakistan, Palestine and Indonesia are relatively more productive in agro industries. On the other hand, natural resource abundant countries Qatar, Kuwait, Iraq and Oman have agro-industrial productivity that is lower than the half of their productivity in total manufacturing.

FIGURE 5.6
Productivity in Agro-food vs Manufacturing Industries



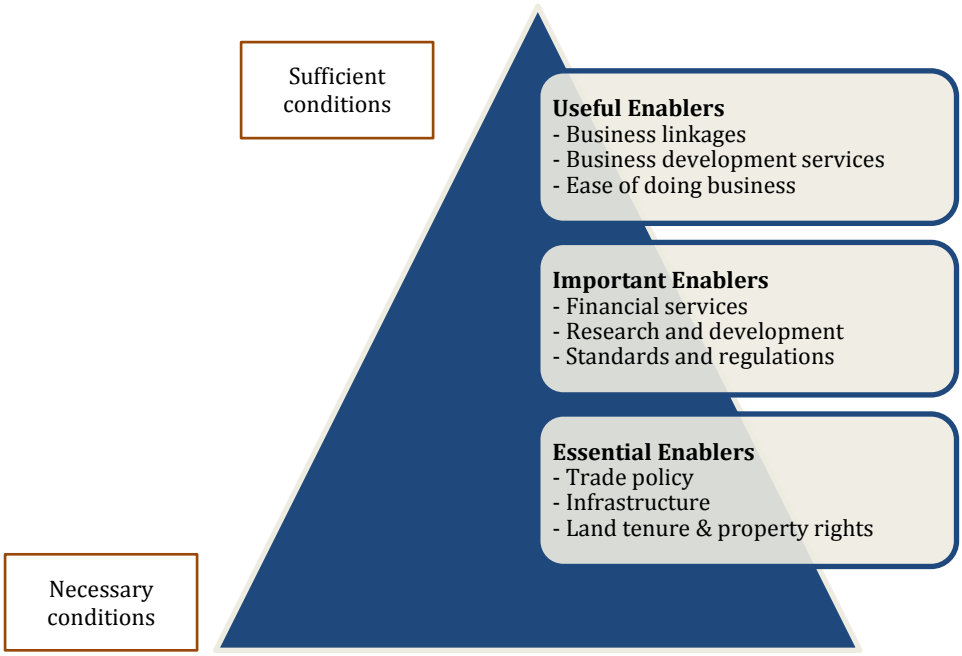
Source: *UNIDO, INDSTAT4 2015 Edition.*

Overall, this analysis confirms that the agro-food industries remain as one of the most efficient economic sectors in some OIC countries that promote the productivity growth and development. In other countries, there might be a need for further efforts to promote the competitiveness of the agro-food industries. In this context, sub-section 5.3 below highlights some important issues related to promoting agro-industrial development in OIC countries.

5.3. Promoting the Competitiveness of Agro-Food Industries

Developing countries have a natural comparative advantage[4] in global markets in many agro-industrial products. Yet, these advantages have not always been effectively realised in fostering the competitive agro-industrial and economic development by agriculture-based countries. On the one hand, the rise of global markets based on competitive advantage[5] is increasingly forcing policy makers to make assessments of the 'enabling environment' for

FIGURE 5.7
Hierarchy of Enabling Needs



Source: *Christy et al. 2009, pg. 150.*

agro-industries. On the other hand, due to protective trade regimes and distorted tariffs in developed countries -with most famous one being Common Agricultural Policy in Europe- developing countries face major challenges in increasing their overall market share in world agro-industrial trade.

Some of the reasons for uncompetitive agro-industry are inadequate government spending on education, R&D and infrastructure, a non-conducive investment climate and trade policy, and poor access to technologies and energy. A successful domestic and export-oriented agro-industry requires creating a business environment and a supportive policy framework to foster productivity (FAO, 2008). By developing a suitable mechanism at national and regional level, the competence of the developing countries must be raised in identification, selection, development and successful commercial utilization of technologies that are modern and socially appropriate so that they can maintain and improve the comparative advantage.

[4] Comparative advantage occurs when a country can produce something at a relatively cheaper rate than can the other countries. Comparative advantage is *given* by the access to certain resources that others don't have.
[5] Competitive advantage occurs when a company is able to produce goods or deliver services at higher profits than the competition and at a lower cost to the consumers. Competitive advantages are *created* by combining different resources, primarily knowledge

Figure 5.7 identifies a hierarchy of enabling needs that governments can consider in addressing their role in advancing economic progress, derived from the proceedings of a number of FAO regional workshops on "Comparative Appraisals of Enabling Environment", conducted in 2007. The proposed hierarchy divides state actions into three levels of activities that characterize and assess enabling environments for agro-industrial enterprises. At the base of the pyramid, essential enablers must be provided by state for better functioning of markets and enterprises. This category includes items such as rule of law (contract enforcement, property rights, etc.), efficient infrastructure, and a conducive trade policy. The so-called important enablers are second-order activities that the state can and often does provide, such as finance, transportation, and information. Finally, useful enablers are defined as sufficient but not necessary conditions to include grades and standards, linking small farmers to formal markets, and business development services (Christy et al. 2009).

In food processing sector, by introducing and accelerating technical innovations, promoting entrepreneurship and improving business practices along the value chain, SMEs can essentially contribute to local/rural development and facilitate the integration of developing countries into global markets. However, they face important challenges with respect to adaptation to increasing competitive environment, scale, quality and standards. Wilkinson (2004) identifies six areas as potential spaces for strengthening the presence of SMEs. These are:

1. Traditional activities that still escape the effects of scale and new demands on quality,
2. Innovative firms supplying niche markets, services and technologies,
3. SMEs as suppliers for large firms,
4. Obligational subcontracting between SMEs and large firms,
5. SMEs organized in autonomous networks,
6. The promotion of traditional SMEs associated with special quality artisan products.

The food processing industry has become a key source of employment opportunities and evidence from Europe and Japan suggests that this will continue to be the case throughout the course of development. In addition to employment opportunities generated by agro-food industries, agro-industrial development plays a strategic role in the overall growth strategies of developing countries.

Pressure on industry actors, especially on the agro-food SMEs, is considerable in many economies. It has been generally highlighted that SMEs have a persistent lack of resources as regards financial capital and skilled workforce, a fact that weakens their competitiveness. In order to support the competitiveness of SMEs and agro-food industries, the following policy recommendations can be made:

- Promote entrepreneurship by increasing the support to the SMEs
- Improve the access for SMEs to available financial sources
- Support the development of new food technologies and simplify their access to funding innovation and research programs
- Facilitate the access of agro-food SMEs to regional and global markets and better promote international trade standards in order to remain competitive

Rapid urbanization, income growth and other global trends will foster demand for agro-industrialized products. Private sector investments will be essential, but public sector can facilitate agro-industrial development through innovative policies and institutions. Despite continuing barriers to trade, it is believed that developing countries can identify and explore export market opportunities by developing their agro-industry. Crucial for successful is the integration into global agro-markets. However, there are also issues such as adherence to standards, quality consistency, volume requirements and timely delivery.

6.State of Food Security

Food security is one of the most crucial challenges facing humanity today. Over the past few decades, many initiatives have been taken at both the national and international levels to end hunger and achieve the goal of food security at global levels. In 2000, the elimination of hunger and under-nourishment was identified in Millennium Development Goals (MDGs) as one of the most important objectives to be achieved on both national and global levels. However, despite all efforts, food insecurity is still on the rise across the globe where current estimates of the FAO indicate that 795 million people worldwide are undernourished in 2014-16. The majority of these undernourished people reside in the developing regions of Asia & Pacific, Sub-Saharan Africa and Latin America & the Caribbean. Considering the fact that the majority of OIC countries are located in these regions, it is evident that a significant portion of the undernourished people in these regions resides in OIC countries, particularly in the least-developed member countries. Undoubtedly, this situation has worsened, given the impact of the surge in food insecurity, particularly following the food crisis in 2006-2008, which posed serious socio-economic challenges both for households and policy makers in many OIC countries.

In the light of these challenges, this section highlights the state of food security in OIC countries in terms of production and trade of food, low-income food deficit countries and food aid, food deprivation and impact of food prices volatility.

6.1. Production and Trade of Food

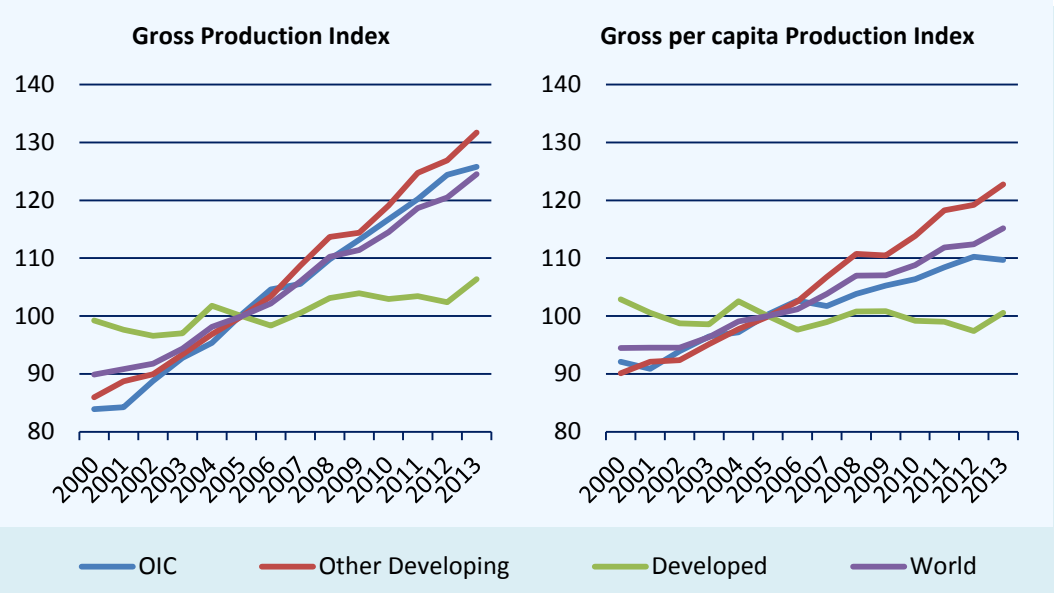
As shown at left hand side in Figure 6.1, global food production index (FPI) has increased by 25% in 2013 compared to the base year level of 100 in 2005. FPI of the other developing countries remained above the world average and registered an increase of 32% throughout

the period under consideration. FPI of OIC countries, as a group, also indicated an upward trend and remained above the world average, whereas developed countries could only increase their food production by 6% for the same period which was far below the world average. Notably, although the FPI of OIC countries as a group increased by 26% during the same period, at the individual country level, the FPI was lower than the world average in 25 OIC countries in 2013 (Annex Table A.13).

Global per capita food production also indicated an upwards trend which implies that growth in food production was higher than the population growth. As shown on the right hand side in Figure 6.1, despite fluctuations, food production per capita index of developed countries remained unchanged during the period under consideration. In contrast, food production per capita index of OIC countries and other developing countries exhibited an upward trend during 2000-2013. On average, in terms of per capita food production, OIC countries and other developing countries witnessed an increase of 10% and 23%, respectively since 2005. Notably, OIC countries average remained below the world average, while other developing countries remained above the world average. Consequently, at the individual country level, food production per capita index was lower than the world average in 34 OIC countries.

Per capita production gap with other countries is increasing

FIGURE 6.1
Food Production Index 2000-2013



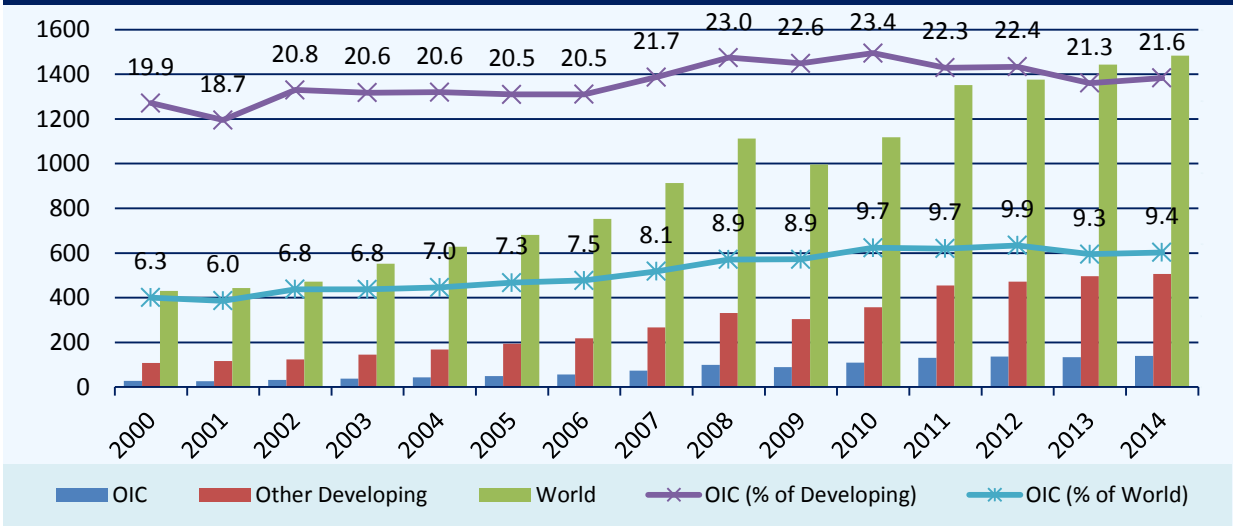
Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Tables A.13 and A.14), SESRIC Staff analysis*

The performance of OIC countries in terms of their per capita food production index indicates that a majority of these countries has insufficient food production capacity to meet the domestic demand for their growing populations and, therefore, have to rely heavily on food imports. In this respect, the rest of this section sheds light on the state of food trade in OIC countries.

During the period 2000-2014, food trade indicated an upward trend, where global food exports increased from US$ 430 billion in 2000 to US$ 1483 billion in 2014 (Figure 6.2). Similarly, total food exports of the developed countries exhibited an upward trend and reached US$ 837 billion in 2014 compared to US$ 295 billion in 2000. OIC countries and

other developing countries also witnessed a growth trend in their food exports during the same period. The former country group increased their food exports from US$ 27 billion in 2000 to US$ 140 billion in 2014 whereas the latter group increased their food exports to US$ 507 billion in 2014 from US$ 109 billion in 2000. On average, total food exports of OIC countries accounted for 8.6% of total world food exports and 22% of total food exports of the developing countries during the period 2000-2014.

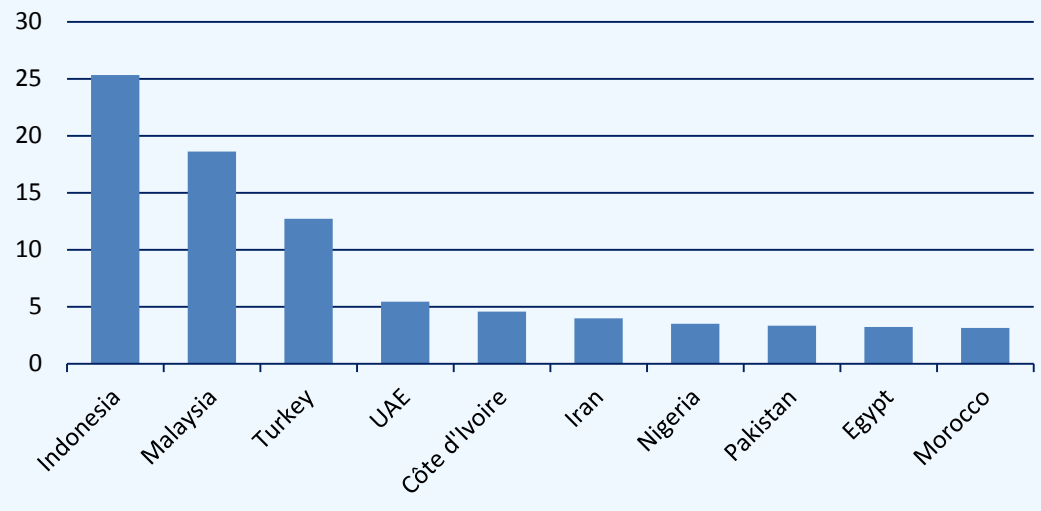
FIGURE 6.2
Exports of Food 2000-2014 (US$ billions)



Source: *World Trade Organization Online Database (Annex Table A.15), SESRIC Staff analysis*

At the individual country level, food exports are concentrated in a few OIC countries, where in 2014, only 10 countries, namely Indonesia, Malaysia, Turkey, UAE, Côte d'Ivoire, Iran, Nigeria, Pakistan, Egypt and Morocco together accounted for 84% of the total food exports of OIC countries. Moreover, only three of them, namely Indonesia, Malaysia and Turkey accounted for 57% of the total food exports of OIC countries (Figure 6.3).

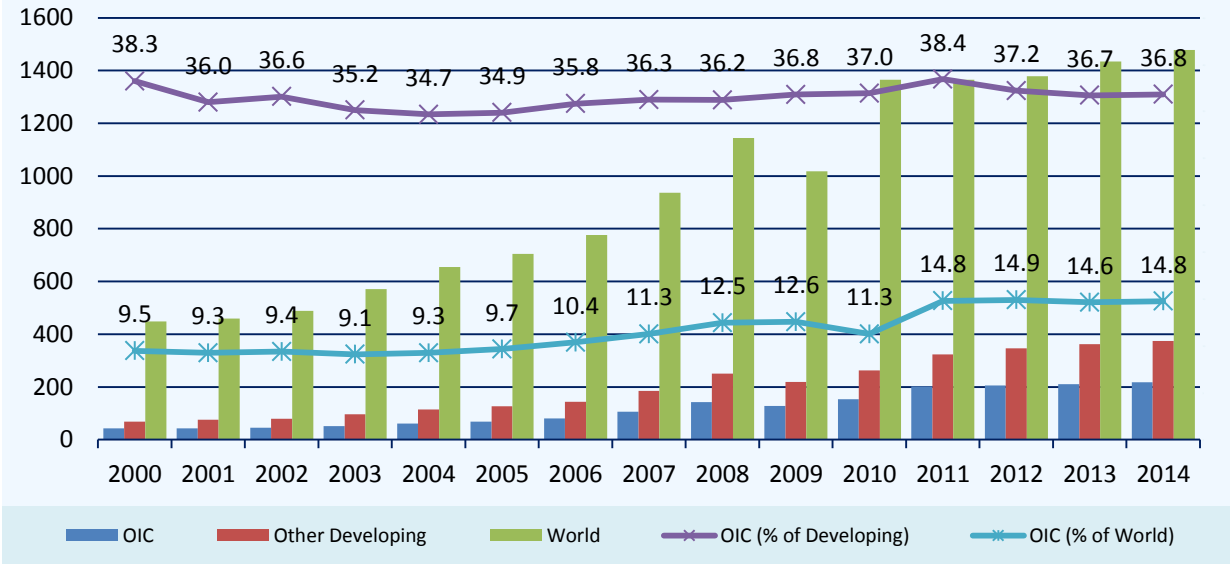
FIGURE 6.3
OIC Top-10 Food Exporters, 2014



Source: *World Trade Organization Online Database (Annex Table A.15)*

On the other hand, global food imports also reflected an upwards trend, where developed countries' food imports increased from US$ 337 billion in 2000 to US$ 885 billion in 2014 (Figure 6.4). Meanwhile, total food imports of OIC countries increased from US$ 43 billion in 2000 to US$ 218 billion in 2014. During the same period, food imports of the other developing countries also increased to US$ 375 billion in 2014 from US$ 69 billion in 2000. On average, total OIC food import accounted for 12.6% of that of the world and 38% of the total food imports of developing countries.

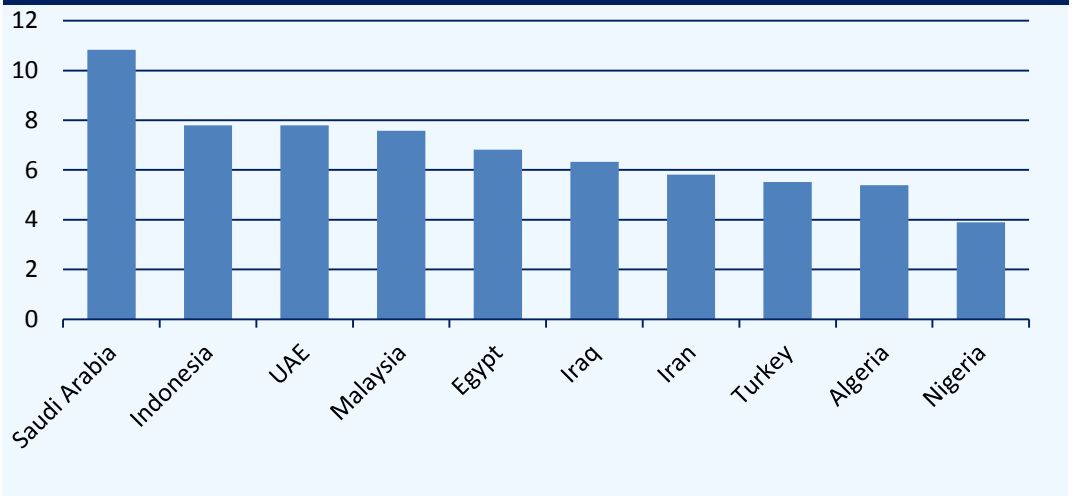
FIGURE 6.4
Food Imports 2000-2014 (US$ billions)



Source: *World Trade Organization Online Database (Annex Table A.16), SESRIC Staff analysis*

As was the case in food exports, OIC food imports were also concentrated in a few member countries, where in 2014, the top 10 OIC food importing countries, namely Saudi Arabia, Indonesia, UAE, Malaysia, Egypt, Iraq, Iran, Turkey, Algeria, and Nigeria, which accounted for 68% of total food imports of OIC countries (Figure 6.5).

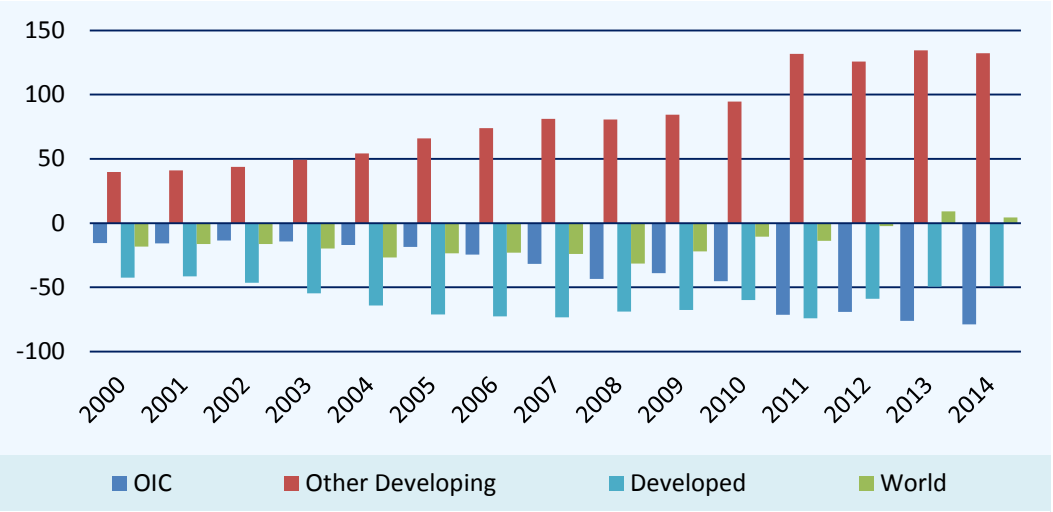
FIGURE 6.5
OIC Top-10 Food Importers, 2014



Source: *World Trade Organization Online Database (Annex Table A.16)*

During the period 2000-2014, the growth of food exports was outweighed by the growth of food imports in OIC countries. Food trade deficit of OIC countries has increased rapidly from US$ 16 billion in 2000 to US$ 79 billion in 2014 (Figure 6.6). This clearly indicates that OIC countries, as a group, are on average, net food importers, where the majority of them still rely heavily on imports of various food products to meet their increasing domestic food demands. This situation has been reflected in a steadily increasing food trade deficit trend in OIC countries as a group, similar to that of the world average food trade deficit. Notably, during the same period, developed countries were also net food importers. However, other developing countries, in contrast, achieved a steadily increasing food trade surplus.

FIGURE 6.6
Food Trade Balance 2000-2014 (US$ billions)



Source: *World Trade Organization Online Database, SESRIC Staff analysis*

At the individual country level, it was observed that only 7 OIC countries, namely Indonesia Malaysia, Turkey, Côte d'Ivoire, Uganda, Guyana, and Mauritania recorded food trade balance surplus in 2014 (calculated based on WTO data).

6.2. Low-Income Food Deficit Countries and Food Aid

According to the FAO's classification for 2016, 28 OIC member countries are found to be among the world 54 low-income food-deficit countries (LIFDCs), most of them are in Sub-Saharan Africa and the arid regions of West Asia and North-eastern Africa (Table 6.1). In general, the majority of LIFDCs are characterised by low income level, conflicts, political instability and high prevalence of undernourishment. They are unable to produce sufficient food to meet their domestic demands while due to lack of resources they cannot import it as well.

TABLE 6.1
Low-Income Food Deficit Countries (LIFDCs) in OIC Countries

Afghanistan	Comoros	Mauritania	Syria
Bangladesh	Djibouti	Mozambique	Sudan
Benin	Gambia	Niger	Tajikistan
Burkina Faso	Guinea	Nigeria	Togo
Cote d'Ivoire	Guinea-Bissau	Senegal	Uganda
Cameroon	Kyrgyzstan	Sierra Leone	Uzbekistan
Chad	Mali	Somalia	Yemen

Source: www.fao.org

Moreover, the internal conflicts in some of these countries, particularly in Africa are, without doubt, negatively affecting all aspects of life, not only by exacerbating the unfavourable living conditions but also by remaining as obstacles in front of the potential for economic development. The insecure conditions in these countries also make it difficult for the food aids from other countries or international organisations to reach in the areas in need. In this respect, food shortages continued to affect a significant number of the 28 OIC-LIFDCs, where 17 of them have been classified by the FAO as "Countries in Crisis Requiring External Assistance" (Table 6.2).

TABLE 6.2

OIC Countries in Crisis Requiring External Assistance for Food*

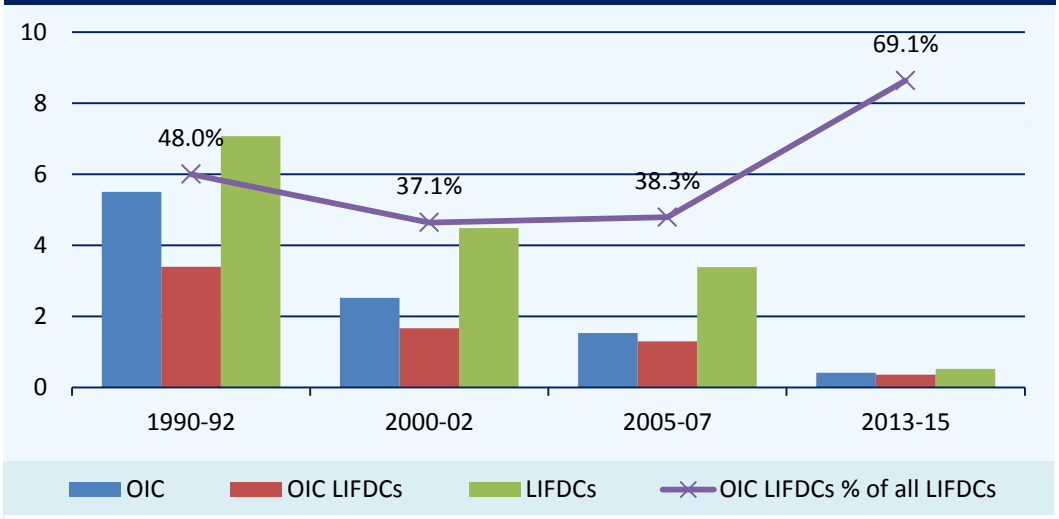
1-Exceptional shortfall in aggregate food production/supplies	
Iraq	Escalation of the conflict and large internal displacement
Syria	Worsening civil conflict and large internal and external displacement
2-Widespread lack of access	
Burkina Faso	Influx of refugees from Mali
Chad	Large caseload of refugees puts additional pressure on local food supplies
Djibouti	Inadequate pasture availability due to consecutive unfavourable rainy seasons
Guinea	Outbreak of Ebola and impacts on agricultural trade flows from neighbouring countries
Mali	Population displacements and insecurity in Northern areas
Mauritania	Refugee caseload continue to put additional pressure on local food supplies
Niger	Successive food crisis, Malian refugees, internal displacement
Sierra Leone	Outbreak of Ebola and impacts on agricultural trade flows from neighbouring countries
Yemen	Prolonged conflict, poverty, high food and fuel prices
3-Severe localized food insecurity	
Afghanistan	Continuing conflict and population displacement
Cameroon	Influx of refugees from CAR and Nigeria, Internal displacement
Mozambique	Tighter cereal supplies and poor cereal production prospects due to unfavourable seasonal rains
Somalia	Conflict, civil insecurity , drought and reduced localized crop production
Sudan	Conflict, Internally displaced people
Uganda	Below-average crop production due to unfavourable rainy season

Notes: * Countries in crisis requiring external assistance are expected to lack the resources to deal with reported critical problems of food insecurity. Food crises are nearly always due to a combination of factors but for the purpose of response planning, it is important to establish whether the nature of food crises is predominantly related to lack of food availability, limited access to food, or severe but localized problems. Accordingly, the list of countries requiring external assistance is organized into four broad, not mutually exclusive, categories:
1- Countries facing an **exceptional shortfall in aggregate food production/supplies** as a result of crop failure, natural disasters, interruption of imports, disruption of distribution, excessive post-harvest losses, or other supply bottlenecks.
2- Countries with **widespread lack of access**, where a majority of the population is considered to be unable to procure food from local markets, due to very low incomes, exceptionally high food prices, or the inability to circulate within the country.
3- Countries with **severe localized food insecurity** due to the influx of refugees, a concentration of internally displaced persons, or areas with combinations of crop failure and deep poverty.
Source: FAO (2016), Crop Prospects and Food Situation, March 2016.

Therefore, few decades ago, the United Nations initiated its food aid program for such countries. Food aid played an important role to help these countries to ensure the availability of food for their poor households and overcome the problem of growing food insecurity. Initially, the programmed aid was having the priority, and emergency food aid was at very low levels. However, over the years, due to increasing conflicts, wars, adverse climate conditions and population displacement, the focus of the United Nations food aid program has been changed from programmed food aid to emergency food aid. Nevertheless, some LIFDCs with high prevalence of food insecurity are still permanent recipients of food aid.

According to the FAO's food aid statistics, the volume of cereal aid in absolute terms declined, over the past two decades. As shown in Figure 6.7, total cereal aid deliveries to OIC countries decelerated to 0.36 million metric tons in 2013-15, down from 5.5 million metric tons in 1990-92, corresponding to a decrease of 92.6%. Total cereal aid shipments to all LIFDCs also decreased from 7.1 million metric tons in 1990-92 to 0.52 million metric tons in 2013-15, corresponding to a decrease of 92.7%. Similarly, the total cereal aid shipments to the OIC-LIFDCs declined from 3.4 million metric tons in 1990-92 to 0.36 million metric tons in 2013-15, corresponding to a decrease of 89.4%. Accordingly, the share of OIC-LIFDCs in total cereal aid shipments to all LIFDCs has also declined from 48% in 1990-92 to 38.3% in 2005-07 before climbing up to 69% in 2013-15.

FIGURE 6.7
Total Cereal Aid Shipments (Million Metric Tons)



The volume of cereal aid shipments to OIC countries declined over time

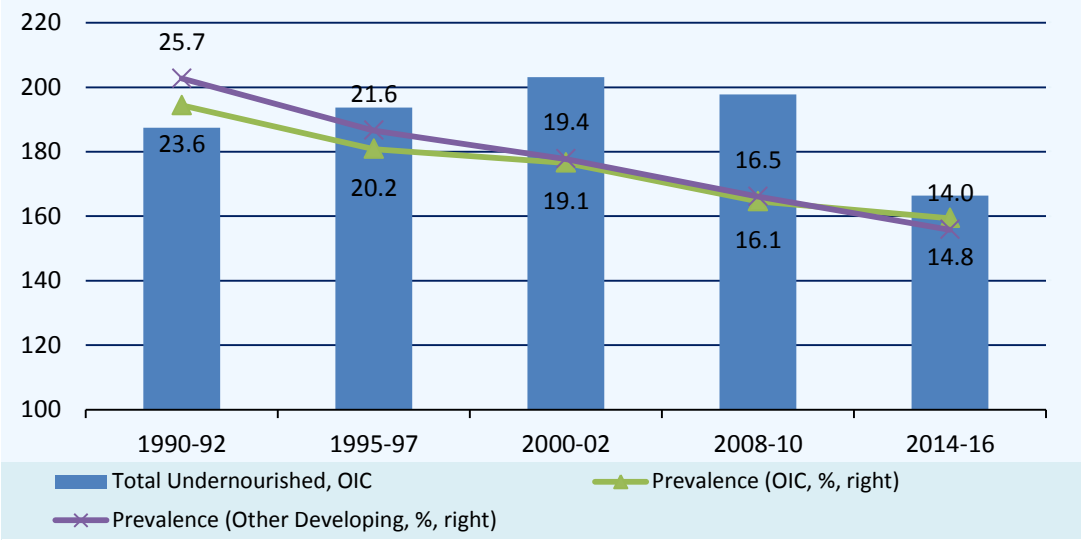
Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Table A.17)*

6.3. Food Deprivation (Undernourished People)

According to the FAO's recent estimates (SOFI, 2015), some 795 million people across the globe are now undernourished which represents 12.0 % of the global population, or one in nine people. The majority of these undernourished people reside in developing regions of Asia & Pacific (487 million), Sub-Saharan Africa (220 million) and Latin America & Caribbean (34 million). Being a substantial part of the developing countries, OIC countries are no exception. In 2014-16, there were 166 million undernourished people in OIC countries (Figure 6.8), corresponding to 20.8% of the world total undernourished people. On the other hand, prevalence of under-nourishment (i.e. the share of undernourished people in the total population) in OIC countries declined from 23.6% in 1990-92 to 14.8% in 2014-16 by

remaining above the other developing countries average of 14.0% and the world average of 12.0% during the same period.

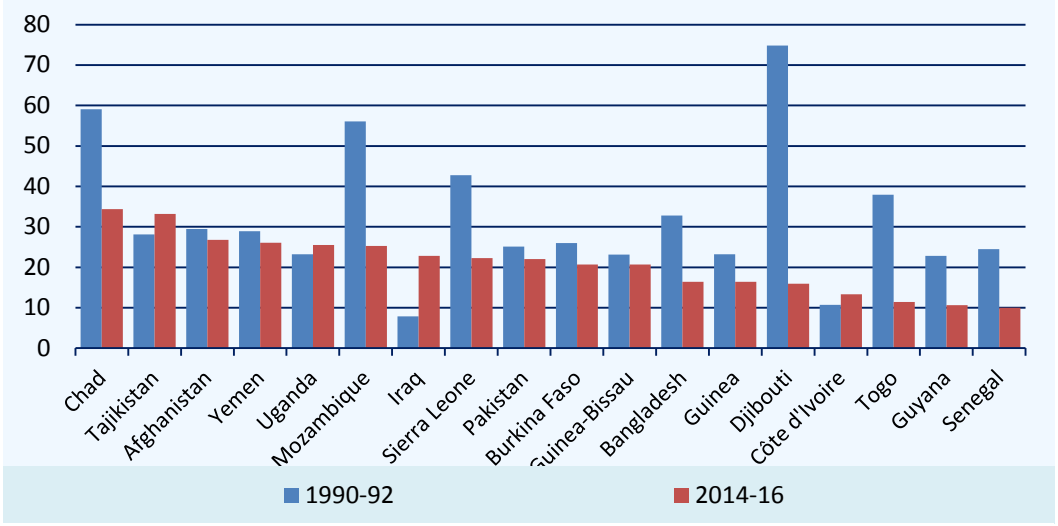
FIGURE 6.8
Under-nourishment in OIC Countries



Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Tables A.18 and A.19), SESRIC Staff Analysis*

At the individual country level, some OIC countries made impressive progress and the share of undernourished people in their total population declined significantly during the period between 1990-92 and 2014-16. However, prevalence of under-nourishment was still very high in many OIC countries, particularly in the OIC-LIFDCs in Sub-Saharan Africa and South and Central Asia like Chad, Tajikistan, Afghanistan, Yemen, Uganda and Mozambique (Figure 6.9). It is, therefore, easy to argue that the food and economic crisis in 2007-2008 deteriorated the state of food security in many of these countries where high food prices had more severe negative socio-economic repercussions in these countries than in the others.

FIGURE 6.9
Prevalence of Under-nourishment (% of total population)



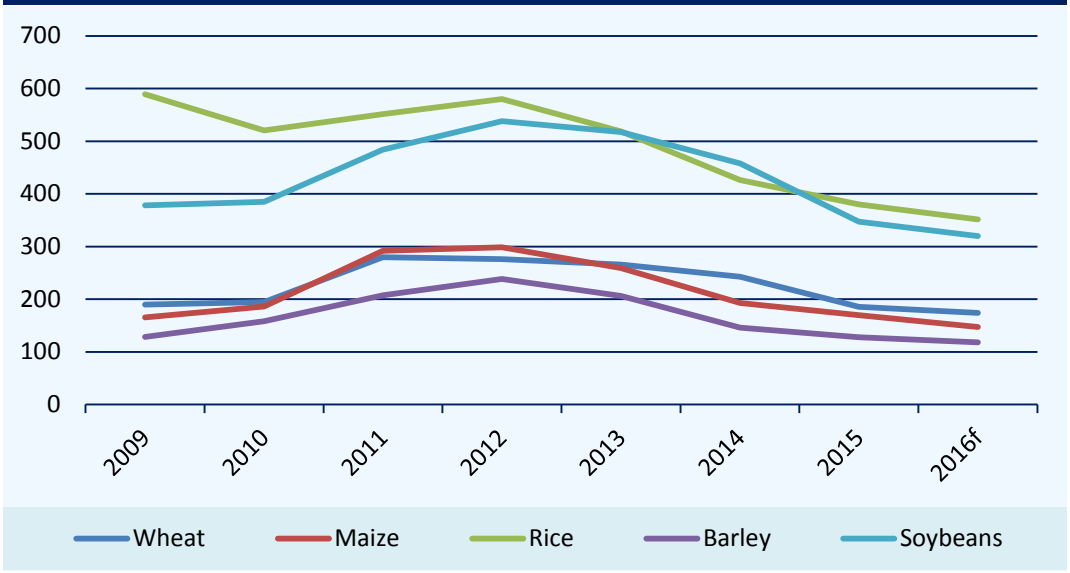
Source: *Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Table A.19)*

6.4. Food Prices

The LIFDCs are more vulnerable than others to any rise in the international food prices in terms of increasing their food import bills and trade deficits, posing serious negative impacts on basic socio-economic sectors such as health care and education, and, consequently, worsening the state of food security through increasing the number of undernourished people. Moreover, the internal conflicts in some of these countries caused a great number of farmers to abandon their lands and, therefore, negatively affected the production and trade of food and further contributed to increase in domestic prices of food products.

During the food crisis of 2006-08, prices of all major food commodities witnessed an exponential increase and reached to their historic peaks in 2008. After a slight decrease in 2009, prices of most of the major food commodities exhibited an upward trend again up to the end of 2012. Afterwards, prices started to decline and as of 2015prices of maize, soybeans, rice, barley and wheat were significantly lower than their 2012 levels. As shown in Figure 6.10, wheat prices decreased to US$ 186/MT in 2015, registering nearly 33% decrease over 2012 prices. Corresponding to a 43% decrease over 2012 level, whereas maize prices reached to US$ 170/MT in 2015. Meanwhile, prices of rice decreased by 35% and soybeans by 35% over the prices of 2012.

FIGURE 6.10
Prices of Major Food Commodities (US$/Metric Ton)



Prices of major food commodities are on the decline

Source: *FAO, International Commodity Prices Database, SESRIC Staff analysis*

At the individual OIC country level, prices of major food commodities have shown different trends. According to the FAO's 2015 "Crop Prospects and Food Situation", between July and September 2015 the prices of millet in Nigeria declined by 15% whereas maize prices increased by 91% and 128% in the year to September 2015 in Malanville (Benin) and Anie (Togo), respectively. . During the same period, prices of wheat in Pakistan increased due to seasonal patterns whereas prices of wheat flour eased in Bangladesh. In Indonesia, prices of rice strengthened for the sixth consecutive month reaching record highs in November largely supported by lower-than-earlier expected 2015 off-season output.

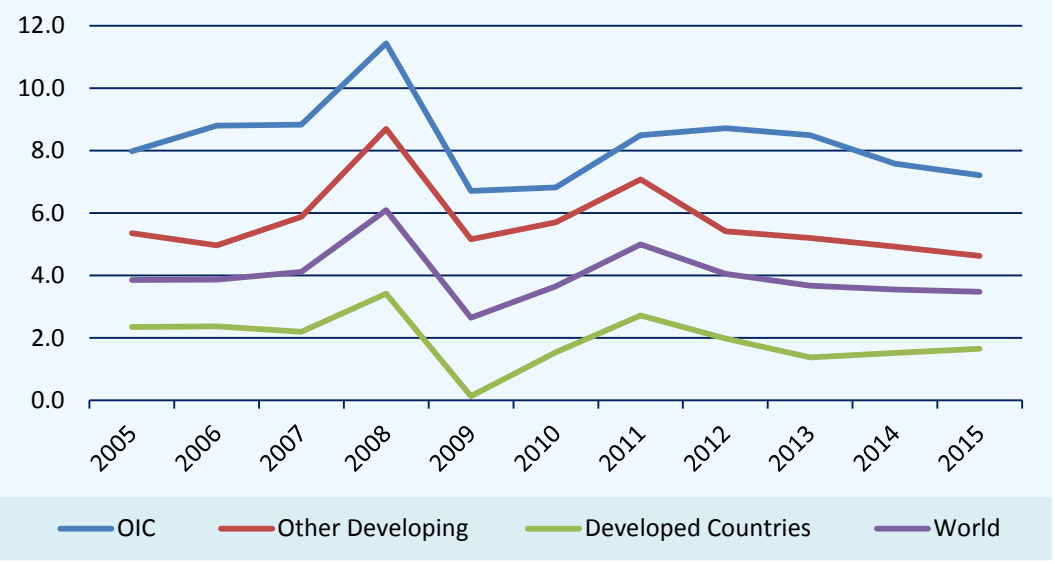
Undoubtedly, food price hike and volatility witnessed during and after the food crisis caused serious negative socio-economic impacts on the economies of many developing countries,

including OIC countries and, therefore, created further hardships for millions of people who were already suffering from the hunger and poverty in these countries. The OIC-LIFDCs were more exposed to these negative impacts than the others, where food price inflation worsened the already deteriorated food security situation in these countries, increased the food import bills and trade deficits, triggered the head line inflation and, thus, posed serious negative impacts on health and education of the poor people in these countries who spend the bulk of their income on food consumption.

Food prices inflation, therefore, played an important role in increasing the inflation rate in terms of the change in consumer price index across the globe. However, considering that share of food is very high in the total household expenditures in the developing countries, food price hike and volatility caused higher inflation in these economies. However, downward trend in major food commodity prices since 2012 has largely eased the food inflation and the associated socio-economic burdens especially on the low income food importing countries.

As shown in Figure 6.11, world inflation rate has shown a volatile trend after 2004. As of 2015, it reached 3.5% which is significantly lower than its level in 2008. In OIC countries, average inflation rate has been significantly higher than the average of the developed and developing economies. Triggered by food and fuel price hike, inflation increased from 8.0% in 2005 to double-digit level of 11.4% at the end of 2008, nearly double the world average inflation rate. However, the average OIC inflation rate exhibited a downward trend during 2008-2010 and declined from its peak level, of 11.4% to approximately 6.8% but thereafter it started increasing moderately until 2012. Despite a decrease thereafter, the average

FIGURE 6.11
Inflation: Annual Change in Consumer Price Index (Per cent)



Source: *IMF, World Economic Outlook Database (2015), SESRIC Staff analysis*

inflation remained comparatively very high 7.0% in 2015.

BOX 6

Temporary Labor Migration as Mitigation: Strategies for Managing Seasonal Famine

Researchers: Gharad Bryan, Shyamal Chowdhury, Mushfiq Mobarak; **Location:** Kurigram and Lalmonirhat districts in Northwestern Bangladesh; **Timeline:** 2008

It is common for agricultural laborers in other regions of Bangladesh to either switch to local non-farm labor markets or to migrate to urban informal labor markets in search of higher wages in response to price hikes and wage drops during the pre-harvest season. If he finds work, the laborer can send money back to his family to help alleviate the effects of the pre-harvest lean season. However, this is generally not seen in Rangpur District. A national survey found that 22 percent of all Bangladeshi households receive domestic remittances, while only 5 percent of households in Rangpur reported receiving domestic remittances. This intervention primarily seeks to understand why these Monga-affected workers appear hesitant to seasonally migrate to better employment opportunities.

The researchers found that offering an incentive to migrate had a large effect on likelihood of seasonal migration. Over 40 percent of households that received a cash or credit incentive migrated, compared to only 14 percent of households not receiving an incentive. Providing information about job opportunities but no incentives only increased the likelihood that someone from a household migrated by 3 percentage points. These results suggest that credit or saving constraints reduce migration.

Requiring migrants to form groups of three instead of pairs reduced migration probability by almost 6 percentage points. Migrating in larger groups changes the dynamic for the individuals involved with respect to using social networks to find a job and sharing the risks of migration with their partners. When partners are assigned, the larger group reduces propensity to migrate by only 3 percentage points whereas in self-chosen groups, having to form larger group reduces propensity to migrate by almost 9 percentage points. This suggests that people may have trouble forming groups and finding the right set of partners with whom to migrate.

Placing restrictions on a migrant's destination decreased take-up of the migration incentive by 7.4 percentage points. The distance to the destination also appears to be an important consideration. For example, when faced with the option of migrating to two similar sized cities with comparable market opportunities, households were 12 percentage points were likely to migrate to the closer city. However, the size of the labor market is even more important: migrants are 6 percentage points more likely to take-up the offer when Dhaka is specified as the destination compared to when a nearby smaller town, Munshiganj, is offered.

Source: *MIT, The Abdul Latif Jameel Poverty Action Lab (J-PAL)*

7. OIC Cooperation in Agriculture and Food Security: Opportunities and Project Proposals

7.1. Background

The importance of agriculture sector in the economies of OIC countries, especially the importance of the issues related to food security, and, thus, the urgent need for growth and development in the agriculture sector had been recognised quite early. It was also realised that the food issue is closely linked with agricultural production, productivity, input use, infrastructure, agricultural policies, and trade-related issues. Consequently, in the context of its rapidly expanding economic agenda, the OIC began to focus quite extensively on agriculture and food security, particularly during the 1980s.

The 1981 OIC Plan of Action to Strengthen Economic Cooperation among Member Countries of the OIC, which was adopted by the Third Islamic Summit Conference held in Makkah Al Mukarramah in January 1981, contained a section on cooperation in the area of food security and agriculture, which highlighted the following points:

- With a view to creating balanced development of the agriculture and industrial sectors, greater accent shall be placed upon agro-based and agro-related industries such as the production of tractors, fertilizers, seed industry, pesticides as well as the processing of the agricultural raw materials;
- To ensure food security in the Islamic World, regional food reserve stocks must be created;
- Necessary measures shall be taken to improve the agricultural infrastructure and the transport facilities;
- Alternative ways and means shall be devised and considered for tackling natural phenomena such as desertification, deforestation, water logging and salinity;

- The Islamic Development Bank and other financial institutions should play more active roles in financing food and agricultural projects of Member Countries both at national and communal levels.

Three OIC ministerial conferences on Food Security and Agricultural Development took place during the period 1981-1988. The First OIC Ministerial Conference on Food Security and Agricultural Development, which was held in Ankara in October 1981, adopted a "Program of Action" in the field of Food and Agriculture for OIC countries. The Second OIC Ministerial Conference on Food Security and Agricultural Development, which was held in Istanbul in March 1986, reviewed the implementation of the decisions adopted earlier and deliberated upon possible new areas of cooperation in the agriculture sector, including fisheries and fishing technology, seed industry, irrigation and livestock and animal husbandry. The Third OIC Ministerial Conference on Food Security and Agricultural Development, which was held in Islamabad in October 1988, reviewed various food issues and adopted indicators for the purpose of monitoring the level of food security in the member countries. The Conference also recommended collaboration in livestock and agreed to establish an OIC Food Security Reserve based on the principle of collective self-reliance. However, the eventual progress on all these areas of cooperation among the member countries was very limited.

The 1994 version of the OIC Plan of Action to Strengthen Economic Cooperation among the Member Countries of the OIC, which was endorsed by the Seventh Islamic Summit Conference held in Casablanca in December 1994, identified “Food, Agriculture and Rural Development” as one of the top ten priority areas of cooperation among the OIC countries. The Plan underlined the major problems facing the OIC community in the field of food and agriculture such as hunger, malnutrition, famine, widespread and mass poverty, desertification and under-utilization of the existing potentials, the insufficiency of food production, the impacts of the need to import the greater parts of their food requirements, and the concomitant heavy food import bills that put a strain on the foreign exchange vitally needed for overall development. The Plan, accordingly, specified some programs of actions to be undertaken at the OIC level as follows:

- Promoting and expanding cooperation in the area of agricultural research and development of joint activities, by giving a pivotal role to the private sector.
- Overcoming major threats to food production caused by plant and animal pests and diseases through Early Warning Systems and other joint mechanisms.
- Identification and implementation of joint ventures in the area of food and agricultural production, with the active participation of the private sector.
- Promotion of investments in rural infrastructure by making use of the existing facilities within OIC including those at IDB, and development of agricultural credit systems.

The Fourth OIC Ministerial Conference on Food Security and Agricultural Development, which was held in Tehran in January 1995, adopted a Declaration which emphasized the need to explore ways and means to increase agricultural production and decided to periodically review the situation of food security in all OIC countries.

More recently, the “OIC Ten-Year Programme of Action to Meet the Challenges Facing the Muslim Ummah in the 21st Century”, which was adopted by the Third Extraordinary Islamic Summit Conference held in Makkah Al Mukarramah in December 2005, emphasised the need for supporting development and poverty alleviation in the member countries, particularly in the African and least-developed members. To this end, the Programme called for adopting a special programme for the development of Africa and promoting activities aimed at achieving economic and social development in these countries, including supporting

industrialization, energizing trade and investment, transferring technology, alleviating their debt burden and eradicating diseases.

The Fifth OIC Ministerial Conference on Food Security and Agricultural Development held in Khartoum in October 2010 urged the member countries to:

- Give food security a high priority in their national development agendas and budgets as well as mobilize resources for implementing food security and agricultural development projects,
- Allocate a minimum of 6% of the national budgets to food security programs and create favourable conditions for attracting and sustaining foreign investments into the agricultural sector, food security and rural development,
- Formulate an Executive Framework for Agriculture, Rural Development and Food Security in OIC member states. The Framework must be actionable, result oriented, inclusive and comprehensive, including timelines and benchmarks.

The Meeting also called on Islamic donor countries and financing institutions, particularly the Islamic Development Bank, to increase their funding for agricultural projects in member states with particular emphasis on empowerment of most vulnerable segments of population. It also called on the private sector to increase investment in the agricultural sector and develop partnership with national governments, and non-governmental bodies to promote food security and rural development in member states.

The Sixth OIC Ministerial Conference on Food Security and Agricultural Development held in Istanbul in October 2011 reiterated the need for OIC countries to allocate more resources from their national budgets to agricultural development and food security programmes in line with the resolution of the Fifth Ministerial Conference. It also urged OIC countries to continue to support cross-border and regional projects aimed at enhancing intra-OIC cooperation in the area of agriculture, rural development and food security.

Agriculture and food security has also been recently identified as one of the six priority areas in the new COMCEC Strategy with the aim of increasing the productivity of agriculture sector and sustaining the food security in OIC countries. With this new strategy, COMCEC aims support the productivity of agriculture sector, improve the effectiveness of the regulatory and supportive role of the State in agriculture sector and food security, promote reliable and up-to-date data collection with a view to ensuring sound analysis of the sector and improve the market performance and access of the member countries.

Notwithstanding all these efforts, the OIC countries did not reach, over these long years, workable cooperation arrangements with concrete results in agricultural development and food security area to help the development efforts of the majority of the member countries. All the above-mentioned conferences and meetings have only brought out, although not yet realized, ideas to enhance cooperation among the OIC countries in food security and agriculture. Among others, these ideas include:

- Strengthening cooperation in the field of preparation and implementation of food security programs at regional and national levels and in rehabilitation and rebuilding of the agricultural sector in poor member countries,
- Financing food and agricultural projects at national and communal level,
- Solving the financial constraints on food production,
- Sharing agricultural technology among OIC countries.

In this context, the adoption and implementation of the Executive Framework for Agriculture, Rural Development and Food Security in OIC countries carry significant importance for a result-oriented and implementable roadmap of cooperation among the

member countries. This Framework has been drafted by the COMCEC Coordination Office, in collaboration with relevant OIC and international institutions and submitted to the 28th Session of the COMCEC held in Istanbul in October 2012. The draft document is expected to be adopted by the Seventh OIC Ministerial Conference on Food Security and Agricultural Development to be held in Dakar in November 2013.

7.2. Promoting Intra-OIC Investment in Agriculture Sector

7.2.1. Agriculture and Investment

In general, agricultural development and food security in a country can be improved by increasing agriculture output, particularly food products, through either increasing agricultural productivity or extension of the arable land area (i.e. bringing more land under cultivation). This, of course, necessitates the availability of appropriate investments in agriculture sector at the national level and/or in terms of foreign direct investments (FDI). However, while investment in agriculture is a well-established economic activity in the developed countries, it is still lagging behind in many developing countries, particularly in the least-developed and low-income agricultural-based countries.

Investment in agriculture-oriented projects in these countries is often regarded as a high-risk investment. In general, this is due to factors related to the weak business and investment climate in most of these countries. These factors include, among others, conflict and political instability, inadequate physical infrastructures such as transportation, telecommunication, agricultural machinery and technologies, and inappropriate financial and banking systems. Accordingly, though they may well-endowed with high potential in agricultural resources such as human resources (agricultural labour force), arable land and water resources, it is very difficult for many of these countries to gain access to appropriate financing for their agricultural development projects.

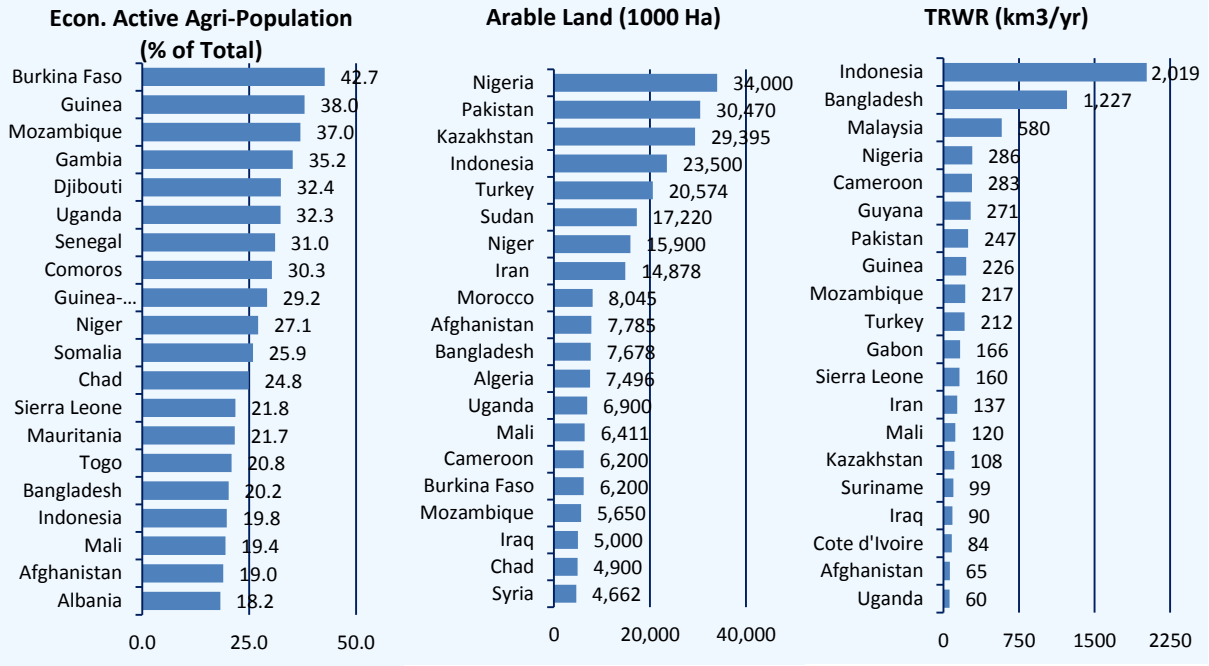
This is particularly true in the case of many OIC least-developed and low-income agricultural-based countries where, due to limited financial resources, both domestically and in terms of FDI, the inherent agricultural potential of these countries does not manifest itself in the form of reasonable levels of agricultural development and food security, where most of them are still classified as LIFDCs with high levels of undernourished people. Therefore, intra-OIC investment in agricultural projects should be encouraged, particularly in the agricultural-based member countries to increase agricultural productivity and/or extension of arable land through the supply of improved seeds, fertilizers, agricultural machinery and modern irrigation systems as well as through the development of agriculture-related infrastructures and processing of agricultural raw commodities, particularly food products with the aim of establishing agro-based industries to improve the state of food security at the OIC regional level.

In this respect, it is well known that some OIC countries, particularly the GCC member countries, have been seeking investment opportunities in the agriculture sector in some OIC least-developed agricultural-based countries. In order to promote and encourage such intra-OIC investment, OIC countries with high potential in agriculture sector, particularly in terms of agricultural labour force, arable land and water resources are needed to be identified to ascertain their potential for encouraging intra-OIC investment in agriculture sector. For this purpose, the following section attempts to highlight and evaluate the OIC countries with most potential to attract intra-OIC investment into the agricultural sector.

7.2.2. Member Countries with Higher Agriculture Potential

Arable land, agricultural labour force and water resources are the main ingredients of the agriculture sector. The top 20 OIC countries in terms of the overall availability of these three main agricultural resources are depicted in Figure 7.1.

FIGURE 7.1
Top Agricultural-Based OIC Countries



Source: *Food and Agriculture Organization (FAO) FAOSTAT and AQUASTAT Online Databases, SESRIC Staff analysis*

It is clear that 36 OIC countries (19 of them are least-developed countries) enjoy high potential at least in terms of one of the three-mentioned agricultural resources. These countries could in general be considered as the OIC agricultural-based member countries and classified into 7 groups as follows:

1- OIC countries well-endowed with **agricultural labour force, arable land and water resources**: Afghanistan, Bangladesh, Indonesia, Mali, Mozambique and Uganda.
2- OIC countries well-endowed with **arable land and water resources**: Cameroon, Iran, Iraq, Kazakhstan, Nigeria, Pakistan, Turkey.
3- OIC countries well-endowed with **agricultural labour force and arable land**: Burkina Faso, Chad, and Niger.
4- OIC countries well-endowed with **agricultural labour force and water resources**: Guinea and Sierra Leone.
5- OIC countries well-endowed with **arable land**: Algeria, Morocco, Sudan, and Syria.
6- OIC countries well-endowed with **water resources**: Cote d'Ivoire, Gabon, Guyana, Malaysia, Suriname.
7- OIC countries well-endowed with **agricultural labour force**: Albania, Comoros, Djibouti, Gambia, Guinea Bissau, Mauritania, Senegal, Somalia, and Togo.

In general, this information highlights the OIC countries that could be targeted for intra-OIC investments in the agriculture sector. In the light of such information, it could be possible to

suggest to which member countries intra-OIC investments should be directed and promoted. It could be also possible to roughly suggest the type of agricultural inputs that such of these investments should be focused on. On the other hand, in the light of this information it could be possible to suggest some broad recommendations to serve as policy guidelines to which the attention of these countries needs to be drawn in their efforts towards achieving sustainable agricultural development and attracting FDI in the agriculture sector. It should be, however, noted that the availability of resources alone is not sufficient to attract foreign investment. From infrastructure to business environment, education to economic and political stability, many factors affect the investment decision of fund owners. The countries with abundant resources should endeavour to improve other conditions that are crucial to attract investors.

In terms of the overall availability of the three main agricultural resources together (labour, land and water), it seems that Afghanistan, Bangladesh, Indonesia, Mali, Mozambique and Uganda are exhibiting the most potential for attracting intra-OIC investment in the agriculture sector. Yet, from the investors' perspective, considering the limited ability of these countries to attract FDI due to relatively weak business and investment climate and poor agricultural infrastructure, these countries may not attract sufficient interest from the investors. Due to their favourable business and investment environments as well as the plenty of arable land and water resources, the countries in the second group (Cameroon, Iran, Iraq, Kazakhstan, Nigeria, Pakistan, and Turkey) emerge as stronger choices and they feature prominently as highly potential destinations for FDI in the agriculture sector. Albeit to a lesser extent, for similar reasons, the countries in the fifth group (Algeria, Morocco, Sudan and Syria) and those in the sixth group (Cote d'Ivoire, Gabon, Guyana, Malaysia, Suriname) may also provide better prospects for investors.

The five countries in the third group, namely Burkina Faso, Chad, and Niger exhibit high potential in terms of agricultural labour force and arable land. Yet, being all least-developed countries, they need to improve their investment climate in order to be able to attract FDI in the agriculture sector, particularly to increase the levels of their agricultural productivity through investing in the efficient use of water resources in agriculture and introducing modern irrigation systems and agricultural machinery. In contrast, the two countries in the fourth group, namely Guinea and Sierra Leone, exhibit high potential in terms of agricultural labour force and water resources. Thus, the challenge in these countries is to bring more land under cultivation through investing in improved seeds, fertilizers, agricultural machinery and modern irrigation systems as well as through the development of agriculture-related infrastructures and processing of agricultural raw commodities, particularly food products.

On the other hand, among the 36 agricultural-based countries, the eight countries in the last group, namely Guinea Bissau, Gambia, Djibouti, Senegal, Comoros, Somalia, Togo and Mauritania, exhibit comparably the lowest potential to attract FDI into the agriculture sector given the low availability of arable land and water resources. As such, these countries need to focus on exploiting the unutilised potential of the existing arable land and water resources through improving the levels of agricultural productivity along with creating a reasonable business and investment environment.

To sum up, it should be noted that the above-mentioned 36 OIC countries features strong agricultural development potential when their resource abundance is considered and this constitutes a solid ground for attracting intra-OIC investment in the agriculture sector. Yet, there is still a need to identify specific agriculture-oriented projects and investment opportunities in these countries. This, of course, depends on the specific geographical and climatic conditions as well as on the specific features of the land and water resources in each

country, and, thus, on the suitable crops to be feasibly cultivated. If other issues related to creating a favourable business and investment environment are resolved, then these countries may be among the top recipients of FDI in the agriculture sector at the OIC regional level.

In fact, some of these countries, such as Indonesia, Turkey, Malaysia, Kazakhstan Mozambique, Iraq and Nigeria, are already among the top 10 OIC countries in terms of attracting FDI (see SESRIC Economic Outlook Report on OIC Countries, 2015). In addition, as shown earlier in Table 2.2 in Section 2 of this report, many of these countries, from different climatic regions, are ranked among the top 20 producers of major agricultural commodities worldwide. These commodities vary from cereals such as wheat, rice and maize to tropical/temperate zone commodities such as palm oil, cocoa, coffee, rubber and sugar. All in all, promoting and encouraging intra-OIC investment in the agriculture sector in these countries would undoubtedly contribute significantly to the state of agricultural development and food security in OIC countries as a whole.

7.3. Enhancing OIC Cooperation in Agricultural Development and Food Security: Ongoing Activities

The 35th Session of the Council of the Foreign Ministers (CFM) of the OIC held in Kampala, Republic of Uganda, in June 2008, addressed the issue of food security and agricultural development in OIC countries and adopted a relevant resolution thereon. This resolution called on the member countries to unite their efforts in order to tackle the food crisis and reaffirmed the importance of cooperation among them with a view to launching joint agricultural projects aimed at increasing their agricultural production through investments and transfer of expertise.

During the years after, two project proposals have gained support from the member states and moved towards materialization. These proposals were on the establishment of an OIC Food Security institution and an OIC Agro-food Industrial Association.

7.3.1. Establishment of Islamic Organisation for Food Security

Background

The President of Kazakhstan Nursultan Nazarbayev in his speech at the 38th Session of OIC CFM, which was held in Astana on 28-30 June 2011, called for development of a system of mutual food assistance within the OIC in the form of a Regional Fund similar to the FAO, which would include the possibility of creating a pool of food in the interested states.

The 6th OIC Ministerial Conference on Food Security and Agricultural Development, which was held in Istanbul on 3-6 October 2011, supported the proposal by the Republic of Kazakhstan on the establishment of an OIC Food Security institution. In a similar vein, the 27th Session of COMCEC, which was held in Istanbul on 17-20 October 2011, welcomed the resolution of 6th OIC Ministerial Conference on Food Security and Agricultural Development and recommended that the relevant details on this initiative be submitted to the 39th Session of CFM through the Islamic Commission for Economic, Cultural and Social Affairs (ICECS).

In late April 2012, the Permanent Mission of the Republic of Kazakhstan submitted the Draft Charter of the proposed Food Security institution. On its part, the OIC General Secretariat circulated the said draft among OIC countries, reflected all comments from member states and submitted the summary of respective comments of member states to the 35th Session of the ICECS. Pursuant to the decision of the 35th ICECS, the Expert Group Meeting to consider draft documents on the establishment of the OIC Food Security Office was held in Istanbul on 9 October 2012.

The 39th Session of the OIC Council of Foreign Ministers (CFM), which was held in Djibouti on 15-17 November 2012, approved the establishment of the proposed institution in Astana, Kazakhstan and, to this end, requested OIC Secretary General to convene in consultation with member states, an Intergovernmental Expert Group Meeting to finalize its constituent instrument. In a similar vein, the 12th Islamic Summit held in Cairo on 2-7 February 2013 endorsed the decision of the 39th Session of the OIC CFM to establish an OIC Food Security institution in Kazakhstan.

The Intergovernmental Expert Group Meeting to finalize the constituent instrument of the approved OIC Food Security institution in Kazakhstan was held in Astana on 11-13 June 2013. The meeting attended by more than 30 member states as well as representatives of OIC institutions including General Secretariat, SESRIC, and IDB. The meeting exhaustively examined the Draft Statute and made several amendments to its provisions. The meeting adopted the Statute of the new institution and recommended the document for consideration and adoption by the OIC CFM. The meeting adopted a suitable name for the institution as: Islamic Organisation for Food Security.

Main Aims and Objectives of the Islamic Organisation for Food Security

The main aims and objectives of the Islamic Organisation for Food Security shall be to:

(a) Provide expertise and technical know-how to member states on the various aspects of sustainable agriculture, rural development, food security and biotechnology, including addressing the problems posed by desertification, deforestation, erosion and salinity as well as providing social safety nets;
(b) Assess and monitor, in coordination with member states, the food security situation in member states in order to determine and make necessary emergency and humanitarian assistance, including the creation of food security reserves;
(c) Mobilize and manage financial and agricultural resources for developing agriculture and enhancing the food security in member states; and
(d) Coordinate, formulate and implement common agricultural policies, including the exchange and transfer of appropriate technology and public food management system.

Membership of Islamic Organisation for Food Security

According to the agreed Statute, the Organisation will be a specialized institution of the OIC. Accordingly, every member state of the OIC may become a member of the Organisation upon signing officially the Statute, and after it has completed the membership legal formalities, in accordance with its national legislation, and informed in writing the Secretariat of the Organisation. A state, which is not a member of the OIC, cannot become a member of the Institution.

A member state or observer of the OIC, which is not member of the Organisation, may apply for the status of observer at the Organisation. Regional and international organizations may enjoy the status of observer, after submitting a request to, and upon approval of, the General Assembly.

7.3.2. Establishment of OIC Agro-Industrial Association

Background

The Forum on Development of Agro-Food Industries in OIC Member States, which was held in Kampala, Uganda, on 11-12 October 2011, attended by delegates comprising officials of both public and private sectors from 22 member states, recommended creating the OIC

Agro-Industrial Association which would serve as a platform for companies and individuals engaged in this industry to exchange ideas and experiences and develop a robust value-chain approach to agro-industrial development.

Consequently the OIC General Secretariat communicated this recommendation to the member states seeking their views and experiences on the modalities for establishing the proposed OIC Agro-Food Industries Association. The various responses received from the competent authorities in OIC countries showed an overwhelming support for this initiative.

A consultative meeting was held on 14 May 2013 on the proposed OIC Agro-Food Industries Association at Muscat, Sultanate of Oman. The Meeting made the following recommendations:

- To continue with the efforts the OIC General Secretariat is making to ensure that the objectives enunciated in the draft Statute of the Association are attained.
- To immediately establish an e-mail group among the stakeholders to enrich the draft statute and plan for future activities.
- To address the critical issues of technology transfer, research and networking among private sector entities with a view to increasing productivity and competitiveness of OIC member states in the field of Agro-Industries.
- To work closely with international partners in the area of agriculture, rural development and food security such as IFAD and FAO.

Draft statute of the proposed Association

Following the encouraging responses from member states, the OIC General Secretariat went ahead to prepare a zero draft statute of the proposed association in which it spelt out the possible structure, objectives, resources, membership and other related matters. The zero draft statute was circulated to member states and again a significant number of them made valuable comments which have been incorporated in the working document before this meeting for consideration and adoption.

It is proposed that membership shall be drawn from OIC countries and would also be open to individual companies and associations working in the field of Agro-Food industry and food processing, in accordance with the following membership categories:

- **Ordinary Members** include national apex bodies of processors' of any one food item such as fish, diary, meat, date, grain processors' associations, individual public and private companies working in the field of Agro-food industry and food processing whose investment capital is not below US$ 500,000.
- **Associate Members** include government and private sectors support bodies such as bureau of standards, export promotion agencies, investment promotion agencies, research institutions, farmers' associations, manufacturers' of agricultural in-puts and implements etc.
- **Honorary Members** include those individuals who may be nominated by the Executive Board by virtue of their scientific, technical work or public service and are concerned in the improvement and development of food processing and the AGM ratifies this nomination.

The proposed association is further expected to establish its own organs in accordance with the draft statute in order to carry out its activities.

Expected outcome

Once established, the OIC Agro-Industrial Association will operate like its counterparts in other regions, such as the Arab Organisation for Agricultural Development (AOAD) and is expected to provide a forum for all the public and private ventures working in the domain of agro-industrial development towards addressing the above-mentioned bottlenecks and contributing to the growth of agro-food industries which, on its part will significantly impact, among others, on:

- Improving food supplies by preventing quantitative and qualitative losses;
- Increasing self-reliance by reducing imports;
- Providing employment, especially in rural areas;
- Reducing income disparities;
- Stimulating rural development;
- Increasing foreign exchange earnings through export of finished and semi-finished products;
- Reducing migration to urban areas;
- Increasing investment opportunities in rural and urban areas.

7.4. Enhancing OIC Cooperation in Agricultural Development and Food Security: Project Proposals

The 24th Session of the OIC Standing Committee for Economic and Commercial Cooperation (COMCEC), held in October 2008, requested the Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC) to prepare a comprehensive study entitled "Enhancing Economic and Commercial Cooperation among OIC Member Countries" with aim of developing concrete, feasible and practical project proposals for enhancing cooperation in trade and investment among the OIC countries in potential areas and sectors including, but not limited to, agriculture and tourism.

The study was prepared based on a methodology which includes relevant data analysis, findings of academic research, special questionnaires and interviews and a brainstorming workshop on the theme "Enrichment of the Agenda of the COMCEC". The outcome of the study, which include a set of project proposals and recommendations for enhancing economic and commercial cooperation among the OIC countries in various areas and sectors, including agriculture and food security, has been presented at the 25th Session of the COMCEC held in Istanbul in November 2009 for consideration by the ministers of economy and trade of OIC countries.

In the light of all the above, particularly the resolution adopted by the 35th Session of the OIC CFM on food security and agricultural development and the outcome of the study of SESRIC on enhancing economic and commercial cooperation among OIC countries, the rest of this section presents briefs on three project proposals for cooperation among the OIC countries in the area of agriculture development and food security.

7.4.1. Establishment of OIC Seed and Crop Improvement Centre (OIC-SCIC)

Background: Why Agricultural Research Matters

Rising food prices, concern over global climate change and new interest in the potential of bio-fuels have introduced a new era of challenge and opportunity for agriculture development and natural resource management. By worsening growing conditions for crops, climate change will further strain the capacity of agricultural land and threaten the productivity growth vital for food security and poverty reduction. In this respect, rising temperatures and changing rainfall patterns are estimated to decrease agriculture

production by approximately 50% in African countries and by 30% in Central and South Asia.

While affecting all OIC countries, these global trends have particularly high risks and consequences for the approximately 40% of their total population (573 million people) who depend directly or indirectly on agriculture for their livelihoods. While most of these people rely on agriculture for income and sustenance, the majority of them lack the resources to grow or buy enough food, and many cannot grow crops in environmentally safe ways. Therefore, strengthened investment in agricultural science and research at both national and OIC cooperation levels is essential to meet these new and multi-faceted challenges. According to the World Bank "World Development Report 2008", investment in agriculture research has "paid off handsomely," delivering an average rate of return of 43% in 700 development projects evaluated in developing countries.

BOX 7
OIC Cotton Training Programme (OIC-CTP)

Cotton is one of the most important crops in the world and is of particular importance in many OIC Member Countries, some of which are the world's largest producers. In this regard, the OIC came up with a 5-year Action Plan on Cotton in 2006 to develop more practical ways and means for enhancing cooperation among the OIC Member Countries in the field of cotton production and trade, and to enable them to increase efficiency and effectiveness of the cotton sector.

OIC Cotton Training Programme (OIC-CTP) has been developed by SESRIC within the framework of the implementation of the OIC 5-Year Action Plan on Cotton to organise short and long term training courses in close collaboration with the Centres of Excellence specialised in cotton research and training in OIC Member Countries.

SESRIC started to implement Cotton Training Programmes after collecting and evaluating the related questionnaires from member countries.

Some of the Implemented Training Programmes:

Venue	Date	Program
Dhaka/Bangladesh	22-24 December 2015	Cotton Biotechnology
Namialo-Nampula/ Mozambique	06-07 October 2015	Pest, Disease and Weeds Control
Izmir/Turkey	03-05 August 2015	"Form to Fashion" Conference
Dhaka/Bangladesh	07-08 May 2015	Quality Seed Production

Source: *SESRIC OIC-VET Programme website at: http://www.oicvet.org/cbp-ctp.php*

At the OIC regional level, there is a need to maximally utilise the benefit of agricultural science and research for increasing agriculture productivity to improve the levels of agricultural development and food security while conserving natural resources such as water, forests and fisheries. Strong programmes of relevant and effective agricultural science and research must be at the top of the OIC agricultural development and food security agenda.

In this respect, development of high quality improved seeds and cropping systems has recently become an activity that yields substantial value added through increased agriculture productivity and output levels. As a result, dependency of agriculture on improved seeds has increased considerably, especially in the face of the growing importance of food security. Therefore, breeding improved seeds and more nutritious varieties of main agricultural crops, like wheat, and planting them on million hectares in non-temperate areas in many OIC

countries will increase crop yields and decrease prices for basic food crops in these countries. This, in turn, will decrease dependence on imports of food and increase per capita calorie intake and, thus, decrease the number of malnourished children and undernourished people in many of these countries.

Vision & Mission

The proposed OIC Seed and Crop Improvement Centre (OIC-SCIC) aims to be the OIC premier partnership-based applied research Centre for agricultural development through improvement of high quality seeds and associated cropping systems in OIC countries. The

BOX 8

OIC Agriculture Capacity Building Programme (OIC-AgriCaB)

The role of agriculture in world's economy cannot be underestimated. According to Webster's dictionary, agriculture is defined as "the art or science of cultivating the ground, including the harvesting of crops, and the rearing and management of livestock; tillage; husbandry; farming." It is also one of the main activities and income resources for human being for ages. Agriculture not only provides food and raw material but also employment opportunities to a very large proportion of population. However, while some countries enjoy the new technological improvements and mechanical capabilities in agriculture, and decrease its proportion of the labour force accordingly; some of them, which are experiencing extreme hunger and poverty, still face problems of efficiency in the agricultural sector due to the lack of useful and efficient agricultural techniques to increase fertility. The Statistical Economic and Social Research and Training Centre for Islamic Countries (SESRIC), with its experience in contributing to the "Ministerial Conferences of the Organisation of Islamic Cooperation (OIC) on Food Security and Agricultural Development" initiates the Agriculture Capacity Building Programme for OIC Member Countries (OIC-AgriCaB) within its framework of Capacity Building Programmes (CPBs).

OIC-AgriCaB is expected to enhance the capacities' of the related institutions in OIC Member Countries in wide range of areas such as efficient techniques of land, water and livestock management, fisheries and aquaculture and food security. Besides, a platform where best practices can be shared will be created.

Within the framework of this programme, SESRIC also has special CBPs for Cotton (OIC-CTP) and Environment (Environment-CaB).

Some of the Implemented Training Programmes:

Venue	Date	Program
Baku/ Azerbaijan	09-10 December 2015	Seed Development: Biotechnology Studies
Kabul/ Afghanistan	06-07 December 2015	Water Management
Kampala /Uganda	16-17 September 2015	Green House Farming
Mogadishu /Somalia	23-27 August 2015	Small Scale Fisheries and Poverty Reduction

Source: *SESRIC OIC-VET Programme website at: http://www.oicvet.org/cbp-agricab.php*

OIC-SCIC will assume the task of creating, sharing and utilising knowledge and technology to improve agricultural productivity and profitability of farming systems with a view to achieving sustainable food security and reduce poverty in OIC countries. The Centre will create and participate in an extensive network of people and institutions who share similar development goals, including the public and private sector, non-governmental and civil society organisations, relief and health agencies, farmers, and the development assistance community.

Focus Areas and Functions

The main function of the proposed OIC-SCIC is to develop high quality improved seeds and associated cropping systems in OIC countries, particularly for basic food crops, with the aim of producing plants that naturally resist diseases and pests, tolerate to little water and poor soils, survive excessive cold or heat weather conditions, offer more nutrition, and yield more production. Accordingly, the focus areas and functions of the proposed OIC-SCIC will include:

- Collecting seeds, herbarium specimens and up-to-date related information and data from OIC countries in different climatic and geographical regions.
- Conducting applied scientific agricultural research to produce and conserve the best quality seeds and associated cropping systems, particularly for basic food crops, and developing improved varieties that resist climate change, put into more production and respond better to fertilizer.
- Focusing on the breeding of strategic cash and/or food security crops (wheat, rice, maize, cotton, tea, etc.) for increased drought tolerance and improved food security for the poor people.
- Develop a partnership and network arrangement in the area of seed improvement and conservation with the aim of developing seed gene-bank and secure important collections of seed for future generations.
- Developing and implementing capacity building training programmes for plant breeders in OIC countries to help them producing better crops, new and improved cultivars using conventional and molecular breeding tools.
- Creating, sharing and utilising knowledge and agricultural technology to improve the productivity and profitability of farming systems in OIC countries.
- Developing awareness programmes for farm households in OIC countries about appropriate seeds and cropping practices to help them recover from famine, drought, floods, and other disasters, and, thus, reduce the threat of continuing food shortages and long-term dependence on food aid.
- Providing technical information and support that helps researchers, policymakers, and development workers in OIC community to advocate appropriate policies to foster food security.

Expected Outcomes of the Research at the OIC-SCIC

The OIC-SCIC is expected to generate cutting-edge science to foster sustainable agricultural growth in OIC countries that helps achieving stronger food security, better human nutrition and health, higher incomes and improved management of agricultural resources. The new crop varieties, knowledge and other products resulting from the OIC-SCIC collaborative research will be made widely available to individuals and organisations working for sustainable agricultural development in OIC countries. Thus, the OIC-SCIC will assure significant gains in terms of reduced hunger and improved incomes for small farmers in many OIC countries. In addition, OIC-SCIC research is expected to be much broader than agricultural productivity alone, encompassing a range of initiatives related to water, biodiversity, forests, fisheries and land conservation, and, thus, protecting millions of hectares of forest and grasslands, safeguarding biodiversity, and preventing land degradation. Among the expected outcomes of the research at the OIC-SCIC are the following:

- Successful biological control of seeds and crops which are vital for food security in OIC countries with resistance to adverse climatic conditions and local pests and diseases.
- Reducing national food import bills and generating higher incomes in rural communities.

- Developing drought-tolerant and flood-tolerant varieties, which enable farmers obtaining yields two to three times those of the non-tolerant version, a situation that will become more common as a result of climate change.
- Spreading and adoption of resource-conserving "zero-till" technology, which generates benefits through higher crop yields, lower production costs and savings in water and energy.
- Spreading and adoption of the agro-forestry system called "fertilizer tree fallows," which renews soil fertility using on-farm resources, and, thus, strengthening food security and reduced environmental damage.

Members and Partners of the OIC-SCIC

All OIC countries may become members in the OIC-SCIC. National, regional and international institutions and organisations dealing with agricultural development and research and willing to invest financial, human and technical resources toward this end could be partners to the OIC-SCIC. Examples on these institutions and organisations include:

- African Centre for Crop Improvement (ACCI),
- International Maize and Wheat Improvement Centre (CIMMYT),
- Consultative Group on International Agricultural Research (CGIAR),
- International Crops Research Institute for the Semi-Arid Tropics (ICRISAT),
- The Arab Centre for the Studies of Arid Zones and Dry Land (ACSAD),
- The Food and Agriculture Organization of the United Nations (FAO),
- The International Fund for Agricultural Development (IFAD),
- The United Nations Development Programme (UNDP),
- The World Bank.

Financing Arrangements

The OIC countries which are partners in the project are expected to share the cost of initial investment, as well as the running expenses of the project, yet financial support from international and regional development funding agencies, private foundations, and the private sector could also be secured.

7.4.2. Establishment of OIC Agricultural Investment Promotion Agency (OIC-AIPA)

The proposed project aims at creating a new agency to encourage and promote direct investments into the agriculture sector in OIC countries by facilitating investment opportunities in the member countries for both investors from the OIC community and outside. The proposed Agency is also expected to serve as a reference point for international investors and as a point of contact for the concerned parties within the OIC countries.

Rationale and Expected Benefits

- To increase the volume of foreign and intra-OIC direct investments into the OIC region.
- To improve image of OIC countries as FDI destinations.
- To assist investors through start-up clearances.
- To propose national and OIC level policy reforms to improve the overall business and investment environment in the member countries.

Potential Partners: The project is intended to be open to all member countries

Financial Arrangements: Required funds for the initiation and operations of the agency can be provided by the participating member countries and some regional financial institutions such as IDB.

7.4.3. Establishment of OIC Agriculture Commodity Exchange Market (OIC-ACEM)

The proposed project aims at enhancing intra-OIC trade in agricultural commodities through establishing an online "OIC Agricultural Commodity Exchange Market", preferably in a centrally located major city such as Istanbul, Cairo or Dubai. The proposed market is expected to facilitate trade in agricultural commodities among the OIC countries and internationally both physically and in terms of tradable securities. The market is also aimed to be integrated with licensed storage facilities for these commodities.

Rationale and Expected Benefits

- To enable online intra-OIC trade of agricultural commodities produced in OIC countries and globally in reliable and transparent platform.
- To increase the depth of trading in agricultural commodities by attracting more investors to the market through the transformation of physical commodities into tradable securities.
- To create additional collateral opportunity for the producers or financial institutions through the physical commodities kept in licensed storage facilities.

Potential Partners: The project would be open to all Agricultural Commodity Exchanges in OIC countries on a voluntary basis. In the future, the Market may also be opened to non-OIC countries and other regional and international Commodity Exchanges.

Financing Arrangements: IDB, participant Commodity Exchanges in the member countries and other interested institutions.

8. Concluding Remarks and Policy Recommendations

Many OIC countries are still facing a number of serious constraints and challenges in the domains of agricultural development and food security that should be carefully addressed by the relevant national authorities and policy makers as well as the representatives of the private sector in these countries. In this respect, it was observed that, over time, agriculture activity in most OIC countries has been slightly replaced by services and, to a lesser extent, by industrial activity, where the average share of agriculture in their total GDP amounted to only 10.4% in 2014, gradually declining from around 16.3% in the beginning of 1990s. In fact, various policies, structural, climatic and geographical factors were behind this state of affairs. In the majority of OIC countries, these factors include the negative impacts of the economic transformation and structural diversification efforts on the agriculture sector, increasing migration of agriculture labour force from rural to urban areas seeking higher wages in other sectors, mainly in the services sector, the scarcity of water resources and the inadequate agricultural investment and infrastructure, the low level of agricultural machinery and technology utilization, the fluctuations in world agricultural commodity prices and trade difficulties that many of these countries are still facing in the international commodity markets.

Together, these factors have adverse impact on the level of agricultural productivity in many OIC countries and on the average level of the group as a whole. Therefore, agriculture production and the supply of agricultural products, mainly food products, in most of the OIC countries did not keep pace with the rapidly increasing demand for food due to the rapid increase in their populations, leading to a widening food gap to be filled by imports. This makes these countries, particularly the 28 OIC LIFDCs, vulnerable to any sharp rise in the international food prices in terms of increasing the food import bills and trade deficits, posing serious negative impacts on health and education, and consequently, worsening the already deteriorated state of food security through increasing the number of undernourished people. Moreover, the internal conflicts in some of these countries caused a great number of

farmers to abandon their lands and directly or indirectly affected agriculture production and trade. Meanwhile, food shortages due to inadequate rainfall and other adverse climatic conditions continued to affect some of these countries, which faced food emergencies and were classified as countries in crisis requiring external assistance.

All in all, the major constraints and challenges facing agricultural development, and, thus, food security in the majority of OIC countries can be summarised as follows:

- Inadequate use of land and water resources, due to the scarcity and insufficient use of water resources and agricultural machinery and technologies.
- Inadequate land tenure and water rights due to the lack of appropriate legal rules and regulations frameworks, as well as problems related to cross-border water sharing agreements.
- Low levels of agriculture productivity and poor access to production inputs and related infrastructure and services.
- Inadequate agricultural investments and limited financial resources and fluctuations in world agricultural commodity prices and other trade difficulties in the international commodity markets.
- Inadequate economic transformation and structural diversification policies and increasing migration of agriculture labour force from rural to urban areas seeking higher wages in other sectors, particularly in services sector.
- Concerns on governance, political and economic stability, weak institutional capacities and administrative bureaucracy, and inadequate agricultural planning and strategies.

However, notwithstanding these constraints and challenges, employing 37.7% of their total population in 2014, agriculture is still considered to be a very important and crucial economic sector in many OIC countries with high potential to significantly improve the state of food security in these countries as a group. This is true considering the fact that the 57 OIC countries are dispersed over a large geographical area in different climatic regions over four continents and, as a group, they are well-endowed with potential economic resources in different fields and sectors such as water and arable land, energy and mining, human resources, and a large strategic trade region. Moreover, 25 OIC countries from different climatic regions are ranked among the top 20 producers of major agricultural commodities worldwide. These commodities vary from cereals such as wheat, rice and maize to tropical/temperate zone commodities such as palm oil, cocoa, coffee, rubber and sugar.

Therefore, it is commonly believed that there is still a wide scope for the development of a sustainable agriculture and food sector in OIC countries. Overall, this requires the adoption of long-term strategies as well as medium to short-term plans and programmes at both the national and regional levels along with a process of creating a supportive OIC cooperation and coordination environment. In this context, the following recommendations can serve as broad policy guidelines at both the national and intra-OIC cooperation levels.

- At the national level, agricultural productivity should be increased, particularly in food products, through the extension of the arable land area (i.e. bringing more land under cultivation) through appropriate national investments and/or through attracting foreign direct investments (FDI) in the agriculture sector.

- Directing more intra-OIC investment in the agriculture sector should be encouraged and enhanced, particularly in the OIC agricultural-based countries which are well-endowed with the basic agricultural resources such as arable land and water resources.
- An OIC Agricultural Investment Promotion Agency (OIC-AIPA) is recommended to be established with a view to encouraging and promoting direct investments into the

agriculture sector in OIC countries by facilitating investment opportunities for both investors from within an outside the OIC community.

- An OIC Seed and Crop Improvement Centre (OIC-SCIC) is recommended to be established with the aim of creating, sharing and utilising knowledge and technology to improve agricultural productivity and profitability of farming systems and, thereby, achieving sustainable food security and reduce poverty in OIC countries.
- An online OIC Agriculture Commodity Exchange Market (OIC-ACEM) is recommended to be developed with a view to facilitating trade in agricultural commodities among the OIC countries and internationally both physically and in terms of tradable securities. This will also work as a market information exchange system on the community-wide food markets. An OIC periodical bulletin related to this endeavour should also be published.
- Investment in agriculture processing facilities should be promoted particularly in the top producer OIC countries with the objective of increasing the value-added of the agricultural commodities and thus increasing the competitiveness of these commodities in the international markets. In this respect, well-known global OIC food brands could be developed through providing sufficient financing to the private food sector in order to compete in the global markets. To this end, the establishment of an OIC Agro-Business Fund to encourage investments in food sector and food security programmes should be considered.
- An OIC Food Security Program is recommended to be developed for rehabilitation and rebuilding of the agriculture and food sector especially in the OIC-LDCs and OIC-LIFDCs in order to prevent, prepare for as well as mitigate the impact of natural disasters in the agriculture sector. In this context, policy measures with the aim of protecting the poor from food price shocks and food shortages should be developed as an immediate action by the governments of these countries. There is also a pressing need to build storage facilities like grain houses to serve this need. Furthermore, effective policies should be developed towards helping the smallholder farmers to exploit their true potential through the establishment of micro-credit facilities both at the national and OIC levels.
- There is an urgent need, at both the national and OIC cooperation levels, to address the issue of water shortage in the context of food security, public health and sanitation, and access to safe drinking water. In particular, the physical infrastructure and irrigation systems in rural areas should be enhanced through encouraging more investment in modern and efficient irrigation systems.
- Business and investment environment should be enhanced at the national level through developing incentives for investors from both within and outside the OIC countries by introducing specific measures in national regulatory frameworks and promoting joint investment approaches such as joint trade/investments programmes and strategies and joint entries into OIC markets led by private investment banks. In order to achieve this goal, member countries should revisit and revise complicated regulations, licensing and other institutional bottlenecks.
- An emergency response mechanism is recommended to be developed and adopted to minimise the adverse impacts of climate change and consequences of natural disasters like floods, droughts and cyclones, which cause severe damage to agriculture sector and pose severe threats to the very survival of millions of people across the OIC countries.
- There is a need to establish effective and efficient fertilizer subsidization programs as agricultural productivity depends on the quantity and quality of inputs, and food security situation is broadly affected adversely by simultaneous increases in food prices in international markets and input prices.
- Strategies should be devised to both increase the number of agricultural machineries, including establishment of local leasing schemes, and ensure more effective use of the existing ones, including, inter alia, provision of trainings to farmers.

- Adequate provision of training programmes to peasants and farmers should be ensured for the use of more effective irrigation techniques, such as localized irrigation, as well as incentives to increase the use of techniques as such. There is also a need to increase the access of farmers to weather and price forecasts for better crop planning.
- The establishment of large water reservoirs and adoption of modern irrigation systems and techniques should be promoted through the encouragement of both public and private sector investments in new water-saving irrigation systems and water management infrastructure and proper water storage and control facilities like dames and ponds should be considered.
- Practices of sustainable agriculture should be encouraged and promoted by helping and educating the farmers for identifying best techniques including for improving yields on marginal land, farming in forests, expanding aquaculture, rediscovering forgotten foods, and encouraging urban agriculture.
- The involvement of the private sector in agricultural activities and projects should be supported through the right legal and regulatory arrangements with a view to turning the private sector into a more active participant in producing and financing agricultural projects. This would require the tackling of the issue of land tenure, which is one of the biggest obstacles in securing bank loans for millions of farmers.
- Investments in R&D activities, including new agricultural practices and innovations in new crop varieties, should be promoted and encouraged, which will, in turn, contribute significantly to poverty alleviation through improving productivity and nutritional value of food.
- The development of climate-resilient crop varieties, which are heat and drought-resistant, should be encouraged and supported. There is also a need to promote and encourage climate-friendly agricultural production systems and land-use policies.
- Actions should be taken at national level to deploy grain storage facilities and establish insurance facilities to protect farmers from post-harvest losses, thereby minimizing the frequency of food price bubbles and food shortages.
- Strategies and policies should be developed to promote agro-industrial development, which is overwhelmingly important for developing countries, through, inter alia, allocating adequate resources for the development and utilization of raw material as well as the selection and utilization of socially appropriate technologies.
- An utmost priority should be given to developing and strengthening institutional infrastructure, training personnel in the areas of technology, management, entrepreneurship, and R&D as an essential part of the efforts to improve the amount, quality and safety of agro-industrial products and foster agro-industrial development.
- Measures and special programmes should be developed to support the competitiveness of the SMEs and agro-food industries through, inter alia, promoting entrepreneurship (by increasing the support to the SMEs and new start-ups and improving the access of SMEs to available financial sources, supporting the development of new food technologies and simplifying their access to innovation and research funding programs), facilitating the access of agro-food SMEs to regional and global markets, and better promoting international trade standards.
- Finally, at the OIC cooperation level, there is a need to enhance both OIC-level and regional cooperation among member countries, and strengthen the national research and development centres with a view to adopting appropriate agricultural technologies, which would, in turn, fill an important gap in the development of food and agricultural products processing industries.

REFERENCE

Antón, J., Kimura, S., Lankoski, J. and Cattaneo, A., 2012. A Comparative Study of Risk Management in Agriculture under Climate Change. OECD Food, Agriculture and Fisheries Papers, No. 58, OECD Publishing.

Arab Forum for Environment and Development (AFED), 2009. Impact of Climate Change on the Arab Countries.

Binswanger-Mkhize, H.P. and McCalla, A.F., 2009. The Changing Context and Prospects for Agricultural and Rural Development in Africa. International Fund for Agricultural Development and African Development Bank, Rome and Tunis.

Celine, W.R., 2007. Global Warming and Agriculture. Peterson Institute for International Economics, Washington D.C.

Chowdhury, A., 2002. Politics, Society, and Financial Sector Reform in Bangladesh. International Journal of Social Economics, 29 (12).

Christy, R., Mabaya, E., Wilson, N., Mutambatsere, E. and Mhlanga, N., 2009. Enabling Environments for Competitive Agro-industries (in Agro-Industries for Development by FAO and UNIDO).

Climate and Development Knowledge Network, 2012. Managing Climate Extremes and Disasters in the Agriculture Sector: Lessons from the IPCC SREX Report.

Croppenstedt, A., Demeke, M. and Meschi, M, 2003. Technology Adoption in the Presence of Constraints: the Case of Fertilizer Demand in Ethiopia. Rev. Dev. Econ., 7(1): 58-70.

FAO, 2008a. Enabling Environments for Competitive Agro-Industries. Paper for Global Agro-Industries Forum, April.

FAO, 2008b. Climate Change and Food Security: A Framework Document.

FAO, 2009. The State of Food and Agriculture: Livestock in the Balance.

FAO, 2012a. The State of Food and Agriculture: Investing in Agriculture for a Better Future.

FAO, 2012b. The State of World Fisheries and Aquaculture.

FAO, 2013a. The State of Food and Agriculture: Food Systems for Better Nutrition.

FAO, 2013b. Statistical Yearbook: World Food and Agriculture.

FAO, 2015. Crop Prospects and Food Situation.

FAO, 2015. The impact of natural hazards and disasters on agriculture and food security and nutrition.

FAO, 2015. The State of Food Insecurity (SOFI) report.

Food and Agriculture Organization (FAO), 2007. Coping with Water Scarcity - Challenge of the Twenty-first Century.

Foster, A. and Rosenzwig, M.R., 2010. Macroeconomics of Technology Adoption. Annual Review of Economics, 2(1), pp. 395-424.

Gitz, V., and Meybeck, A., 2012. Risks, vulnerabilities and resilience in a context of climate change. Proceedings of the FAO/OECD Workshop: Building Resilience for Adaptation to Climate Change in the Agriculture Sector.

Grimm M., 2009. Food Price Inflation and Children's Schooling. Institute of Social Studies (ISS) Working Paper No. 472.

Harvard World Model United Nations (WORLDMUN), 2013. Organisation for Islamic Cooperation Study Guide: Agricultural Development and Access to Food in Crisis Situtations.

High Level Panel of Experts on Food Security and Nutrition (HLPE), 2012. Climate Change and Food Security.

Ice2Sea, 2013. From Ice to High Seas: Sea-level rise and European coastlines, The ice2sea Consortium, Cambridge, UK.

IMF, 2013. World Economic Outlook, April.

IMF, 2014. World Economic Outlook, April.

International Monetary Fund (IMF), 2012. World Economic Outlook, April.

IPCC, 2007. Fourth Assessment Report.

IPCC, 2007. Fourth Assessment Report. Intergovernmental Panel on Climate Change Secretariat. Geneva, Switzerland. http://www.ipcc.ch/

IPCC, 2008. Technical Paper VI: Climate Change and Water.

IPCC, 2012. Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation, Cambridge, UK.

IPCC, 2014. Fifth Assessment Report. Intergovernmental Panel on Climate Change Secretariat. Geneva, Switzerland. http://www.ipcc.ch/

IWMI, 2010. Managing Water for Rainfed Agriculture, International Water Management Institute, Issue 10.

Jack, B.K., 2011. Market Inefficiencies and the Adoption of Agriculture Technologies in Developing Countries." Center for International Development (CID) Working Paper No.50.

Mahul, O. and Skees, J.R., 2007. Managing Agricultural Risk at the Country Level: The Case of Index-Based Livestock Insurance in Mongolia. World Bank Policy Research Working Paper #4325, Washington D.C.

Mahul, O. and Stutley, 2010. Government Support to Agricultural Insurance: Challenges and Options for Developing Countries. World Bank, Washington D.C.

Mittal, A., 2009. The 2008 Food Price Crisis: Rethinking Food Security Policies. UNCTAD G-24 Discussion Paper Series No. 56, June.

Morris, M., Binswanger-Mkhize, H.P and Byerlee, D., 2011. Awakening Africa's Sleeping Giant: Prospects for Commerical Agriculture in the Guinea Savannah Zone and Beyond. Working Paper at the ASTI-FARA-IFPRI Conference.

OECD & FAO, 2014. OECD-FAO Agricultural Outlook 2014-2023.

Ozor, N., 2008. Challenges and impacts of agricultural biotechnology on developing societies. African Journal of Biotechnology, 7 (4), pp. 322-330.

Phocaides, A., 2000. Technical Handbook on Presurrized Irrigation Techniques, UN-FAO. Accessible via: http://www.fao.org/

SESRIC, 2010. Agriculture and Food Security: Its Importance for Development and Poverty Alleviation.

SESRIC, 2015. OIC Water Report 2015.

The World Bank, 2005. Managing Agricultural Production Risks: Innovations in Developing Countries. World Bank Agriculture and Rural Development Department, Report No. 32727.

The World Bank, 2009."Awakening Africa's Sleeping Giant: Prospects for Commercial Agriculture in the Guinea Savannah Zone and Beyond." Directions in

Development. Washington, DC: World Bank and FAO.

The World Bank, 2013. Turn Down the Heat: Climate Extremes, Regional Impacts, and the Case for Resilience.

The World Bank, 2014. World Development Report 2014.

UNEP, 2009. The Environmental Food Crisis: The Environmental's Role in Averting Future Food Crisis.

UNEP, 2012. The Emissions Gap Report 2012.

UNEP, 2015. The Emissions Gap Report 2015.

Wilkinson, J. and Rocha, R., 2008. Agro-industries trends, patterns and developmental impacts, Global Agro-Industries Forum, 2008.

Wilkison, J., 2004. The Food Processing Industry, Globalization and Developing Countries. Online Journal of Agricultural and Development Economics, 1(2), pp. 184-201.

DATA SOURCES

AQUASTAT: http://www.fao.org/nr/water/aquastat/main/index.stm

ASTI (Agriculture Science and Technology Indicators): http://www.asti.cgiar.org/

FAOSTAT: http://faostat.fao.org/

IMF World Economic Outlook Database (v. April 2015).

UN Statistical Division, National Accounts Main Aggregates Database.

The World Bank, World Development Indicators Online Database.

STATISTICAL TABLES

Table A.1: Population (2014)

		Urban		Rural		Agricultural	
Countries	Total, million	million	% of total	(million)	% of total	(million)	% of total
Afghanistan	31281	7648	24.45	23633	75.5506538	5931	18.96
Albania	3185	1804	56.64	1381	43.3594976	581	18.24
Algeria	39929	30137	75.48	9792	24.5235293	3399	8.51
Azerbaijan	9515	5172	54.36	4343	45.6437204	1071	11.26
Bahrain	1344	1195	88.91	149	11.0863095	3	0.22
Bangladesh	158513	47333	29.86	111180	70.1393577	31974	20.17
Benin	10600	4968	46.87	5632	53.1320755	1782	16.81
Brunei	423	326	77.07	97	22.9314421	0.01	..
Burkina Faso	17420	5058	29.04	12362	70.9644087	7435	42.68
Cameroon	22819	12280	53.81	10539	46.1851965	309	1.35
Chad	13211	2915	22.06	10296	77.9350541	3280	24.83
Comoros	752	213	28.32	539	71.6755319	228	30.32
Côte d'Ivoire	20805	11125	53.47	9680	46.5272771	2719	13.07
Djibouti	886	685	77.31	201	22.6862302	287	32.39
Egypt	83387	36682	43.99	46705	56.0099296	6232	7.47
Gabon	1711	1491	87.14	220	12.8579778	198	11.57
Gambia	1909	1125	58.93	784	41.0686223	672	35.20
Guinea	12044	4443	36.89	7601	63.1102624	4572	37.96
Guinea-Bissau	1746	802	45.93	944	54.0664376	509	29.15
Guyana	804	230	28.61	574	71.3930348	51	6.34
Indonesia	252812	133983	53.00	118829	47.0029113	50012	19.78
Iran	78470	54537	69.50	23933	30.499554	6621	8.44
Iraq	34769	23076	66.37	11693	33.6305329	402	1.16
Jordan	7505	6262	83.44	1243	16.5622918	118	1.57
Kazakhstan	16607	8851	53.30	7756	46.7031974	1132	6.82
Kuwait	3479	3420	98.30	59	1.69588962	17	0.49
Kyrgyzstan	5625	2003	35.61	3622	64.3911111	502	8.92
Lebanon	4966	4349	87.58	617	12.4244865	26	0.52
Libya	6253	4893	78.25	1360	21.7495602	54	0.86
Malaysia	30188	22579	74.79	7609	25.2053796	1459	4.83
Maldives	352	157	44.60	195	55.3977273	22	6.25
Mali	15768	5814	36.87	9954	63.1278539	3064	19.43
Mauritania	3984	1686	42.32	2298	57.6807229	863	21.66
Morocco	33493	19468	58.13	14025	41.8744215	2878	8.59
Mozambique	26473	8460	31.96	18013	68.0429116	9788	36.97
Niger	18535	3446	18.59	15089	81.4081467	5021	27.09
Nigeria	178517	91888	51.47	86629	48.527031	12577	7.05
Oman	3926	2913	74.20	1013	25.8023434	451	11.49
Pakistan	185133	68855	37.19	116278	62.8078192	26260	14.18
Palestine	4436	3328	75.02	1108	24.9774572	103	2.32
Qatar	2268	2249	99.16	19	0.8377425	8	0.35
Saudi Arabia	29369	24352	82.92	5017	17.0826382	440	1.50
Senegal	14548	6321	43.45	8227	56.5507286	4515	31.04
Sierra Leone	6205	2505	40.37	3700	59.6293312	1350	21.76
Somalia	10806	4231	39.15	6575	60.8458264	2794	25.86
Sudan	38764	11664	30.09	27100	69.910226	6087	15.70
Suriname	544	386	70.96	158	29.0441176	33	6.07
Syria	21987	12587	57.25	9400	42.7525356	1352	6.15
Tajikistan	8409	2243	26.67	6166	73.3261981	907	10.79
Togo	6993	2760	39.47	4233	60.5319605	1458	20.85
Tunisia	11117	7443	66.95	3674	33.0484843	821	7.39
Turkey	75837	56324	74.27	19513	25.7301845	7607	10.03
Turkmenistan	5307	2638	49.71	2669	50.2920671	735	13.85
Uganda	38845	6536	16.83	32309	83.1741537	12542	32.29
UAE	9446	8050	85.22	1396	14.7787423	154	1.63
Uzbekistan	29325	10652	36.32	18673	63.6760443	2689	9.17
Yemen	24969	8506	34.07	16463	65.9337579	2215	8.87
OIC Total/Average	1678314	815047		863267		238310	
Other Dev'ing Total/Avg.	4541747	2227037		2314710		1084400	
World Total/Average	7239382	3877620		3361762		1333629	
OIC (% of Dev'ing)	36.95	36.60		37.29		21.98	
OIC (% of World)	23.18	21.02		25.68		17.87	

Source: FAOSTAT Online Database

Table A.2: Agricultural Land (2013)

	Land Area	Agricultural Area		Arable land		Permanent crops		Permanent pastures	
	1,000 Ha	1,000 Ha	% of Land Area	1,000 Ha	% of Agri. Area	1,000 Ha	% of Agri. Area	1,000 Ha	% of Agri. Area
Afghanistan	65286	37910	58.07	7785	20.54	125	0.33	30000	79.13
Albania	2740	1187.3	43.33	617.1	51.98	79.2	6.67	491	41.35
Algeria	238174	41431.64	17.40	7496.2	18.09	939	2.27	32996.43	79.64
Azerbaijan	8265.9	4769.8	57.70	1925.3	40.36	230.3	4.83	2614.2	54.81
Bahrain	77	8.6	11.17	1.6	18.60	3	34.88	4	46.51
Bangladesh	13017	9108	69.97	7678	84.30	830	9.11	600	6.59
Benin	11276	3750	33.26	2700	72.00	500	13.33	550	14.67
Brunei	527	14.4	2.73	5	34.72	6	41.67	3.4	23.61
Burkina Faso	27360	12300	44.96	6200	50.41	100	0.81	6000	48.78
Cameroon	47271	9750	20.63	6200	63.59	1550	15.90	2000	20.51
Chad	125920	49935	39.66	4900	9.81	35	0.07	45000	90.12
Comoros	186.1	133	71.47	65	48.87	53	39.85	15	11.28
Côte d'Ivoire	31800	20600	64.78	2900	14.08	4500	21.84	13200	64.08
Djibouti	2318	1702	73.43	2	0.12	..	..	1700	99.88
Egypt	99545	3761	3.78	2738	72.80	1023	27.20	..	..
Gabon	25767	5160	20.03	325	6.30	170	3.29	4665	90.41
Gambia	1012	605	59.78	440	72.73	5	0.83	160	26.45
Guinea	24572	14500	59.01	3100	21.38	700	4.83	10700	73.79
Guinea-Bissau	2812	1630	57.97	300	18.40	250	15.34	1080	66.26
Guyana	19685	1678	8.52	420	25.03	28	1.67	1230	73.30
Indonesia	181157	57000	31.46	23500	41.23	22500	39.47	11000	19.30
Iran	162855	46161	28.34	14878	32.23	1806	3.91	29477	63.86
Iraq	43432	9230	21.25	5000	54.17	230	2.49	4000	43.34
Jordan	8878	1056.6	11.90	231	21.86	83.6	7.91	742	70.23
Kazakhstan	269970	216994.1	80.38	29394.7	13.55	131.5	0.06	187467.9	86.39
Kuwait	1782	153.6	8.62	10.6	6.90	7	4.56	136	88.54
Kyrgyzstan	19180	10585.8	55.19	1276	12.05	74.8	0.71	9235	87.24
Lebanon	1023	658	64.32	132	20.06	126	19.15	400	60.79
Libya	175954	15355	8.73	1720	11.20	335	2.18	13300	86.62
Malaysia	32855	7839	23.86	954	12.17	6600	84.19	285	3.64
Maldives	30	7.9	26.33	3.9	49.37	3	37.97	1	12.66
Mali	122019	41201	33.77	6411	15.56	150	0.36	34640	84.08
Mauritania	103070	39711	38.53	450	1.13	11	0.03	39250	98.84
Morocco	44630	30401	68.12	8045	26.46	1356	4.46	21000	69.08
Mozambique	78638	49950	63.52	5650	11.31	300	0.60	44000	88.09
Niger	126670	44782	35.35	15900	35.51	100	0.22	28782	64.27
Nigeria	91077	70800	77.74	34000	48.02	6500	9.18	30300	42.80
Oman	30950	1468.5	4.74	37.7	2.57	30.8	2.10	1400	95.34
Pakistan	77088	36280	47.06	30470	83.99	810	2.23	5000	13.78
Palestine	602	262	43.52	46	17.56	66	25.19	150	57.25
Qatar	1161	67.61	5.82	14.11	20.87	3.5	5.18	50	73.95
Saudi Arabia	214969	173295	80.61	3068	1.77	227	0.13	170000	98.10
Senegal	19253	8918	46.32	3250	36.44	68	0.76	5600	62.79
Sierra Leone	7218	3948.65	54.71	1583.65	40.11	165	4.18	2200	55.72
Somalia	62734	44125	70.34	1100	2.49	25	0.06	43000	97.45
Sudan	237000	108815.3	45.91	17220	15.82	145.3	0.13	91450	84.04
Suriname	15600	83.2	0.53	60	72.12	6	7.21	17.2	20.67
Syria	18363	13921	75.81	4662	33.49	1071	7.69	8188	58.82
Tajikistan	13996	4875	34.83	860	17.64	140	2.87	3875	79.49
Togo	5439	3820	70.23	2650	69.37	170	4.45	1000	26.18
Tunisia	15536	9943	64.00	2853	28.69	2276	22.89	4814	48.42
Turkey	76963	38423	49.92	20574	53.55	3232	8.41	14617	38.04
Turkmenistan	46993	33838	72.01	1940	5.73	60	0.18	31838	94.09
Uganda	20052	14415	71.89	6900	47.87	2200	15.26	5315	36.87
UAE	8360	382.3	4.57	37.5	9.81	39.8	10.41	305	79.78
Uzbekistan	42540	26770	62.93	4400	16.44	370	1.38	22000	82.18
Yemen	52797	23546	44.60	1248	5.30	298	1.27	22000	93.43
OIC Total/Average	3178445	1409016.3		306328.36		62843.8		1039844.13	
Other Dev'ing Total/Avg.	7713049.26	2998198.29		875307.05		98728.1		2006860.87	
World Total/Average	13951206.8	5444287.25		1514161.48		180867.19		3720726.8	
OIC (% of Dev'ing)	41.21	47.00		35.00		63.65		51.81	
OIC (% of World)	22.78	25.88		20.23		34.75		27.95	

Source: FAOSTAT Online Database

Table A.3: Water Resources (2008-2014)

	Average Precipitation in Depth (mm/yr)	IRWR (km3/yr)	ERWR (km3/yr)	TRWR (km3/yr)	TRWR per Capita (m3/yr)	Dependency Ratio %
Afghanistan	327	47.15	18.18	65.33	2088	28.72
Albania	1485	26.9	3.3	30.2	9482	10.93
Algeria	89	11.25	0.42	11.67	292.3	3.599
Azerbaijan	447	8.115	26.56	34.68	3645	76.6
Bahrain	83	0.004	0.112	0.116	86.31	96.55
Bangladesh	2666	105	1122	1227	7741	91.44
Benin	1039	10.3	16.09	26.39	2490	60.97
Brunei	2722	8.5	0	8.5	20095	0
Burkina Faso	748	12.5	1	13.5	775	7.407
Cameroon	1604	273	10.15	283.1	12406	3.585
Chad	322	15	30.7	45.7	3459	67.18
Comoros	900	1.2	0	1.2	1596	0
Cote d'Ivoire	1348	76.84	7.3	84.14	4044	8.676
Djibouti	220	0.3	0	0.3	338.6	0
Egypt	51	1.8	56.5	58.3	699.1	96.91
Gabon	1831	164	2	166	97019	1.205
Gambia	836	3	5	8	4191	62.5
Guinea	1651	226	0	226	18765	0
Guinea-Bissau	1577	16	15.4	31.4	17984	49.04
Guyana	2387	241	30	271	337065	11.07
Indonesia	2702	2019	0	2019	7986	0
Iran	228	128.5	8.545	137	1746	6.773
Iraq	216	35.2	54.66	89.86	2584	60.83
Jordan	111	0.682	0.255	0.937	124.9	27.21
Kazakhstan	250	64.35	44.06	108.4	6527	40.64
Kuwait	121	0	0.02	0.02	5.749	100
Kyrgyzstan	533	48.93	-25.31	23.62	4199	1.128
Lebanon	661	4.8	-0.297	4.503	906.8	0.7854
Libya	56	0.7	0	0.7	111.9	0
Malaysia	2875	580	0	580	19213	0
Maldives	1972	0.03	0	0.03	85.23	0
Mali	282	60	60	120	7610	50
Mauritania	92	0.4	11	11.4	2861	96.49
Morocco	346	29	0	29	865.9	0
Mozambique	1032	100.3	116.8	217.1	8201	53.8
Niger	151	3.5	30.55	34.05	1837	89.72
Nigeria	1150	221	65.2	286.2	1603	22.78
Oman	125	1.4	0	1.4	356.6	0
Pakistan	494	55	191.8	246.8	1333	77.71
Palestine	402	0.812	0.025	0.837	188.7	2.987
Qatar	74	0.056	0.002	0.058	25.57	3.448
Saudi Arabia	59	2.4	0	2.4	81.72	0
Senegal	686	25.8	13.17	38.97	2679	33.8
Sierra Leone	2526	160	0	160	25786	0
Somalia	282	6	8.7	14.7	1360	59.18
Sudan	250	4	33.8	37.8	975.1	96.13
Suriname	2331	99	0	99	181985	0
Syria	252	7.132	9.67	16.8	764.1	72.36
Tajikistan	691	63.46	-41.55	21.91	2606	17.34
Togo	1168	11.5	3.2	14.7	2102	21.77
Tunisia	207	4.195	0.42	4.615	415.1	9.101
Turkey	593	227	-15.4	211.6	2790	1.518
Turkmenistan	161	1.405	23.36	24.77	4667	97
Uganda	1180	39	21.1	60.1	1547	35.11
UAE	78	0.15	0	0.15	15.88	0
Uzbekistan	206	16.34	32.53	48.87	1666	80.07
Yemen	167	2.1	0	2.1	84.1	0
OIC Total/Average	47043	5271	1958	7229	4652	32
Other Dev'ing Total/Avg.	130474	31846	7843	39689	9373	18
World Total/Average	208187	42788	10199	52987	7601	23
OIC (% of Dev'ing)	36.06	16.55	24.97	18.22	..	..
OIC (% of World)	22.60	12.32	19.20	13.64	..	..

Source: AQUASTAT Online Database

Table A.4: Water Withdrawals (2008-2014)

	Total Water Withdrawal			Agricultural Water Withdrawal		
	km3/yr	% of IRWR	% of TRWR	km3/yr	% of Total Withd.	% of TRWR
Afghanistan	20.37	43.21	31.18	20.00	98.17	30.61
Albania	1.31	4.87	4.34	0.52	39.49	1.71
Algeria	6.03	53.63	51.70	3.50	58.04	30.01
Azerbaijan	12.98	159.96	37.43	10.10	77.81	29.12
Bahrain	0.36	8935.00	308.10	0.16	44.54	137.24
Bangladesh	35.87	34.16	2.92	31.50	87.82	2.57
Benin	0.13	1.26	0.49	0.06	45.38	0.22
Brunei	..	..	..	..	..	..
Burkina Faso	0.82	6.54	6.06	0.42	51.43	3.12
Cameroon	1.09	0.40	0.38	0.74	67.71	0.26
Chad	0.88	5.86	1.92	0.67	76.42	1.47
Comoros	0.01	0.83	0.83	0.00	47.00	0.39
Cote d'Ivoire	1.55	2.02	1.84	0.60	38.43	0.71
Djibouti	0.02	6.33	6.33	0.00	15.79	1.00
Egypt	68.30	3794.44	117.15	59.00	86.38	101.20
Gabon	0.14	0.08	0.08	0.04	28.97	0.02
Gambia	0.10	3.39	1.27	0.04	38.58	0.49
Guinea	0.57	0.25	0.25	0.29	51.04	0.13
Guinea-Bissau	0.19	1.19	0.61	0.14	75.79	0.46
Guyana	1.44	0.60	0.53	1.36	94.34	0.50
Indonesia	131.40	6.51	6.51	92.76	70.59	4.59
Iran	93.30	72.61	68.10	86.00	92.18	62.77
Iraq	66.00	187.50	73.45	52.00	78.79	57.87
Jordan	0.94	137.96	100.42	0.61	64.96	65.23
Kazakhstan	21.14	32.85	19.50	14.00	66.22	12.92
Kuwait	0.96	..	4817.50	0.49	51.05	2459.50
Kyrgyzstan	7.66	15.66	32.43	7.10	92.69	30.06
Lebanon	1.31	27.29	29.09	0.78	59.54	17.32
Libya	4.33	618.00	618.00	3.58	82.85	512.00
Malaysia	11.20	1.93	1.93	2.51	22.38	0.43
Maldives	0.01	19.67	19.67		0.00	0.00
Mali	5.19	8.64	4.32	5.08	97.86	4.23
Mauritania	1.35	337.55	11.84	1.22	90.58	10.73
Morocco	10.43	35.97	35.97	9.16	87.78	31.57
Mozambique	0.98	0.98	0.45	0.69	70.42	0.32
Niger	0.73	20.91	2.15	0.66	89.70	1.93
Nigeria	13.11	5.93	4.58	7.05	53.75	2.46
Oman	1.32	94.36	94.36	1.17	88.42	83.43
Pakistan	183.45	333.55	74.33	172.40	93.98	69.85
Palestine	0.42	51.48	49.94	0.19	45.22	22.58
Qatar	0.44	792.86	765.52	0.26	59.01	451.72
Saudi Arabia	23.67	986.25	986.25	20.83	88.00	867.92
Senegal	2.22	8.61	5.70	2.07	92.98	5.30
Sierra Leone	0.21	0.13	0.13	0.05	21.54	0.03
Somalia	3.30	54.97	22.44	3.28	99.48	22.32
Sudan	26.94	673.38	71.26	25.91	96.19	68.54
Suriname	0.62	0.62	0.62	0.43	70.00	0.44
Syria	16.76	235.00	99.76	14.67	87.53	87.32
Tajikistan	11.49	18.11	52.46	10.44	90.82	47.65
Togo	0.22	1.94	1.52	0.08	34.08	0.52
Tunisia	3.31	78.78	71.61	2.64	80.00	57.29
Turkey	44.50	19.60	21.03	34.00	76.40	16.07
Turkmenistan	27.95	1989.61	112.85	26.36	94.30	106.42
Uganda	0.64	1.63	1.06	0.26	40.66	0.43
UAE	4.00	2665.33	2665.33	3.31	82.84	2208.00
Uzbekistan	56.00	342.72	114.59	50.40	90.00	103.13
Yemen	3.57	169.76	169.76	3.24	90.74	154.05
OIC Total/Average	933.22	17.70	12.91	784.81	84.10	10.86
Other Dev'ing Total/Avg.	2124.22	6.67	5.35	1606.33	75.62	4.05
World Total/Average	3925.51	9.17	7.41	2729.45	69.53	5.15
OIC (% of Dev'ing)	43.93	..	..	48.86	..	..
OIC (% of World)	23.77	..	..	28.75	..	..

Source: AQUASTAT Online Database

Table A.5: Irrigation (2008-2014)

	Total Area Equipped for Irrigation			Irrigation Techniques (% of Total Irrigated Area)		
	1,000 Ha	% of Agri. Area	% of Arable Area	Surface	Sprinkler	Localized
Afghanistan	3208	8.5	41.2		3.6	
Albania	397	33	64.9	100	0	
Algeria	513.4	1.2	6.8		7.8	
Azerbaijan	1426	30	76.1	91.3	10.4	0.2
Bahrain	4	51.5	308.8	84.4	4	11.6
Bangladesh	5050	55.2	66.7	100	0	0
Benin	11	0.3	0.4	46	41.7	12.4
Brunei	1	8.8	33.3	100	0	0
Burkina Faso	18.6	0.2	0.3	79	21	0
Cameroon	22.5	0.2	0.4	75.8	24.2	
Chad	30.3	0.1	0.7	87.6	12.4	0
Comoros	0.1	0.1	0.2			
Cote d'Ivoire	47.8	0.2	1.7	24.6	75.4	
Djibouti	1	0.1	50.6			
Egypt	3422	92.8	118.7	88.5	5	6.5
Gabon	3.2	0.1	1			
Gambia	2.1	0.3	0.5	100	0	0
Guinea	20.4	0.1	0.7	97.7	1.5	0.8
Guinea-Bissau	8.6	0.5	2.9	100		
Guyana	150.1	9	35.7	100	0	0
Indonesia	6722	12.5	28.5	100	0	0
Iran	8132	16.8	47.3	91.4	3.4	5.2
Iraq	3525	40.3	78.3			0.2
Jordan	78.9	7.7	39.3	17.6	1.3	81.2
Kazakhstan	1200	0.6	5.1	96.6	2.5	0.9
Kuwait	8.6	5.7	76.1	35.1	7	13.4
Kyrgyzstan	1077	10.1	84.4	96.6	3.4	0
Lebanon	90	13.1	62.1	63.6	27.9	8.6
Libya	470	3	26.9			
Malaysia	340.7	4.3	18.9	100	0	0
Maldives	0	0	0			
Mali	97.5	0.2	1.5	100	0.1	0
Mauritania	45	0.1	11.5			
Morocco	1459	4.9	18.1	82.9	10.4	6.7
Mozambique	118.1	0.2	2.3			
Niger	13.7	0	0.1			
Nigeria	238.2	0.3	0.7	100	0	
Oman	58.9	3.2	59.4	79.3	11.3	9.4
Pakistan	19270	73.3	94.3	100		
Palestine	20.1	5.5	20.1			
Qatar	12.9	19.9	107.8	75	14	10.9
Saudi Arabia	1731	1	54.1	31.6	59.4	1.8
Senegal	102.2	1.1	2.7	100	0	0.4
Sierra Leone	1	0	0.1	100	0	0
Somalia	50	0.1	5	100		
Sudan	1731	1.3	8.6			
Suriname	51.2	62.9	88.2	98.3	1.7	0
Syria	1439	10.3	30.8	86.9	9	4
Tajikistan	742.1	15.6	100	100	0	0
Togo	2.3	0.1	0.1	100		
Tunisia	367	3.7	13.6	58.6	24.5	16.9
Turkey	4970	12.8	23.3	92	6	2
Turkmenistan	1744	5.3	94.3	100	0	0
Uganda	5.6	0	0.1	95.9	4.1	
UAE	226.6	39.8	354.1	12	1.8	86.3
Uzbekistan	4281	16.1	99.5	99.9	0	0.1
Yemen	454.3	1.9	38.8	99.9	0.1	0.1
OIC Total/Average	75212.7	5.3	25.7	82.1	3.5	1.7
Other Dev'ing Total/Avg.	177344.8	7.3	23.7	89.3	6.9	1.2
World Total/Average	296381.1	6.1	21.5	80.1	10.3	2.0
OIC (% of Dev'ing)	34.2					
OIC (% of World)	25.4					

Source: AQUASTAT Online Database

Table A.6: Value-Added by Major Sectors of Economic Activity (%)

	Agriculture			Industry (non-Man.)			Manufacturing			Services		
	2000	2005	2014	2000	2005	2014	2000	2005	2014	2000	2005	2014
Afghanistan	36.6	29.6	25.7	10.3	8.9	10.2	16.7	13.0	11.9	36.5	48.5	52.2
Albania	20.1	20.7	22.7	28.5	22.0	20.1	28.5	7.0	6.4	46.4	50.4	50.8
Algeria	8.0	8.6	10.7	55.1	47.2	39.9	55.1	4.3	4.1	32.3	40.0	45.4
Azerbaijan	9.8	5.9	5.7	56.2	58.9	52.8	56.2	5.1	5.1	27.0	30.1	36.4
Bahrain	0.3	0.3	0.3	29.9	30.8	32.5	29.9	14.6	14.9	56.9	54.2	52.3
Bangladesh	20.1	17.8	16.1	10.7	9.3	10.2	10.7	16.9	17.4	52.6	56.0	56.3
Benin	27.1	25.4	23.0	9.1	9.3	8.6	9.1	15.4	14.1	42.5	49.9	54.3
Brunei Darussalam	0.9	0.7	0.8	57.2	52.7	50.9	57.2	14.6	15.9	27.0	31.9	32.4
Burkina Faso	38.9	35.6	35.4	6.3	15.1	16.9	6.3	7.9	7.3	43.1	41.4	40.3
Cameroon	20.4	23.3	22.0	13.2	13.6	15.7	13.2	16.1	14.2	47.8	47.0	48.1
Chad	26.1	35.9	24.4	29.8	29.4	28.6	29.8	7.3	11.5	39.0	27.4	35.5
Comoros	41.0	38.5	33.6	7.7	6.4	3.7	7.7	5.1	6.9	47.2	50.0	55.8
Côte d'Ivoire	25.2	27.0	25.4	7.8	9.7	8.9	7.8	15.0	15.0	49.3	48.3	50.6
Djibouti	3.6	3.6	3.2	13.6	15.6	20.4	13.6	3.4	2.4	80.2	77.4	74.0
Egypt	14.4	14.0	14.5	19.6	20.6	23.5	19.6	16.9	16.4	48.8	48.5	45.6
Gabon	5.2	4.6	3.9	57.9	50.5	44.1	57.9	5.1	6.9	32.2	39.8	45.2
Gambia	28.6	30.7	19.7	7.9	8.1	9.7	7.9	5.0	5.5	56.5	56.3	65.1
Guinea	24.3	22.1	18.0	28.4	37.5	32.8	28.4	7.3	8.6	40.9	33.2	40.6
Guinea-Bissau	45.4	46.4	46.0	1.6	1.7	2.1	1.6	11.7	12.2	39.9	40.3	39.7
Guyana	25.7	17.6	18.2	21.3	27.9	26.7	21.3	6.6	6.0	45.6	47.9	49.1
Indonesia	12.1	14.3	13.7	18.4	21.3	21.4	18.4	22.6	21.6	44.8	41.8	43.3
Iran	6.4	6.7	7.4	32.5	28.6	30.2	32.5	11.6	11.5	47.9	53.1	50.9
Iraq	6.9	5.1	4.1	62.0	53.2	56.1	62.0	2.3	2.9	29.9	39.4	36.9
Jordan	3.0	3.2	3.6	10.3	11.0	10.2	10.3	18.2	18.0	70.1	67.6	68.2
Kazakhstan	6.6	4.6	4.5	26.6	30.1	25.1	26.6	11.6	11.0	54.2	53.6	59.4
Kuwait	0.3	0.4	0.4	53.2	52.9	56.7	53.2	5.3	5.2	39.5	41.4	37.7
Kyrgyzstan	31.3	18.8	16.6	8.0	10.1	11.1	8.0	18.1	14.7	46.6	53.0	57.6
Lebanon	4.0	4.3	3.2	8.5	7.2	10.2	8.5	8.5	13.4	79.3	80.1	73.2
Libya	2.2	2.5	2.0	71.0	68.4	56.0	71.0	5.6	3.5	22.2	23.5	38.4
Malaysia	8.4	10.5	9.2	19.0	16.8	16.8	19.0	24.8	24.2	44.7	48.0	49.8
Maldives	7.5	4.1	3.5	8.5	10.7	13.2	8.5	4.2	4.9	77.7	81.0	78.4
Mali	37.5	40.5	39.5	14.2	14.7	14.0	14.2	5.4	8.3	38.5	39.4	38.2
Mauritania	29.8	21.3	20.6	23.4	33.4	37.3	23.4	7.5	7.1	37.9	37.8	35.0
Morocco	13.1	14.4	13.0	10.3	11.2	11.1	10.3	17.4	18.2	58.0	56.9	57.7
Mozambique	25.4	28.9	24.6	5.7	7.5	11.0	5.7	11.1	9.6	53.8	52.5	54.7
Niger	45.5	43.8	39.2	5.8	11.6	14.5	5.8	5.1	6.3	42.7	39.4	39.9
Nigeria	25.6	23.9	20.2	17.5	18.8	15.2	17.5	6.6	9.8	50.7	50.8	54.8
Oman	1.6	1.4	1.2	53.7	52.4	51.5	53.7	10.4	9.3	36.3	35.9	37.9
Pakistan	24.3	24.3	25.1	7.7	6.9	7.2	7.7	13.6	14.1	54.6	55.1	53.6
Palestine	5.8	6.4	5.5	11.8	8.0	8.7	11.8	15.3	14.7	68.3	70.2	71.1
Qatar	0.1	0.1	0.1	64.1	58.0	55.3	64.1	8.8	9.8	26.0	33.1	34.8
Saudi Arabia	3.2	2.4	1.9	52.3	47.4	46.7	52.3	11.0	10.8	35.0	39.2	40.6
Senegal	16.8	17.5	15.3	8.6	9.6	10.2	8.6	13.8	14.1	59.6	59.2	60.4
Sierra Leone	51.0	55.2	52.3	9.0	5.8	13.2	9.0	2.3	2.0	37.4	36.7	32.4
Somalia	60.1	60.2	60.2	4.9	4.9	4.9	4.9	2.5	2.5	32.6	32.5	32.5
Sudan		42.9	32.2		3.8	12.3		9.9	9.6		43.4	45.9
Suriname	11.3	10.2	9.9	13.9	15.3	14.8	13.9	22.6	17.8	51.3	51.9	57.5
Syria	20.3	19.7	20.6	28.7	25.8	25.5	28.7	4.8	4.7	48.5	49.6	49.2
Tajikistan	23.8	21.8	27.2	5.1	11.4	11.6	5.1	16.4	13.9	45.6	50.3	47.3
Togo	43.3	46.1	46.7	9.6	9.4	13.0	9.6	8.7	6.4	37.6	35.7	33.9
Tunisia	10.0	8.1	9.3	11.7	13.4	13.0	11.7	17.7	16.0	61.3	60.8	61.6
Turkey	10.6	9.5	8.0	8.6	9.0	9.3	8.6	17.4	17.8	61.4	64.2	64.9
Turkmenistan	18.8	14.5	14.5	8.3	10.4	10.4	8.3	38.0	38.0	43.6	37.0	37.0
Uganda	29.1	26.2	27.0	9.8	10.2	11.9	9.8	10.2	10.0	51.0	53.4	51.1
UAE	1.4	0.8	0.6	43.6	43.8	43.6	43.6	8.6	8.5	44.8	46.8	47.2
Uzbekistan	29.5	19.8	19.3	9.3	11.4	11.0	9.3	22.0	21.9	41.4	46.8	47.8
Yemen	9.6	12.1	14.7	38.0	30.1	29.1	38.0	8.5	8.2	46.6	49.2	48.0
OIC Average	12.0	10.6	10.2	15.7	14.5	13.7	24.0	27.6	27.0	48.3	47.3	49.1
Other Dev'ing Average	10.6	9.5	8.9	14.4	22.3	20.8	21.7	16.0	16.1	53.3	52.1	54.2
World Average	3.5	3.4	4.5	17.2	16.9	16.4	11.8	11.8	13.0	67.5	67.8	66.1

Source: UN National Accounts Main Aggregates Database

Table A.7: Agricultural Production Index*

	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
Afghanistan	84.9	106.0	97.8	108.9	101.0	117.2	116.1	110.9	122.9	120.4
Albania	87.9	98.1	102.3	102.6	107.3	112.0	119.0	124.7	131.7	127.3
Algeria	69.4	99.1	102.9	93.3	95.1	119.2	125.0	134.7	143.8	158.4
Azerbaijan	74.2	104.0	104.1	105.5	111.1	120.5	118.1	125.3	132.0	136.9
Bahrain	122.8	91.8	118.5	114.2	111.4	126.4	115.4	165.5	169.4	206.8
Bangladesh	89.6	102.7	106.1	112.1	120.4	121.4	129.3	132.8	133.8	136.3
Benin	88.9	102.0	92.6	96.5	111.3	112.0	115.0	126.1	131.7	144.9
Brunei Darussalam	85.1	75.5	123.0	128.5	132.0	131.9	139.1	148.1	153.3	166.6
Burkina Faso	65.8	103.3	105.9	85.9	114.1	101.6	116.0	104.8	122.2	123.2
Cameroon	79.0	102.8	109.5	114.5	119.0	127.9	139.2	143.0	149.9	154.5
Chad	78.4	104.0	101.1	95.9	101.3	102.8	104.3	96.9	120.0	115.2
Comoros	95.5	95.8	102.1	102.2	99.6	107.8	113.6	109.6	112.3	113.5
Côte d'Ivoire	99.3	99.9	104.2	100.1	106.4	100.6	107.5	110.6	120.3	123.5
Djibouti	84.9	95.3	111.3	137.3	141.5	126.5	118.6	132.3	134.5	134.4
Egypt	85.5	98.5	105.8	110.7	115.1	116.4	109.3	113.5	118.7	118.4
Gabon	99.0	100.2	101.3	103.2	106.8	110.9	117.0	118.4	121.2	122.3
Gambia	98.2	94.1	98.4	73.1	102.9	120.9	133.5	88.3	107.6	98.2
Guinea	84.0	100.7	101.6	105.3	110.1	110.4	113.4	116.5	122.3	122.8
Guinea-Bissau	87.3	99.2	103.6	104.2	118.7	121.7	121.7	128.0	137.4	140.4
Guyana	95.8	94.2	97.8	98.6	98.0	106.0	107.7	113.4	113.0	128.9
Indonesia	78.2	98.1	106.4	109.2	113.8	119.7	122.9	127.1	135.4	136.9
Iran	78.0	102.9	102.5	106.9	98.9	106.9	107.9	108.6	112.3	113.4
Iraq	96.3	104.1	103.6	100.8	90.0	90.9	104.4	113.0	113.5	128.6
Jordan	80.9	97.5	103.0	103.8	107.9	115.5	129.3	134.2	132.2	136.6
Kazakhstan	78.4	100.1	106.4	115.5	107.7	122.9	106.8	142.5	110.5	127.1
Kuwait	80.1	96.9	103.3	107.0	100.2	133.5	134.4	161.6	167.5	171.2
Kyrgyzstan	96.2	97.8	100.0	101.2	102.5	106.6	104.8	107.1	106.7	111.6
Lebanon	99.1	97.3	98.6	100.0	103.9	94.2	94.7	92.4	94.7	97.3
Libya	94.6	100.7	100.4	106.2	104.8	107.6	109.7	110.5	111.5	110.6
Malaysia	78.1	99.7	105.0	104.4	111.6	109.7	110.7	119.7	119.3	121.4
Maldives	89.4	88.5	98.1	84.0	82.4	77.7	71.5	70.2	66.0	63.6
Mali	70.8	102.5	102.3	111.5	124.1	137.3	142.4	136.3	146.3	141.3
Mauritania	89.4	100.4	102.7	103.5	101.5	102.0	112.5	111.5	120.3	120.3
Morocco	72.1	93.0	109.6	93.2	103.1	122.0	126.4	130.6	124.1	134.4
Mozambique	80.9	95.7	104.0	109.6	110.0	118.6	147.9	157.5	151.5	156.6
Niger	71.7	101.8	110.0	116.4	138.7	113.9	145.1	127.8	138.1	132.4
Nigeria	80.0	99.9	104.6	97.2	103.6	90.7	103.9	96.3	106.3	109.9
Oman	91.8	111.9	95.7	99.7	100.5	98.2	122.1	114.6	127.0	124.4
Pakistan	87.8	100.4	102.1	106.0	110.1	112.8	110.5	116.1	115.5	94.8
Palestine	88.1	107.2	95.3	97.3	98.7	98.9	80.6	91.4	95.9	93.0
Qatar	110.7	94.8	103.1	113.6	106.7	114.8	120.0	132.0	132.7	134.1
Saudi Arabia	81.2	100.4	101.8	103.3	104.1	101.2	108.0	108.4	109.7	107.5
Senegal	107.3	109.6	95.1	86.3	127.2	138.8	150.7	108.3	128.2	125.9
Sierra Leone	44.8	93.5	113.7	99.6	106.4	130.5	148.7	155.5	161.0	169.3
Somalia	89.6	100.4	102.6	98.8	95.3	99.4	104.3	107.5	110.6	117.1
Sudan	78.6	101.4	102.1	101.3	101.0	103.7	98.9	107.0	102.2	113.5
Suriname	95.0	98.7	106.0	113.2	115.6	130.7	137.3	134.6	135.5	145.8
Syria	79.6	99.6	105.1	92.3	88.1	94.3	88.8	98.5	89.1	78.7
Tajikistan	64.0	99.1	101.8	105.2	109.7	117.8	123.3	129.8	144.6	154.0
Togo	89.7	96.4	100.2	103.5	111.6	120.6	123.0	136.3	132.6	120.7
Tunisia	84.1	101.0	105.5	104.6	109.3	105.4	106.5	106.7	118.8	118.0
Turkey	94.9	101.2	103.2	99.0	102.8	105.5	109.9	115.6	121.9	125.3
Turkmenistan	68.5	103.7	100.8	112.6	109.7	102.4	101.5	96.3	100.3	102.6
Uganda	87.7	100.0	99.2	102.8	106.5	108.4	111.6	113.6	110.9	111.8
UAE	168.1	105.4	92.7	92.9	102.4	101.4	111.4	69.1	70.1	72.6
Uzbekistan	77.0	99.9	107.0	109.2	116.4	119.8	127.5	135.6	143.1	151.9
Yemen	82.8	97.6	106.4	116.7	121.7	126.6	136.3	133.4	140.6	137.7
OIC Average	84.0	100.3	104.3	104.8	108.7	111.5	114.9	118.6	122.5	123.9
Other Dev'ing Average	85.7	99.8	103.4	108.7	113.5	114.1	118.9	124.7	126.9	131.4
Developed Average	99.2	100.1	98.2	100.1	102.2	103.0	102.3	102.7	101.8	105.4
World Average	89.7	100.0	102.2	105.8	109.8	110.8	114.0	118.4	120.1	124.0

Source: FAOSTAT Online Database – Production Statistics

* Relative level of the aggregate volume of agricultural production for each year in comparison with the base period 2004-2006

Table A.8: Per Capita Agricultural Production Index*

	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
Afghanistan	102.3	105.9	94.7	102.6	92.7	105.0	101.5	94.6	102.3	97.8
Albania	85.0	98.1	102.8	103.6	108.7	113.6	120.7	126.4	133.2	128.2
Algeria	74.3	99.2	101.3	90.3	90.5	111.3	114.6	121.2	127.0	137.3
Azerbaijan	78.3	104.1	102.9	103.1	107.2	114.9	111.2	116.7	121.5	124.6
Bahrain	163.1	92.6	110.5	98.2	88.6	94.0	81.8	113.6	114.0	137.8
Bangladesh	96.9	102.8	104.9	109.6	116.5	116.2	122.5	124.4	123.8	124.6
Benin	104.4	101.8	89.6	90.5	101.3	98.9	98.7	105.3	107.0	114.6
Brunei Darussalam	94.4	75.6	120.8	124.2	125.3	123.3	127.8	134.1	137.1	146.8
Burkina Faso	76.2	103.4	103.0	81.1	104.6	90.4	100.3	88.1	99.8	97.7
Cameroon	90.2	103.0	106.9	108.9	110.3	115.6	122.6	122.8	125.5	126.1
Chad	94.6	104.0	97.7	89.8	91.9	90.5	89.1	80.3	96.5	89.9
Comoros	108.7	95.7	99.4	96.9	92.2	97.3	99.9	94.1	93.9	92.8
Côte d'Ivoire	107.1	100.0	102.7	97.0	101.4	94.1	98.6	99.3	105.6	105.8
Djibouti	91.3	95.4	109.8	133.6	135.9	119.7	110.5	121.5	121.6	119.7
Egypt	92.8	98.6	104.1	107.1	109.5	108.9	100.5	102.7	105.6	103.6
Gabon	111.4	100.2	98.9	98.4	99.3	100.7	103.7	102.5	102.4	100.9
Gambia	114.6	93.9	95.3	68.6	93.5	106.6	114.0	73.0	86.2	76.2
Guinea	92.1	100.8	99.3	100.5	102.3	99.9	99.9	100.0	102.3	100.2
Guinea-Bissau	97.5	99.3	101.4	99.8	111.3	111.6	109.0	112.1	117.5	117.2
Guyana	97.9	94.2	97.3	97.4	96.1	103.3	104.2	109.0	108.2	122.6
Indonesia	84.1	98.2	105.0	106.2	109.1	113.2	114.7	117.1	123.2	123.0
Iran	83.1	102.9	101.4	104.4	95.5	102.0	101.7	101.1	103.1	102.7
Iraq	110.8	104.2	101.1	96.0	83.7	82.5	92.3	97.2	94.8	104.3
Jordan	89.1	97.8	99.6	96.4	95.9	98.1	105.2	104.7	99.1	98.6
Kazakhstan	81.1	100.2	105.3	113.1	104.3	117.6	101.1	133.4	102.3	116.5
Kuwait	96.7	97.1	98.3	96.4	85.3	107.8	103.4	119.0	118.6	116.9
Kyrgyzstan	98.0	97.9	99.3	99.5	99.6	102.2	99.2	100.1	98.3	101.6
Lebanon	121.6	96.8	95.9	95.9	98.5	88.0	86.6	81.9	80.9	80.1
Libya	102.2	100.8	98.8	102.8	99.8	101.0	101.6	101.3	101.4	99.8
Malaysia	86.2	99.7	103.1	100.6	105.7	102.1	101.2	107.6	105.5	105.6
Maldives	97.5	88.4	96.4	81.2	78.1	72.3	65.3	62.9	58.1	54.9
Mali	82.5	102.6	99.2	104.7	112.9	121.0	121.7	112.9	117.7	110.3
Mauritania	103.9	100.4	99.8	97.8	93.3	91.2	98.1	94.7	99.7	97.3
Morocco	75.7	93.1	108.7	91.6	100.3	117.6	120.4	122.8	115.0	122.7
Mozambique	93.0	95.7	101.2	103.8	101.5	106.6	129.7	134.6	126.3	127.3
Niger	86.3	102.0	106.2	108.4	124.3	98.3	120.6	102.3	106.4	98.1
Nigeria	91.0	100.0	102.0	92.2	95.7	81.5	90.9	81.9	88.0	88.4
Oman	105.2	111.5	94.2	97.6	97.4	92.7	109.5	95.3	96.4	86.1
Pakistan	96.4	100.4	100.3	102.2	104.2	104.8	100.8	104.2	101.9	82.2
Palestine	97.9	107.3	93.3	93.0	92.1	90.0	71.5	79.1	80.9	76.6
Qatar	153.7	95.2	87.8	81.3	64.7	60.5	56.6	57.0	53.4	51.0
Saudi Arabia	99.3	100.2	98.8	98.2	97.3	93.0	97.5	96.2	95.5	91.8
Senegal	122.6	109.5	92.5	81.7	117.1	124.2	131.1	91.5	105.2	100.4
Sierra Leone	55.4	93.4	110.2	94.1	98.4	118.4	132.3	135.7	137.8	142.2
Somalia	102.7	100.4	100.0	93.9	88.3	89.7	91.7	91.9	91.9	94.5
Suriname	101.6	98.6	104.8	110.8	112.1	125.5	130.6	126.9	126.5	135.1
Syria	88.6	99.9	101.9	86.0	78.9	81.7	75.1	82.3	74.2	65.5
Tajikistan	70.4	99.1	99.6	100.7	102.6	107.7	110.0	113.1	122.9	127.7
Togo	102.1	96.4	97.5	98.2	103.2	108.7	108.0	116.6	110.5	98.0
Tunisia	88.6	101.1	104.5	102.4	105.8	100.8	100.8	99.7	109.8	107.9
Turkey	101.8	101.2	101.8	96.5	99.0	100.3	103.2	107.2	111.6	113.3
Turkmenistan	72.2	103.7	99.7	110.1	106.0	97.6	95.6	89.6	92.1	93.0
Uganda	103.7	100.0	95.9	96.1	96.2	94.7	94.2	92.8	87.6	85.4
UAE	230.7	105.5	78.9	66.5	62.5	54.5	54.8	32.1	31.6	32.3
Uzbekistan	80.8	100.0	105.9	106.7	112.3	114.0	119.7	125.5	130.7	136.8
Yemen	95.2	97.7	103.8	111.0	113.0	114.7	120.7	115.3	118.7	113.7
OIC Average	92.3	100.3	102.5	101.3	103.2	104.2	105.5	107.3	109.0	108.4
Other Dev'ing Average	89.9	99.8	102.5	106.8	110.6	110.1	113.6	118.2	119.2	122.4
Developed Average	103.0	100.1	97.5	98.6	99.9	100.0	98.5	98.3	96.8	99.6
World	94.3	100.0	101.2	103.7	106.6	106.5	108.5	111.6	112.1	114.7
	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013

Source: FAOSTAT Online Database – Production Statistics

* Relative level of the aggregate volume of agricultural production for each year in comparison with the base period 2004-2006

Table A.9: Agricultural Production by Major Product Groups (million tonnes)

	Cereals		Fruits		Vegetables		Meat	
	2000	2014	2000	2013	2000	2013	2000	2013
Afghanistan	1.94	6.76	0.70	1.00	0.71	0.92	0.32	0.32
Albania	0.57	0.70	0.14	0.39	0.62	0.88	0.07	0.10
Algeria	0.93	3.46	1.43	4.23	2.58	6.79	0.56	0.74
Azerbaijan	1.50	2.30	0.53	0.96	1.04	1.67	0.11	0.30
Bahrain			0.02	0.02	0.01	0.02	0.01	0.02
Bangladesh	39.50	55.07	1.36	3.70	1.80	4.19	0.45	0.64
Benin	0.99	1.71	0.16	0.54	0.35	0.55	0.05	0.08
Brunei Darussalam	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.03
Burkina Faso	2.29	4.47	0.09	0.10	0.36	0.28	0.16	0.20
Cameroon	1.27	3.05	1.99	5.64	1.27	2.56	0.21	0.33
Chad	0.93	2.65	0.10	0.12	0.11	0.11	0.11	0.15
Comoros	0.02	0.04	0.06	0.07	0.01	0.01	0.00	0.00
Côte d'Ivoire	1.29	2.86	2.35	2.30	0.84	0.70	0.20	0.27
Djibouti	0.00	0.00	0.00	0.00	0.02	0.04	0.01	0.01
Egypt	20.11	22.05	6.97	10.90	15.15	19.59	1.32	2.07
Gabon	0.03	0.05	0.29	0.31	0.04	0.05	0.03	0.04
Gambia	0.18	0.17	0.01	0.01	0.01	0.01	0.01	0.01
Guinea	1.80	3.38	1.00	1.26	0.52	0.52	0.05	0.09
Guinea-Bissau	0.18	0.22	0.08	0.10	0.03	0.04	0.02	0.03
Guyana	0.45	0.98	0.08	0.04	0.07	0.06	0.01	0.03
Indonesia	61.58	89.85	8.41	16.00	6.99	10.24	1.70	3.32
Iran	12.87	17.06	12.29	11.81	11.66	23.65	1.55	2.51
Iraq	0.90	6.08	1.74	1.28	3.47	3.83	0.15	0.20
Jordan	0.06	0.09	0.24	0.32	0.89	1.77	0.14	0.24
Kazakhstan	11.54	17.10	0.26	0.29	1.97	4.95	0.62	0.87
Kuwait	0.00	0.05	0.01	0.04	0.17	0.33	0.07	0.08
Kyrgyzstan	1.55	1.36	0.19	0.24	0.81	1.08	0.20	0.20
Lebanon	0.12	0.18	0.85	0.82	0.89	0.99	0.17	0.14
Libya	0.22	0.30	0.31	0.42	0.89	0.99	0.14	0.18
Malaysia	2.21	2.73	1.18	0.94	0.55	1.24	0.89	1.62
Maldives	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Mali	2.31	6.98	0.25	0.44	0.63	0.86	0.19	0.39
Mauritania	0.18	0.30	0.02	0.02	0.01	0.00	0.08	0.11
Morocco	2.00	6.94	2.68	3.63	3.17	5.63	0.61	1.12
Mozambique	1.59	1.72	0.29	0.78	0.12	0.50	0.19	0.21
Niger	2.13	4.78	0.07	0.52	0.79	1.16	0.23	0.30
Nigeria	21.37	25.83	9.28	10.90	8.66	11.92	1.05	1.46
Oman	0.01	0.05	0.34	0.35	0.23	0.30	0.03	0.07
Pakistan	30.46	38.11	5.19	6.12	4.86	5.06	1.70	3.04
Palestine	0.07	0.03	0.24	0.09	0.57	0.74	0.09	0.09
Qatar	0.01	0.00	0.02	0.02	0.06	0.03	0.01	0.02
Saudi Arabia	2.17	0.88	1.19	1.72	1.55	2.30	0.64	0.80
Senegal	1.03	1.25	0.13	0.25	0.41	0.85	0.12	0.20
Sierra Leone	0.22	1.27	0.17	0.26	0.18	0.35	0.02	0.04
Somalia	0.39	0.25	0.19	0.22	0.08	0.11	0.17	0.20
Suriname	0.16	0.28	0.07	0.14	0.03	0.02	0.01	0.01
Syria	3.51	2.70	1.88	2.20	1.78	1.80	0.35	0.36
Tajikistan	0.54	1.25	0.28	0.50	0.44	1.99	0.03	0.09
Togo	0.74	1.32	0.06	0.06	0.13	0.14	0.04	0.07
Tunisia	1.11	2.35	1.01	1.31	2.07	3.34	0.25	0.33
Turkey	32.25	32.71	10.86	15.34	24.61	28.28	1.40	3.00
Turkmenistan	1.75	1.43	0.24	0.42	0.59	1.01	0.15	0.32
Uganda	2.11	3.56	10.09	9.56	0.55	1.12	0.27	0.46
UAE	0.00	0.07	0.80	0.27	2.30	0.22	0.09	0.14
Uzbekistan	3.91	7.84	1.42	3.58	3.10	10.04	0.50	1.00
Yemen	0.67	0.70	0.66	1.00	0.59	0.76	0.17	0.38
OIC Total	275.72	387.30	90.31	123.59	111.33	166.60	17.76	29.05
Other Dev'ing Total	1057.02	1562.77	271.31	443.98	531.07	839.95	116.50	175.97
World Total	2045.64	2783.39	474.06	667.26	778.90	1129.83	228.32	307.58
OIC (% of Dev'ing)	0.21	0.20	0.25	0.22	0.17	0.17	0.13	0.14
OIC (% of World)	0.13	0.14	0.19	0.19	0.14	0.15	0.08	0.09

Source: FAOSTAT Online Database – Production Statistics

Table A.10: Exports of Major Agricultural Product Groups (US$ million)

	Cereals		Dairy		Fruit & Vegetables		Meat	
	2003	2013	2003	2013	2003	2013	2003	2013
Afghanistan	-	-	-	0.1	50.9	190.3	-	-
Albania	0.6	0.1	0.6	1.2	2.4	34.2	1.2	0.7
Algeria	0.0	0.3	7.1	4.9	19.6	57.1	0.0	0.0
Azerbaijan	0.8	0.0	0.4	1.2	61.0	273.9	-	10.4
Bahrain	0.3	0.6	4.2	265.5	12.8	79.8	0.5	1.6
Bangladesh	0.2	3.4	0.0	0.3	14.4	143.6	0.2	0.8
Benin	0.0	18.7	0.2	5.1	18.3	79.2	2.1	-
Brunei	-	0.0	0.0	1.0	0.0	7.0	0.2	0.2
Burkina Faso	1.9	9.6	0.1	0.1	11.6	69.5	0.0	-
Cameroon	0.4	0.5	1.2	0.1	75.1	229.0	0.1	0.0
Chad	-	0.0	-	-	0.0	0.0	-	-
Comoros	-	-	-	-	-	0.0	-	-
Côte d'Ivoire	0.7	47.7	20.7	2.2	189.0	545.1	0.1	1.1
Djibouti	5.0	0.1	0.5	0.2	1.2	1.7	-	0.0
Egypt	155.6	242.6	22.9	411.5	214.3	2,385.6	2.0	3.3
Gabon	0.0	0.1	0.1	-	0.1	0.1	0.2	-
Gambia	0.4	0.8	-	2.7	0.5	7.3	-	0.3
Guinea	0.6	1.5	-	0.0	1.2	25.2	-	0.0
Guinea-Bissau	-	-	-	-	46.0	176.2	-	-
Guyana	35.5	172.6	0.2	0.1	5.6	6.8	0.0	0.1
Indonesia	12.0	49.0	63.3	75.4	320.3	749.4	25.4	23.1
Iran	0.6	21.5	21.9	800.1	1,052.8	1,750.4	7.6	45.5
Iraq	29.6	0.0	0.2	0.2	2.1	55.5	-	-
Jordan	5.2	9.7	55.4	51.1	169.1	724.7	13.1	152.3
Kazakhstan	622.2	1,892.9	8.5	20.6	29.2	29.9	0.7	10.5
Kuwait	0.2	41.6	1.0	142.1	7.8	137.5	0.2	19.0
Kyrgyzstan	1.2	0.2	6.5	17.7	12.4	126.9	0.2	4.5
Lebanon	8.6	22.6	3.7	8.8	84.3	275.7	5.0	21.9
Libya	0.0	0.1	0.0	0.4	0.3	1.1	-	0.0
Malaysia	25.9	50.3	121.0	425.4	234.5	491.7	37.3	127.5
Maldives	-	-	-	-	-	-	-	-
Mali	3.7	0.8	0.0	0.0	1.5	16.4	0.0	0.0
Mauritania	-	-	-	-	0.1	0.1	-	-
Morocco	33.3	89.7	42.4	149.0	725.1	1,733.8	0.4	4.8
Mozambique	0.4	24.0	-	-	19.8	67.3	0.4	-
Niger	0.8	22.6	0.1	0.3	26.3	23.1	0.0	0.0
Nigeria	1.9	1.0	0.3	2.5	18.3	70.4	-	0.0
Oman	28.1	205.2	79.7	264.1	25.2	107.8	5.5	35.3
Pakistan	747.8	2,392.9	6.0	99.8	156.0	754.2	10.7	184.3
Palestine	1.5	6.1	2.2	1.6	30.8	18.7	0.7	17.1
Qatar	0.3	4.9	0.3	1.1	1.0	6.5	2.1	1.5
Saudi Arabia	4.2	16.1	259.3	1,107.6	323.5	664.6	56.4	194.4
Senegal	8.9	45.9	7.5	41.0	7.1	91.9	1.1	2.3
Sierra Leone	-	-	-	-	0.0	-	-	-
Somalia	0.0	0.0	0.0	0.2	0.0	0.9	0.0	0.1
Sudan	2.7	9.6	0.0	0.2	40.2	10.0	23.0	11.4
Suriname	6.0	34.7	-	0.5	23.4	53.9	-	0.8
Syria	159.0	1.5	10.6	22.8	161.8	293.7	0.2	2.1
Tajikistan	-	0.6	-	-	20.8	42.3	-	-
Togo	9.9	4.5	7.8	20.1	1.1	6.5	0.3	0.1
Tunisia	14.5	6.8	7.5	54.4	103.5	406.7	0.9	2.3
Turkey	170.8	1,137.8	39.9	649.5	2,549.2	6,882.2	20.1	663.9
Turkmenistan	-	-	-	-	0.9	1.1	-	-
Uganda	5.6	121.5	0.0	25.7	3.4	40.4	33.4	4.6
UAE	157.2	139.8	44.6	553.9	251.4	505.3	-	160.2
Uzbekistan	0.1	35.0	0.0	0.0	111.9	545.4	-	-
Yemen	2.4	28.7	4.9	29.7	30.9	80.0	-	-
OIC Total	2,266	6,916	853	5,262	7,271	21,078	251	1,708
Other Dev'ing Total	15,516	59,286	2,471	12,100	33,432	105,852	12,703	46,970
World Total	40,765	126,655	33,747	89,162	90,440	222,437	52,542	133,942
OIC (% of Dev'ing)	12.7%	10.4%	25.7%	30.3%	17.9%	16.6%	1.9%	3.5%
OIC (% of World)	5.6%	5.5%	2.5%	5.9%	8.0%	9.5%	0.5%	1.3%

Source: FAOSTAT Online Database

Table A.11: Imports of Major Agricultural Product Groups (US$ million)

	Cereals		Dairy		Fruit & Vegetables		Meat	
	2003	2013	2003	2013	2003	2013	2003	2013
Afghanistan	129.9	350.9	17.5	121.3	19.1	259.6	1.0	85.6
Albania	56.0	140.7	9.2	21.6	66.7	93.9	38.6	66.6
Algeria	1,124.8	3,271.0	520.5	1,260.4	263.8	1,063.4	88.7	254.5
Azerbaijan	117.7	453.0	20.3	72.8	19.0	55.8	10.3	23.0
Bahrain	28.5	109.0	77.0	212.8	118.4	272.8	47.4	294.8
Bangladesh	589.1	1,370.0	62.0	343.5	248.4	972.6	1.0	3.7
Benin	48.4	646.4	17.1	24.7	11.9	24.3	54.1	235.0
Brunei	14.7	33.4	20.9	47.1	47.1	82.5	7.7	40.7
Burkina Faso	42.3	179.9	6.4	24.6	8.5	15.1	0.6	0.7
Cameroon	125.0	559.4	24.8	73.5	10.2	42.5	22.0	9.8
Chad	11.7	49.1	6.4	5.8	0.7	6.0	0.7	1.2
Comoros	7.0	25.5	1.5	2.8	1.7	2.5	8.0	18.8
Côte d'Ivoire	221.4	705.6	47.6	82.3	46.8	99.1	26.0	31.0
Djibouti	24.6	309.6	19.1	27.9	10.1	44.8	1.5	15.7
Egypt	1,137.6	4,744.2	123.9	773.5	225.1	1,056.4	153.3	1,017.7
Gabon	16.4	116.6	11.8	46.1	9.6	46.8	28.6	172.9
Gambia	11.6	55.7	5.2	5.4	2.5	7.3	0.7	1.6
Guinea	70.9	260.4	8.3	46.6	9.8	42.2	2.6	24.0
Guinea-Bissau	28.2	36.7	1.5	14.3	0.7	6.5	1.1	2.2
Guyana	8.6	38.2	22.2	52.8	9.4	24.8	1.7	6.5
Indonesia	1,161.0	3,704.1	281.4	1,328.0	316.4	1,455.5	24.9	242.6
Iran	884.3	5,545.4	72.3	255.9	101.2	852.5	60.7	380.2
Iraq	520.3	2,307.2	116.7	766.2	218.4	753.5	11.1	977.0
Jordan	251.7	786.1	108.6	260.5	103.4	445.0	54.1	451.0
Kazakhstan	5.4	27.5	61.9	411.8	46.5	1,093.7	39.4	400.2
Kuwait	130.3	574.5	121.6	535.2	136.1	909.4	155.2	600.6
Kyrgyzstan	10.7	138.7	1.3	23.0	4.1	56.8	3.7	87.5
Lebanon	142.2	374.5	153.2	349.1	155.6	372.3	67.3	217.4
Libya	256.9	1,131.8	108.2	519.1	41.9	640.4	14.5	250.6
Malaysia	559.3	1,959.1	304.9	1,003.3	458.6	1,667.7	197.8	765.8
Maldives	8.5	31.8	14.0	47.1	26.9	97.4	9.4	54.7
Mali	59.3	149.5	15.1	41.0	6.8	36.1	0.3	8.4
Mauritania	53.5	176.8	25.6	75.6	20.9	31.0	6.0	16.8
Morocco	563.6	1,528.4	93.3	302.5	71.4	276.6	4.2	63.4
Mozambique	117.8	549.6	6.3	68.3	19.0	66.6	10.0	65.3
Niger	54.1	226.1	13.1	36.1	6.8	21.4	0.1	2.6
Nigeria	697.6	3,146.3	254.0	655.3	95.9	345.3	8.2	13.5
Oman	116.2	463.7	157.5	591.1	155.3	439.4	95.2	365.1
Pakistan	42.8	244.6	14.3	95.0	194.0	672.2	1.2	8.3
Palestine	118.4	104.0	35.9	41.5	87.7	133.4	17.3	15.0
Qatar	44.3	181.6	80.6	322.5	89.6	427.8	68.6	413.7
Saudi Arabia	1,472.6	6,151.3	724.1	1,900.8	827.8	2,629.5	690.0	2,861.5
Senegal	289.8	709.1	57.1	81.1	46.7	104.2	25.5	11.5
Sierra Leone	75.6	117.2	7.1	18.5	12.1	18.6	5.6	25.4
Somalia	39.6	333.3	0.1	57.5	5.1	617.9	0.0	4.5
Sudan	166.2	944.0	19.9	137.0	29.7	218.4	0.1	12.3
Suriname	9.9	8.2	6.7	19.8	7.4	26.8	11.6	45.4
Syria	200.8	1,119.4	53.7	98.3	89.1	322.7	2.3	35.6
Tajikistan	26.0	267.0	4.6	3.6	3.8	28.1	14.1	24.8
Togo	30.4	65.5	6.8	22.9	3.3	11.7	4.7	11.8
Tunisia	339.2	993.6	35.4	53.0	43.9	73.0	4.1	33.2
Turkey	695.4	2,000.3	50.0	159.7	129.6	839.3	0.2	28.3
Turkmenistan	3.0	135.2	4.9	14.4	7.6	15.3	4.6	16.2
Uganda	88.0	223.9	2.8	5.0	7.4	15.1	0.5	2.5
UAE	392.6	1,409.8	323.7	1,598.1	825.6	3,170.4	370.6	1,485.5
Uzbekistan	34.0	448.2	19.3	37.8	6.4	25.2	9.5	37.3
Yemen	379.7	1,606.3	102.3	319.4	73.3	290.9	101.0	256.9
OIC Countries	13,855	53,339	4,482	15,515	5,605	23,420	2,589	12,598
Other Dev'ing Total	15,338	46,961	5,871	30,023	14,103	60,979	9,697	42,748
World Total	45,539	138,795	33,981	87,753	98,242	232,142	52,978	129,483
OIC (% of Dev'ing)	47.5%	53.2%	43.3%	34.1%	28.4%	27.7%	21.1%	22.8%
OIC (% of World)	30.4%	38.4%	13.2%	17.7%	5.7%	10.1%	4.9%	9.7%

Source: FAOSTAT Online Database

Table A.12: Food Production Index*

	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
Afghanistan	83.9	106.0	97.9	109.2	100.9	117.2	116.1	110.7	122.9	120.3
Albania	87.1	98.1	102.3	102.7	107.6	112.2	119.2	124.9	132.1	127.5
Algeria	69.2	99.0	103.0	93.2	95.0	119.2	125.1	134.9	144.1	158.8
Azerbaijan	73.5	103.0	105.0	107.4	114.4	124.7	121.9	129.4	136.7	142.1
Bahrain	122.8	91.8	118.5	114.2	111.4	126.4	115.4	165.5	169.4	206.8
Bangladesh	89.5	102.8	106.1	112.4	120.8	121.7	129.6	132.0	133.0	135.7
Benin	84.7	101.6	95.3	99.6	116.0	118.4	122.4	130.7	137.8	150.3
Brunei	85.1	75.2	123.3	128.8	132.3	132.3	139.6	148.6	153.8	167.2
Burkina Faso	69.6	102.9	103.5	90.3	114.6	106.1	122.6	112.5	128.8	124.1
Cameroon	76.6	102.2	109.8	116.1	121.7	132.1	142.9	148.4	155.0	159.4
Chad	77.7	103.5	103.6	98.3	104.0	106.5	110.1	101.2	124.2	119.5
Comoros	95.5	95.7	102.1	102.1	99.6	107.8	113.7	109.6	112.3	113.5
Côte d'Ivoire	94.3	98.1	104.2	101.3	108.2	102.2	109.5	114.4	121.9	124.4
Djibouti	84.9	95.3	111.3	137.3	141.5	126.5	118.6	132.3	134.5	134.4
Egypt	85.3	98.8	106.1	111.0	116.3	117.7	110.1	114.2	119.9	119.6
Gabon	99.7	100.3	100.3	101.8	103.2	109.5	114.5	115.5	118.5	119.7
Gambia	98.3	94.0	98.4	73.0	102.9	120.9	133.6	88.2	107.6	98.2
Guinea	82.2	100.8	101.5	105.1	109.9	110.2	113.2	116.3	122.2	123.4
Guinea-Bissau	87.3	99.2	103.7	103.9	118.8	122.0	122.0	128.4	137.9	140.9
Guyana	95.9	94.2	97.8	98.6	98.0	106.1	107.7	113.4	113.1	129.0
Indonesia	78.5	98.1	106.2	108.8	113.8	121.0	123.9	127.5	136.2	137.6
Iran	77.4	102.9	102.8	107.2	98.5	106.8	108.0	108.9	112.5	113.5
Iraq	96.2	104.2	103.7	100.8	90.1	90.8	104.1	113.1	113.6	129.0
Jordan	80.6	97.5	103.0	103.8	107.9	115.5	129.5	134.4	132.4	136.8
Kazakhstan	78.8	99.9	106.6	116.9	108.7	124.6	107.9	143.9	110.6	126.1
Kuwait	80.1	96.9	103.3	107.0	100.1	133.7	134.6	161.9	167.9	171.6
Kyrgyzstan	94.8	97.7	100.0	102.0	103.2	108.9	106.6	108.2	108.5	114.3
Lebanon	99.0	97.3	98.7	100.0	103.7	94.1	94.5	92.1	94.6	97.1
Libya	94.4	100.7	100.5	106.4	104.9	107.8	109.9	110.7	111.7	110.8
Malaysia	78.0	100.3	104.8	105.1	114.5	114.7	114.8	124.4	124.8	128.1
Maldives	89.4	88.5	98.1	84.0	82.4	77.7	71.5	70.2	66.0	63.6
Mali	72.7	102.7	106.1	119.7	134.3	148.8	153.9	144.6	154.4	149.8
Mauritania	89.4	100.4	102.7	103.5	101.5	102.0	112.5	111.5	120.3	120.3
Morocco	71.9	92.8	109.8	93.1	103.0	122.2	126.7	130.9	124.3	134.7
Mozambique	86.5	95.1	103.6	108.4	109.1	117.8	153.4	162.5	155.5	161.4
Niger	71.4	101.8	110.0	116.5	138.8	113.8	145.3	127.8	138.2	132.4
Nigeria	80.1	99.9	104.6	97.3	103.8	90.9	103.8	96.6	106.8	110.5
Oman	91.8	111.9	95.7	99.8	100.6	98.2	122.2	114.8	127.3	124.6
Pakistan	88.3	100.6	103.0	108.3	112.8	114.8	113.3	117.6	117.4	94.4
Palestine	88.2	107.2	95.4	97.3	98.8	99.0	80.6	91.5	96.0	93.1
Qatar	110.7	94.8	103.1	113.6	106.7	114.8	120.0	132.0	132.7	134.1
Saudi Arabia	81.2	100.4	101.8	103.4	104.2	101.4	108.1	108.6	109.8	107.6
Senegal	108.4	110.1	94.4	85.7	127.8	140.4	152.4	108.9	128.8	126.4
Sierra Leone	43.6	93.1	114.1	99.4	106.4	131.3	148.8	155.4	160.8	169.3
Somalia	89.6	100.4	102.6	98.8	95.3	99.4	104.3	107.5	110.6	117.1
Suriname	95.0	98.7	106.0	113.2	115.5	130.7	137.2	134.6	135.5	145.8
Syria	77.2	98.7	106.9	93.5	89.1	96.3	91.7	102.5	93.6	82.3
Tajikistan	64.0	99.3	104.3	108.7	117.4	131.0	137.1	143.8	157.4	170.0
Togo	84.7	99.1	104.9	107.7	118.0	127.6	129.2	140.5	137.0	124.5
Tunisia	84.0	101.0	105.6	104.6	109.4	105.5	106.6	106.7	118.9	118.1
Turkey	94.6	101.4	103.2	99.5	104.3	107.3	111.3	116.7	123.6	127.3
Turkmenistan	66.6	102.4	105.0	113.7	109.6	107.3	105.9	101.5	106.2	109.0
UAE	168.1	105.4	92.7	92.9	102.4	101.4	111.4	69.1	70.1	72.6
Uganda	87.5	99.9	99.9	102.7	105.5	108.2	111.6	112.9	110.5	111.3
Uzbekistan	75.6	98.8	109.0	112.6	119.5	125.7	135.2	145.4	155.0	166.3
Yemen	82.9	97.7	106.1	116.6	121.6	126.6	136.7	133.6	141.2	138.4
OIC Average	83.9	100.2	104.6	105.5	109.8	113.2	116.7	120.2	124.4	125.8
Other Dev'ing Av.	86.0	99.9	103.4	108.7	113.7	114.4	119.1	124.7	126.9	131.7
Dev'ed Avg.	99.2	100.0	98.4	100.5	103.1	103.9	102.9	103.5	102.4	106.4
World Average	89.9	100.0	102.2	106.0	110.2	111.4	114.5	118.6	120.5	124.5

Source: FAOSTAT Online Database – Production Statistics

* Relative level of the aggregate volume of food production for each year in comparison with the base period 2004-2006

Table 13: Per Capita Food Production Index*

	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
Afghanistan	101.1	105.9	94.8	102.9	92.7	105.0	101.5	94.5	102.3	97.7
Albania	84.3	98.1	102.9	103.8	108.9	113.9	121.0	126.6	133.6	128.5
Algeria	74.2	99.0	101.4	90.2	90.4	111.4	114.7	121.4	127.2	137.6
Azerbaijan	77.6	103.1	103.9	104.9	110.5	118.9	114.9	120.5	125.8	129.4
Bahrain	163.1	92.6	110.5	98.2	88.6	94.0	81.8	113.6	114.0	137.8
Bangladesh	96.8	102.8	104.8	109.8	116.9	116.5	122.8	123.6	123.1	124.0
Benin	99.6	101.5	92.3	93.4	105.6	104.7	105.1	109.2	112.0	119.0
Brunei	94.4	75.3	121.1	124.5	125.6	123.7	128.2	134.5	137.5	147.4
Burkina Faso	80.5	103.0	100.5	85.2	105.0	94.4	106.0	94.5	105.1	98.5
Cameroon	87.4	102.4	107.1	110.5	112.8	119.4	125.9	127.5	129.8	130.1
Chad	93.8	103.5	100.2	92.1	94.5	93.9	94.1	83.9	99.9	93.4
Comoros	108.7	95.7	99.4	96.9	92.2	97.3	100.0	94.0	93.9	92.8
Côte d'Ivoire	101.7	98.2	102.7	98.3	103.1	95.6	100.4	102.6	106.9	106.5
Djibouti	91.3	95.4	109.8	133.6	135.9	119.7	110.5	121.5	121.6	119.7
Egypt	92.6	98.8	104.4	107.4	110.7	110.1	101.3	103.3	106.7	104.7
Gabon	112.1	100.3	97.9	97.0	96.0	99.4	101.5	100.0	100.1	98.7
Gambia	114.7	93.9	95.3	68.5	93.6	106.6	114.0	72.9	86.2	76.2
Guinea	90.1	100.9	99.3	100.2	102.1	99.7	99.8	99.8	102.2	100.7
Guinea-Bissau	97.5	99.2	101.5	99.6	111.3	111.9	109.3	112.5	117.9	117.6
Guyana	98.1	94.2	97.3	97.4	96.1	103.3	104.3	109.1	108.2	122.7
Indonesia	84.4	98.2	104.7	105.8	109.1	114.4	115.6	117.5	123.9	123.7
Iran	82.4	102.9	101.6	104.7	95.1	101.9	101.8	101.3	103.3	102.9
Iraq	110.7	104.3	101.2	96.0	83.9	82.4	92.1	97.3	95.0	104.6
Jordan	88.8	97.7	99.6	96.4	95.9	98.1	105.3	104.9	99.2	98.8
Kazakhstan	81.4	100.0	105.5	114.4	105.2	119.3	102.1	134.7	102.5	115.6
Kuwait	96.6	97.1	98.3	96.4	85.3	107.9	103.5	119.2	118.9	117.2
Kyrgyzstan	96.5	97.8	99.3	100.2	100.2	104.4	100.8	101.1	100.0	103.9
Lebanon	121.5	96.9	96.0	95.9	98.4	87.9	86.4	81.7	80.8	79.9
Libya	102.1	100.7	98.9	102.9	99.9	101.1	101.8	101.5	101.6	100.0
Malaysia	86.1	100.3	102.9	101.3	108.4	106.7	105.0	111.8	110.3	111.4
Maldives	97.5	88.4	96.4	81.2	78.1	72.3	65.3	62.9	58.1	54.9
Mali	84.7	102.9	102.9	112.5	122.3	131.2	131.6	120.0	124.3	117.1
Mauritania	103.9	100.4	99.8	97.8	93.3	91.2	98.1	94.7	99.7	97.3
Morocco	75.5	92.9	108.9	91.5	100.3	117.8	120.6	123.1	115.2	123.0
Mozambique	99.5	95.1	100.9	102.7	100.7	105.9	134.4	138.9	129.6	131.2
Niger	85.8	102.0	106.2	108.4	124.4	98.2	120.8	102.3	106.4	98.1
Nigeria	91.0	100.0	102.0	92.3	95.9	81.7	90.8	82.2	88.3	88.9
Oman	105.2	111.6	94.1	97.6	97.5	92.7	109.6	95.4	96.6	86.3
Pakistan	97.1	100.6	101.2	104.4	106.7	106.7	103.4	105.5	103.6	81.9
Palestine	98.0	107.3	93.3	93.1	92.1	90.1	71.6	79.2	81.0	76.6
Qatar	153.7	95.2	87.8	81.3	64.7	60.5	56.6	57.0	53.4	51.0
Saudi Arabia	99.3	100.1	98.8	98.2	97.4	93.2	97.7	96.3	95.6	91.9
Senegal	123.8	110.1	91.9	81.1	117.7	125.7	132.6	92.1	105.7	100.8
Sierra Leone	54.0	93.1	110.5	93.9	98.4	119.1	132.4	135.6	137.6	142.2
Somalia	102.7	100.4	100.0	93.9	88.3	89.7	91.7	91.9	91.9	94.5
Sudan	91.0	101.0	99.3	95.9	93.6	93.2	87.1			
Suriname	101.6	98.6	104.8	110.8	112.1	125.5	130.6	126.9	126.5	135.1
Syria	86.0	99.1	103.6	87.1	79.8	83.5	77.6	85.7	77.9	68.5
Tajikistan	70.4	99.4	102.1	104.1	109.9	119.8	122.4	125.3	133.8	141.1
Togo	96.5	99.1	102.3	102.3	109.2	115.1	113.5	120.4	114.3	101.3
Tunisia	88.4	101.0	104.5	102.4	105.9	100.9	100.8	99.8	109.9	108.0
Turkey	101.5	101.4	101.9	97.0	100.4	102.1	104.5	108.2	113.2	115.1
Turkmenistan	70.3	102.5	103.8	111.2	105.8	102.4	99.8	94.4	97.6	98.8
Uganda	103.5	99.8	96.5	95.9	95.3	94.6	94.3	92.2	87.3	85.0
UAE	230.7	105.5	79.0	66.5	62.5	54.6	54.8	32.1	31.6	32.3
Uzbekistan	79.4	98.9	107.9	110.1	115.3	119.6	126.9	134.6	141.5	149.9
Yemen	95.3	97.8	103.4	110.9	112.9	114.8	121.0	115.5	119.3	114.2
OIC Average	92.1	100.3	102.7	101.7	103.8	105.2	106.4	108.4	110.3	109.7
Other Dev'ing Av.	90.1	99.9	102.5	106.7	110.7	110.5	113.9	118.3	119.3	122.8
Dev'ed Avg.	103.0	100.0	97.6	99.0	100.7	100.8	99.0	98.9	97.2	100.3
World Average	94.5	100.0	101.2	103.8	107.0	107.0	108.8	111.9	112.4	115.2

Source: FAOSTAT Online Database – Production Statistics

* Relative level of the per capita volume of food production for each year in comparison with the base period 2004-2006

Table 14: Export of Food (US$ current million)

	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Afghanistan					284	221	156	147	75	70	83
Albania	17	38	45	57	54	62	70	81	91	106	121
Algeria	36	70	88	98	127	116	320	359	320	405	326
Azerbaijan	55	325	320	505	531	525	592	714	829	872	831
Bahrain	56	59	57	65	284	289	306	438	489	843	629
Bangladesh	418	581	693	857	1057	576	776	938	970	1118	1168
Benin	38	70	88	104	127	210	270	98	131	159	142
Brunei			7			7	9	12	6	18	41
Burkina Faso	35			107	116	111	135	201	186	312	312
Cameroon	272	418	430	488	687	829	948	861	732	782	902
Comoros	6	3	2	1	4	9					
Côte d'Ivoire	1806	2770	2856	3185	3936	4851	5001	5307	4778	4425	6385
Egypt	375	932	896	1273	2786	4058	4356	4487	4038	4576	4492
Gabon	22	57	50	40	39	40	36	40	40	39	48
Gambia	13	6	9	11	8	35	36	31	32	24	20
Guinea	13	73	84	34	24	19	27	29	22		
Guinea-Bissau		23									
Guyana	226	287	289	338	376	340	356	434	508	514	568
Indonesia	5526	9872	11453	16681	24090	19998	25630	32865	33692	31939	35389
Iran	818	2108	2690	3695	4243	3592	4738	4318	5600	5223	5564
Iraq	114		52	42	30	13	8	8	14	8	8
Jordan	182	642	690	745	1050	1032	1111	1257	1373	1539	1641
Kazakhstan	600	669	1055	2033	2972	1625	1934	1826	3087	2642	2600
Kuwait	54	138	119	142	194	183	209	226	263	482	492
Kyrgyzstan		76	96	156	178	155	192	221	222	238	206
Lebanon	131	285	288	369	441	432	511	570	607	723	636
Libya				1	1	2	1	0	1	1	0
Malaysia	5440	9830	11175	16220	23142	17627	23609	31716	28451	25099	26008
Maldives	41	103	134	106	124	75	71	81	159	164	142
Mali	8	64	89	101	135	114	110	134	156	140	
Mauritania	71	138		175	188	237	278	434	616	464	676
Morocco	1596	2370	2414	2790	3542	3232	3347	3751	3692	4143	4402
Mozambique	156	245	365	268	390	498	485	739	572	672	711
Niger	101	146	160	166	369	188	89	150	185	105	121
Nigeria	38	34	33	876	1054	2264	2891	2256	7665	4574	4900
Oman	399	508	464	541	966	808	980	1102	1125	1414	1207
Pakistan	964	1933	2002	2116	3621	2888	3531	4901	4187	4995	4669
Qatar	9	33	21	23	2	49	4	5	71	9	8
Saudi Arabia	474	1256	1497	2119	687	1018	3086	3528	3610	3517	3315
Senegal	363	424	495	569	443	542	559	776	680	876	956
Sudan	508	299	299		300	452	405	562	713	1243	763
Suriname	21	67	42	46	69	63	49	98	102	78	70
Syria	408	864	1899	2401	3157	2651	2386	2102	841	373	373
Tajikistan	29										
Togo	38	77	74	44	101	81	73	83	122	164	152
Tunisia	510	1088	1384	1444	1716	1334	1269	1801	1588	1657	1596
Turkey	3521	7714	7932	9007	10704	10582	11878	14209	15033	16749	17759
Turkmenistan	7										
UAE	1128	2299	2479	2731	3615	3766	4701	5358	6209	7388	7609
Uganda	241	473	523	739	923	802	887	1163	1092	1335	1261
Uzbekistan									909	1479	
Yemen		247	277	332	390	370	459	521	448	441	425
OIC Total	26884	49715	56115	73842	99275	88971	10887	13093	13633	13413	13972
Other Dev'ing T.	10843	19318	21798	26688	33152	30395	35727	45521	47232	49659	50670
Dev'ed Total	29453	43850	47869	57203	68157	60287	65170	76556	76706	81312	83663
World Total	42985	68140	75279	91275	11123	99580	11178	13517	13757	14438	14830

Source: WTO Online Database

Table 15: Import of Food (Million USD)

	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Afghanistan					525	610	706	897	1248	1200	1064
Albania	238	455	540	690	863	777	826	897	845	865	891
Algeria	2578	3935	4121	5480	8457	6414	6683	10762	9998	10467	11784
Azerbaijan	218	441	551	903	1118	963	1223	1373	1408	1554	1536
Bahrain	449	635	513	595	944	806	934	621	649	934	1311
Bangladesh	1254	1755	2620	3946	5059	4431	4859	8036	6662	7229	8240
Benin	120	269	308	508	619	482	824	702	878	1186	1181
Brunei			285			417	419	508	501	543	555
Burkina Faso	77			249	313	294	310	399	523	526	452
Cameroon	269	493	556	692	984	1016	906	1273	1263	1218	1315
Comoros	16	29	29	23	67	69					
Côte d'Ivoire	427	858	1006	1163	1546	1613	1511	1689	1955	1820	1883
Egypt	3519	3979	3926	5521	8916	7726	10145	14794	15666	11674	14898
Gabon	174	278	287	382	450	429	523	643	637	680	519
Gambia	66	98	81	100	96	104	102	112	126	131	141
Guinea	148	261	273	217	243	140	186	279	304		
Guinea-		51									
Guyana	80	118	113	143	192	168	215	245	274	271	262
Indonesia	3336	4841	5455	7857	9383	8639	11470	16730	15828	16395	17028
Iran	2585	3051	3177	3884	6304	9188	8156	9654	12442	13140	12695
Iraq	203		4287	4415	6772	7592	9191	12997	13163	14278	13810
Jordan	851	1424	1523	2029	2809	2395	2476	2948	3598	3691	4042
Kazakhstan	459	1263	1644	2241	2938	2415	2281	3938	4165	4462	4228
Kuwait	1249	2195	2487	2757	3630	2909	2949	3780	3676	4435	4917
Kyrgyzstan		166	247	371	533	502	544	708	780	842	812
Lebanon	1107	1385	1410	1900	2246	2422	2799	3113	3229	3360	3224
Libya				1089	1493	1512	2151	974	2678	3286	2313
Malaysia	3526	5866	6841	8536	10966	9920	12786	16524	16518	15610	16537
Maldives	92	116	148	182	220	215	245	296	329	390	419
Mali	122	255	314	323	416	368	331	460	474	535	
Mauritania	66	137		364	462	389	335	355	452	438	439
Morocco	1585	2195	2168	3883	4993	3695	4057	5593	5581	4872	5619
Mozambique	162	360	395	542	570	581	700	778	800	1077	1096
Niger	126	252	240	226	301	253	346	304	534	563	533
Nigeria	1159	2864	4112	6490	5908	4010	4535	11556	8147	7952	8520
Oman	1122	1060	1167	1562	2494	1953	2394	2617	2913	3159	3612
Pakistan	1524	2606	3061	2889	5014	3583	4893	5203	4846	4467	5565
Qatar	382	662	857	1123	1688	945	1974	2539	2569	2586	3014
Saudi Arabia	5375	8716	9388	11827	12541	10785	16690	19770	21413	23756	23652
Senegal	362	984	858	1221	1693	1140	1072	1356	1554	1588	1481
Sudan	360	922	1053		1229	1283	3073	1716	992	1038	964
Suriname	74	100	98	117	152	198	212	235	294	320	296
Syria	726	1404	1519	1848	2538	3530	3695	3534	1536	1136	1410
Tajikistan	66										
Togo	59	92	83	115	135	142	155	204	251	281	338
Tunisia	706	1114	1231	1873	2515	1634	2077	2712	2219	2579	2444
Turkey	2128	3284	3486	5167	8502	6104	7411	10653	10420	10830	12047
Turkmenistan	210										
UAE	3026	5371	6263	7641	10629	10062	11198	13744	15572	17012	17024
Uganda	132	308	348	436	587	528	579	758	652	666	673
Uzbekistan									1265	1338	
Yemen		1522	1509	2125	2605	2556	2845	3163	3642	3799	3694
OIC Total	42509	68166	80578	105649	142656	127908	153992	202137	205464	210181	218478
Other Dev'ing	68610	127198	144192	185685	250991	219490	262700	323636	346602	362092	374627
Dev'ed Total	336873	509502	551113	645330	750255	670449	711649	839710	825964	862477	885422
World Total	447992	704867	775884	936664	1143903	1017846	1364948	1365483	1378030	1434750	1478527

Source: WTO Online Database

Table 16: Food Aid Shipment of Cereals (million metric tonnes/year)

	1990-92	2000-02	2005-07	2013-15
Afghanistan	0.08	0.34	0.15	0.02
Albania	0.53	0.04	0.00	
Algeria	0.01	0.03	0.01	0.00
Azerbaijan		0.01	0.04	
Bahrain				
Bangladesh	1.04	0.23	0.20	0.01
Benin	0.02	0.02	0.00	0.00
Brunei Darussalam				
Burkina Faso	0.03	0.02	0.03	0.00
Cameroon	0.00	0.00	0.00	0.01
Chad	0.00	0.01	0.05	0.01
Comoros	0.01		0.00	
Côte d'Ivoire	0.04	0.01	0.02	0.01
Djibouti	0.01	0.01	0.01	0.00
Egypt	0.53	0.01	0.00	
Gabon		0.00		
Gambia	0.01	0.00	0.01	0.00
Guinea	0.03	0.02	0.02	0.00
Guinea-Bissau	0.01	0.01	0.01	0.00
Guyana	0.06	0.05	0.00	
Indonesia	0.04	0.21	0.02	
Iran	0.05	0.01	0.00	0.00
Iraq	0.04	0.00	0.01	0.00
Jordan	0.26	0.22	0.00	0.00
Kazakhstan	0.00			
Kuwait				
Kyrgyzstan	0.06	0.05	0.06	0.00
Lebanon	0.02	0.05	0.00	0.00
Libya				
Malaysia	0.00			
Maldives	0.00	0.01	0.01	
Mali	0.03	0.00	0.03	0.00
Mauritania	0.03	0.04	0.04	0.01
Morocco	0.16	0.01		
Mozambique	0.96	0.19	0.06	0.00
Niger	0.02	0.02	0.06	0.02
Nigeria	0.00	0.01		
Oman				
Pakistan	0.33	0.14	0.07	0.03
Palestine	0.01	0.05	0.08	0.01
Qatar				
Saudi Arabia				
Senegal	0.10	0.00	0.01	0.00
Sierra Leone	0.04	0.06	0.02	0.00
Somalia	0.30	0.03	0.09	0.03
Sudan	0.43	0.13	0.27	0.01
Suriname				
Syria	0.01	0.01	0.00	0.13
Tajikistan	0.06	0.11	0.01	0.00
Togo	0.01		0.00	
Tunisia	0.06			
Turkey	0.00			
Turkmenistan	0.00	0.01		
Uganda	0.03	0.06	0.10	0.00
United Arab Emirates				
Uzbekistan		0.12		
Yemen	0.04	0.15	0.03	0.09
OIC Total	5.50	2.52	1.53	0.41
OIC-LIFDCs Total	3.39	1.66	1.30	0.36
All LIFDCs Total	7.07	4.48	3.38	0.52

Source: FAOSTAT Online Database – Emergency Response Statistics

Table 17: Total Number of Undernourished People (million people)

	1990-1992	1995-1997	2000-2002	2008-2010	2014-2016
Afghanistan	3.8	8.4	10	7.2	8.6
Albania					
Algeria	2.1	2.5	2.7	2	
Azerbaijan	1.8	2.1	1.4		
Bahrain					
Bangladesh	36	44.2	27.7	25.7	26.3
Benin	1.5	1.6	1.6	1.2	0.8
Brunei Darussalam					
Burkina Faso	2.4	2.2	3.3	3.5	3.7
Cameroon	4.7	5.4	5	3	2.3
Chad	3.6	3.7	3.5	4.7	4.7
Comoros					
Côte d'Ivoire	1.3	1.7	2.7	2.7	2.8
Djibouti	0.5	0.5	0.4	0.2	0.1
Egypt					
Gabon	0.1				
Gambia	0.1	0.2	0.2	0.2	0.1
Guinea	1.5	2	2.3	2	2
Guinea-Bissau	0.2	0.3	0.3	0.4	0.4
Guyana	0.2	0.1			
Indonesia	35.9	28.8	38.3	37.6	19.4
Iran	2.9		3.8	4.8	
Iraq	1.4	4.8	5.8	7.8	8.1
Jordan	0.2	0.4	0.3		
Kazakhstan					
Kuwait	0.8				
Kyrgyzstan	0.7	0.7	0.8	0.5	0.3
Lebanon					
Libya					
Malaysia	1				
Maldives					
Mali	1.4	1.7	1.3	0.7	
Mauritania	0.3	0.3	0.3	0.3	0.2
Morocco	1.5	2	1.9	1.7	
Mozambique	7.8	8.3	7.9	7.8	6.9
Niger	2.2	3.1	2.3	1.8	1.8
Nigeria	20.8	13.2	11.2	9.3	12.9
Oman	0.3	0.4	0.3	0.2	
Pakistan	28.7	28.3	34.4	37.2	41.4
Palestine					
Qatar					
Saudi Arabia					
Senegal	1.9	2.6	2.9	1.8	1.5
Sierra Leone	1.7	1.4	1.7	1.7	1.4
Somalia					
Sudan	10.6	9.1	9.6	10.7	
Suriname					
Syria					
Tajikistan	1.6	2	2.5	2.8	2.9
Togo	1.5	1.5	1.4	1.3	0.8
Tunisia					
Turkey					
Turkmenistan	0.4	0.4	0.4		
Uganda	4.2	6	7.1	8.3	10.3
United Arab Emirates					
Uzbekistan			3.6	2.4	
Yemen	3.6	4.7	5.3	6.1	6.7
OIC Total	191	195	204	198	166
Other Dev'ing Total	773	713	651	568	508
World Total	1011	930	942	821	795

Source: FAOSTAT Online Database – Food Security Statistics

Table 18: Prevalence of Undernourishment in Total Population

	1990-1992	2000-2002	2008-2010	2014-2016*
Afghanistan	30	47	26	27
Albania				
Algeria	8	8	6	
Azerbaijan	24	17		
Bahrain				
Bangladesh	33	21	17	16
Benin	28	22	13	8
Brunei Darussalam				
Burkina Faso	26	28	23	21
Cameroon	38	31	15	10
Chad	59	40	41	34
Comoros				
Côte d'Ivoire	11	16	15	13
Djibouti	75	49	24	16
Egypt				
Gabon	12			
Gambia	13	13	11	5
Guinea	23	26	19	16
Guinea-Bissau	23	27	24	21
Guyana	23	10	12	11
Indonesia	20	18	16	8
Iran	5	6	7	
Iraq	8	24	26	23
Jordan	6	6		
Kazakhstan				
Kuwait	39			
Kyrgyzstan	16	17	9	6
Lebanon				
Libya				
Malaysia	5			
Maldives	12	12	12	5
Mali	17	13	5	
Mauritania	15	11	8	6
Morocco	6	7	5	
Mozambique	56	42	33	25
Niger	28	21	12	10
Nigeria	21	9	6	7
Oman	18	12	7	5
Pakistan	25	23	22	22
Palestine				
Qatar				
Saudi Arabia				
Senegal	25	28	15	10
Sierra Leone	43	40	31	22
Somalia				
Sudan	40	27	24	
Suriname	16	14	10	8
Syria				
Tajikistan	28	40	38	33
Togo	38	29	21	11
Tunisia				
Turkey				
Turkmenistan	9	8		
Uganda	23	28	25	26
United Arab Emirates				
Uzbekistan		14	9	
Yemen	29	29	27	26
OIC Average	23.6	19.1	16.1	14.8
Other Dev'ing Average	25.7	19.4	16.5	14.0
World Average	18.6	14.9	11.8	10.9

Source: FAOSTAT Online Database – Food Security Statistics

Table 19: Massachusetts Institute of Technology The Abdul Latif Jameel Poverty Action Lab (MIT J-PAL) and Agricultural Technology Adoption Initiative (ATAI) Projects in OIC Member Countries

Title	Countries	Constraints	Research Question	Results
Temporary Labor Migration as Mitigation: Strategies for Managing Seasonal Famine	Bangladesh	Labor Market Contraints	Can monetary incentives induce rural farmers to migrate to cities and pursue seasonal labor opportunities during times of famine?	Offering an incentive to migrate had a large effect on likelihood of seasonal migration.
Farmer Decision-Making and Technology Experimentation in Indonesia	Indonesia	Information Inefficiencies	Does providing farmers with data on previously unnoticed factors affecting their crop yields can help them adopt optimal agricultural practices?	When experimenting with new farmings techniques, farmers do not initially comprehend the benefits. When results of the new techniques from their plot are reported, farmers are more likely to continue using the new technique.
Opportunities to Improve the Expansion and Impact of Agricultural Lending in Mali	Mali	Credit Market Inefficiencies	Will microfinance in the form of loans, grants, or savings products alleviate constraints to investment among small farmers in Mali?	(Ongoing work)
The Impact of the Alatona Irrigation Project in Mali	Mali	Land Market Contraints	How does a large-scale irrigation project improve yeilds and help farmers secure propery rights?	(Ongoing work)
Savings, Subsidies and Sustainable Food Security in Mozambique	Mozambique	Credit Market Inefficiencies	Can access to saving facilities in combination with subsidies for fertilizer increase long-run fertilizer adoption among farmers in Mozambique?	(Ongoing work)
Mobilizing Migrant Remittances for Agricultural Modernization in Mozambique	Mozambique	Credit Market Inefficiencies	Can remittances strictly identified for agricultural purposes increase uptake of agricultural technologies?	The financial product developed was not popular amongst laborers and failed to have sufficient take-up to test whether there would be any effect on agriculture input purchases.
Promoting Correct Fertilizer Use through Information and Commitment Savings using Mobile Banking in Mozambique	Mozambique	Input and Output Market Inefficiencies, Credit Market Inefficiencies, Information Inefficiencies	Does the provision of information and commitment savings for agricultural inputs through a mobile phone increase uptake of inputs?	(Ongoing work)
Coordinating Farmers with Cell phones: Technology Innovation in Livestock Extension Services in Pakistan	Pakistan	Information Inefficiencies	Does giving farmers a platform to acquire information and share experiences of vetinary care increase use of those services?	(Ongoing work)
Incentive Contracts for the Sale of High Value Crops by Smallholder Producers in Senegal	Senegal	Input and Output Market Inefficiencies	Do different types of contracts for onion traders improve quality and raise prices for farmers?	(Ongoing work)
Promoting Adoption of New Rice Varieties: Addressing the Costs of Early Adoption in Sierra Leone	Sierra Leone	Externalities, Risk Market Inefficiencies, Information Inefficiencies	Researchers investigate whether initial price and training subsidies effectively promote experimentation and adoption of new rice varieties among farmers in Sierra Leone.	(Ongoing work)
Contract Structure and Export Quality in Sierra Leone's Cocoa Market	Sierra Leone	Input and Output Market Inefficiencies	Do variations in contracts offered to cocoa traders increase the quality of cocoa they buy?	Traders who are offered bonuses purchase more high-quality cocoa, but the higher prices they receive are not passed down to farmers.
Women Farmers and Barriers to Technology Adoption: A Randomized Evaluation of BRAC's Extension Program in Rural Uganda	Uganda	Input and Output Market Inefficiencies, Credit Market Inefficiencies, Information Inefficiencies	Does combining extension service along with microfinance increase the use of agricultural advice?	(Ongoing work)
Selective Trials for Agricultural Technology Evaluation and Adoption: A Pilot	Uganda	Externalities, Credit Market Inefficiencies	How can social networks be used strategically to increase uptake of a simple watering technology?	(Ongoing work)

Source: MIT J-PAL